# The CFHTLS T0006 Release

Y. Goranova[1], P. Hudelot[1], F. Magnard[1], H. McCracken[1],
Y. Mellier[1], M. Monnerville[1], M. Schultheis[1,2], G. Sémah[1],
J.-C. Cuillandre[3] and Hervé Aussel[4]

[1] Terapix/Institut d'Astrophysique de Paris ;
[2] Observatoire de Besançon ;
[3] Canada-France-Hawaii Telescope ;
[4] AIM CEA CNRS, Saclay

October 26, 2009

# Contents

# 1 Executive Summary

This document describes the data contained in the $6^{th}$ release of the Canada-France-Hawaii Telescope Legacy Survey[1] (CFHTLS T0006). The release is composed of the CFHTLS Deep (four independent MegaCam pointings of 1deg$^2$ ) and the CFHTLS Wide surveys (171 MegaCam pointings which, due to the limited overlaps between adjacent fields, total $\sim$ 155 deg$^2$ in four contiguous independent patches; see Fig. 1).

T0006 is the first *complete* release. It comprises all planned CFHTLS Deep and Wide scientific observations. The parent sample of T0006 is composed of all CFHT validated images obtained during the whole period of the survey, that is between May 26, 2003 and February 02, 2009, that passed the ELIXIR[2] pre-processing step.

The Deep D1, D2, D3 and D4, and Wide W1, W2, W3 and W4 targeted observations are fully complete in all filters down to the planned nominal depth defined during the revised definition of the survey in 2005. The mean exposure times of the deepest part of the CFHTLS Deep survey are 75000 $s$ in $u^*$, 85000 $s$ in $g$, 145000 $s$ in $r$, 230000 $s$ in $i$, 75000 $s$ in $y$ and 175000 $s$ in $z$, and the median seeings of the final stacks (FWHM) range from 0.58" to 0.88". The W1 field covers 72 deg$^2$, W2 and W4 cover 25 deg$^2$ and W3 covers 49 deg$^2$. The mean exposure times of the Wide survey are 3000 $s$ in $u^*$, 2500 $s$ in $g$, 2000 $s$ in $r$, 4300 $s$ in $i$ and 3600 $s$ in $z$, and the median seeings of the stacks range between 0.60" and 0.89".

In total, the release comprises 2052 Wide and 112 Deep MegaCam-size images, divided into science, chi2 and weight images. The science stacks have been examined and an ID quality card has been produced for all, using the quality control tool described in Section 5.4.

All Wide data comprise observations in five filters, $u^*$, $g$, $r$, $z$ and either $i$ or $y$[3]. All stacks are delivered as Megacam-size FITS image covering a field of view of 1 deg$^2$, with a pixel scale of 0.1860", and located at each pre-defined center position listed in Tables 4 to 8.

There are 855 Wide stacks, in $u^*$, $g$, $r$, $i$ or $y$ and $z$ bands:

- 360 for W1, 125 for W2, 245 for W3, and 125 for W4.

Over the 171 fields of the Wide, 141 are covered in $i$-band and only 30 in $y$. For each stack a catalogue and a mask have been produced using a *gri*-chi2 image as reference. Stacks catalogues and masks are archived at CADC.

These basic data sets are complemented by a series of *merged catalogues* that combine information for each source in all filters into one file in addition to many different types of quality control data (tables, plots, figures). They are available at TERAPIX. The T0006 Wide release contains new catalogues with 26 different aperture magnitudes, instead of three as before, ranging from 10 to 60 pixels diameter.

All Deep data comprise observations in 6 filters, $u^*$, $g$, $r$, $i$, $y$ and $z$. The Deep survey contains two sets of stacks, those comprising the 85% best-seeing images (D-85) and those comprising the 25% best seeing images (D-25). As for the Wide, the final Deep stacks are all in the form of a Megacam-size FITS image covering a field of view of 1 deg$^2$, with a pixel scale of 0.1860", and located at the center positions listed in Table 25.

There are 48 Deep stacks corresponding to $u^*$, $g$, $r$, $i$, $y$ and $z$ bands :

[1] `http://www.cfht.hawaii.edu/Science/CFHTLS/`
[2] `http://www.cfht.hawaii.edu/Instruments/Elixir/`
[3] The new CFHT $i$-band filter, named $i2$ by CFHT

- 12 for D1,   12 for D2,   12 for D3,  and  12 for D4.

As for the Wide release, for each stack a catalogue and a mask have been produced using a *gri*-chi2 image as reference. The stacks, the catalogues and the masks are also archived at CADC. These basic data sets are also complemented by a series of *merged catalogues* identical to those provided for the Wide, in addition to many different types of quality control data (tables, plots, figures). They are available at TERAPIX. The Deep catalogues also contain 26 aperture magnitudes per filter.

The T0006 D2 stack contains additional $u^*$ MegaCam observations made by the COSMOS consortium. Because the COSMOS field fully overlaps the D2 CFHTLS field the CFHT Steering Group and the CFHT Scientific Advisory Committee (SAC) decided CFHTLS D2 $u^*$-band observations should be interrupted to avoid duplication with COSMOS observations. It was decided that the COSMOS $u^*$-band would be added to D2 CFHTLS data at a later date once the COSMOS data became public. T0006 now includes these data, after permission of the COSMOS PIs.

Due to the different observing strategies between CFHTLS-Deep and COSMOS Section 4.2 should be read carefully as the depth is not completely uniform over the central 1 $\deg^2$ of CFHTLS.

In this document the Wide and Deep surveys are described in two separate Sections. As it is presented before the Deep it also introduces most of the tools and methods used for the two surveys, so we often refer to that section when the Deep data are discussed.

A thorough inspection of the release shows that the internal astrometric errors of the stacks are between 1/15 and 1/3 of pixel, in $x$ and $y$. The external astrometric errors are between 0.20" and 0.27", and is limited by the reference catalogue accuracy. The astrometric offsets between the CFHTLS and the astrometric reference catalogue are negligible. They are smaller than $\pm 1/10$ of pixel, in both directions and for all fields.

The photometric errors have been estimated for all stacks using several independent methods, either based on the data only, or by comparison with external catologues or with simulations. We found that for all stacks the photometric errors, in the magnitude range AB=[19.0 - 23.0], are 3-5% in $u^*$, 2-3% in $g, r, i$ and $y$, and 3-5% in $z$. Part of the errors in $z$-band is due to the fringe subtraction residual. We examined the field-to-field photometric scatter inside each Wide field and propose a method to tune the photometry in Section 3.4.7. It relies on the very good accuracy and stability of the CFHTLS $g$-band photometry and on the stellar color-color tracks.

For a quick and concise overview of survey, the interested reader should see Tables 3, 26 and 27. These tables provide all basic data on the survey coverage, seeing, exposure times, depth and completeness, astrometric and photometric errors.

The explanatory document is complemented by practical information at the TERAPIX T0006 release page `http://terapix.iap.fr/rubrique.php?id_rubrique=259`. In particular, the access to CADC (restricted) and TERAPIX data sets, or to all public figures and plots are possible from the T0006 synoptic table: `http://terapix.iap.fr/cplt/table_syn_T0006.html`. If further information are needed please contact the TERAPIX team (`terapix@iap.fr`).

For users who prefer to produce their own stacks, TERAPIX provides all T0006 configuration files as well as the list of images for each Wide stack in the Appendix (Section 8). The lists of images selected in each Deep stack are too long and are not in the Appendix, but can be provided by TERAPIX, upon request (`terapix@iap.fr`). We have also transferred to CADC the complete set of weight-map images we generated from each single Deep and Wide CFHT T0006 pre-processed image. (In total, 6403 for the Wide and 8876 for the Deep).

For one year after the release date, the T0006 stacks and catalogues are only available to CFHTLS registered users. Any users from Canadian or French institutes can apply for registration upon request to the CFHT Director (veillet@cfht.hawaii.edu). The T0006 release date is October XX, 2009. The unique access point for T0006 CFHTLS data products is at CADC: http://www.cadc-ccda.hia-iha.nrc-cnrc.gc.ca/cfht/T0006.html. T0006 will be released worldwide on October XX, 2010.

T0006 is indeed the first complete Terapix release of the entire CFHTLS data set, which collection would not have been possible without the tenacious efforts from the CFHT's Queued Service Observing team over 6 years. The CFHT, in collaboration with the CEA, has also provided excellent support to the MegaPrime/MegaCam instrument, ensuring the steady collection of data of uniform quality over the years. CFHT's support extended to the data pre-processing and calibration (Elixir) and distribution (DADS). CADC provided archival support and distribution to CFHTLS users, while the overall survey integrity was ensured by the CFHTLS Steering Group and reviewing entity it reported to (CFHT's Science Advisory Committee). It is important these efforts be acknowledged in all works using the CFHTLS data. Following recommendations of the CFHT Director and the CFHT Board the following acknowledgement should be part of any publication using CFHTLS data:

"*Based on observations obtained with MegaPrime/MegaCam, a joint project of CFHT and CEA/DAPNIA, at the Canada-France-Hawaii Telescope (CFHT) which is operated by the National Research Council (NRC) of Canada, the Institut National des Sciences de l'Univers of the Centre National de la Recherche Scientifique (CNRS) of France, and the University of Hawaii. This work is based in part on data products produced at TERAPIX and the Canadian Astronomy Data Centre as part of the Canada-France-Hawaii Telescope Legacy Survey, a collaborative project of NRC and CNRS.*"

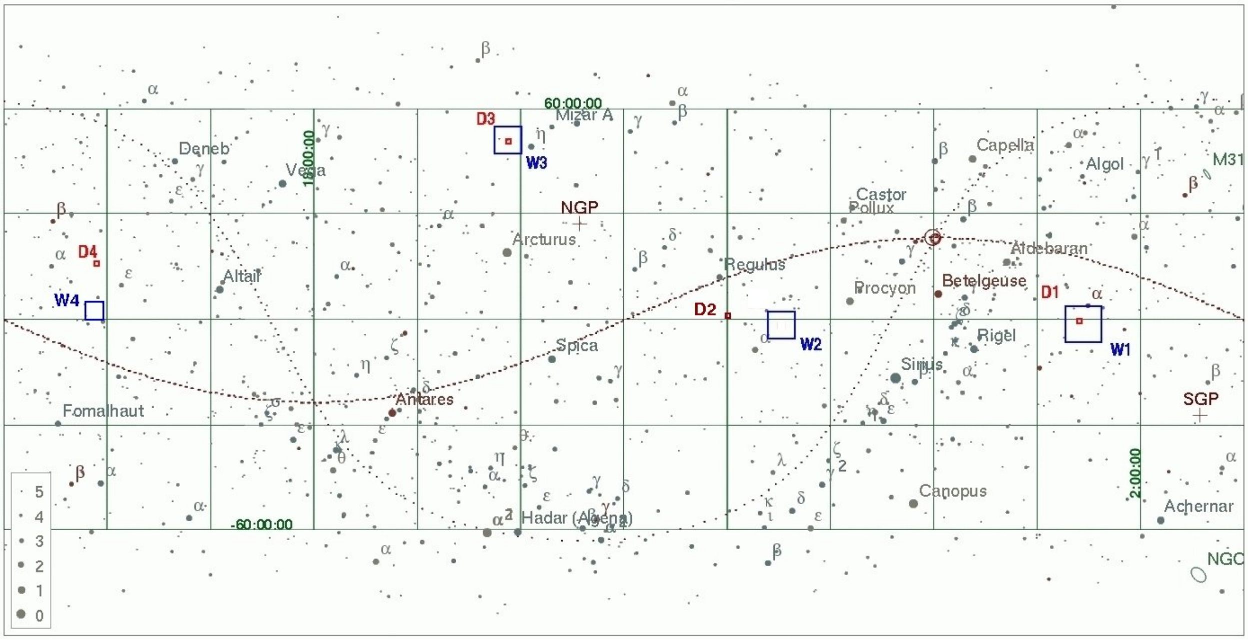



Figure 1: Locations of the 4 Deep and 4 Wide CFHTLS fields in the sky.

## 2 New or notable features in T0006

The CFHTLS T0006 has some notable and additional features:

- Both the CFHTLS Wide and Deep T0006 data now contain the *complete* sample of T0006 input images.

- As in T0005 (and reported in the T0005 document), T0006 uses data taken with two different $i$ filters. During the June 2007, the MegaCam $i$ filter (i.MP9701, hereafter the $i$ filter) broke and a replacement filter (i.MP9702, hereafter the $y$ filter) was installed in October 2007. However, its transmission is different from i.MP9701 (see Fig. 2), and for this reason i.MP9702 images are not mixed with i.MP9701 data. This has no impact on Wide survey depths because data are usually obtained in one single observing period. For most Wide data observations are either carried out in $i$ or in $y$.

  However for Deep fields each stack consists of data taken over the past five years with both filters. After discussion with the CFHTLS Steering Group, the Data Operation Group and CADC, it was decided to separate stacks taken with these two filters and to name them differently, with filters referenced as $i$, for the old $i$ filter (i.MP9701), and $y$[4] for the new one (i.MP9702).

  Since T0005 (November 2008), the Deep $i$-band data are then split into two separate stacks, so the Deep survey data comprise six filters, not five. For example, T0006 contains the Deep D1 image file `CFHTLS_D-85_i_022559-042940_T0006.fits` as well as the Deep D1 image file `CFHTLS_D-85_y_022559-042940_T0006.fits`. This division compromises slightly the depth of the $i$ stacks;

- In contrast with T0005 and with the Deep survey, there are no Wide field stacks with containing both $i$ and $y$-band data. T0006 contains only five filters for all Wide fields. For

[4] There is a slight risk of confusion with the standard near infrared $Y$ filter, but it should not be a serious issue.

each tile, T0006 comprises either $i$ (i.MP9701) or $y$ (i.MP9702) data. $i$ and $y$ data have been processed separately.

- The four CFHTLS-Wide patches are now complete in all five filters. For comparison, the total field of view of T0005-Wide is 115 deg$^2$ (128 tiles), while T0006 covers 155 deg$^2$ (171 tiles);
- Several T0005 $r$-band stacks with missing data due to detector failures have been supplemented by new images that fill the gaps produced by missing CCDs or 1/2 CCDs;
- All the $r$-band Wide fields of T0006 have been visited twice, with observation sequences separated by at least 2 years in order to track stellar proper motions;
- Several fields of the Wide survey have been revisited over the last periods 08A and 08B in order to get better data on fields with images that did not meet the specifications[5].

  These observations are included in T0006, and images that were out of specifications or marginally acceptable in T0005 have been either replaced or mixed with better new data;
- T0006 comprises only the "official" pointings of CFHTLS Wide fields. The W2 pointings that were initially part of the early 49 deg$^2$ W2 field before survey descoping are no longer released. The additional unfinished fields put in T0005 but which are no longer part of W2 have been discarded to avoid confusion.
- As in T0005 all CFHTLS Wide weight-maps images have been re-processed. This is however not the case for the Deep images. For Deep fields new weight-maps were only produced for images not part of T0005 and for a small subset of CFHT-Elixir[6] to improve the flat field or fringe subtraction quality.
- As in T0005 saturated sources are carefully handled at the onset of the catalogue production and throughout processing. The flux saturation limit has been set to a lower value than the CCD saturation coefficient provided by CFHT. This provides a better rejection of very bright sources from the calibration catalogue and improves the star-galaxy separation and make the astrometric calibration more reliable.
- As for T0004 and T0005, two Deep stacks are produced, one including the 25% best seeing images and the other one the 85% best seeing images. Since $i$ and $y$ filters are not mixed, each Deep survey field comprises 12 stacks ($u^*$, $g$, $r$, $i$, $y$ and $z$ for D-85 and D-25).

  In order to avoid confusion with the Wide survey, we denote $i/y$ a Wide sample comprising $i$ *or* $y$ band data (exclusve), and $i$,$y$ a Deep sample that includes both $i$ and $y$ data;
- The Deep D2 comprises supplementary $u^*$-band COSMOS images that are now in the CFHT public archive at CADC;
- Contrarily to all previous releases, T0006 comprises 5 sets of ASCII masks (DS9 compliant `.reg` files) per field, one for each filter. Missing CCDs that generally concern one or two filters per stack are then better taken into account;
- In addition to the ASCII masks, BINARY masks (FITS images) derived from the ASCII masks have been produced;

[5] The series of revisited images were defined by H. Aussel, J.-C. Cuillandre and Y. Mellier. For the 07B, 08A and 08B observing runs, the inspection and the decision about re-visits were done on a monthly basis, immediately after the observations, in order to define a new schedule the month after.

[6] Magnier & Cuillandre 2004 ; `http://www.cfht.hawaii.edu/Instruments/Elixir/`

- In contrast with previous releases, the T0006 merged catalogues also contain the `SExtractor` extraction flags of all filters. They are written after the e(b-v) correction column (the last column of merged catalogues in previous releases).

- T0006 includes supplementary object magnitudes in the source catalogues. It contains the aperture magnitudes and their errors inside 26 different diameters, instead of three previously. The aperture sizes range from 10 to 60 pixels diameter.

- For CFHTLS users who only wish to use aperture magnitudes only, TERAPIX has produced a merged aperture catalogue. This catalogue combines 26 aperture magnitudes for each object in each filter into one single file. Note that these merged aperture catalogues have more than 500 columns and are very large.

- For the Wide data TERAPIX produced stellar locus regression (SLR) tracks and of color correction terms for each stack. They are derived by comparing the location of colour-colour tracks on CFHTLS stacks with the reference SDSS colour-colour track models;

- Based on these colour-colour corrections, we describe a correction scheme for W1, W3 and W4 fields and can offer corrected catalogues, on request. The corrected catalogues leads to a magnitude residual between CFHTLS and SDSS of less than 3% in all bands;

- As for T0003 and T0004 releases, a detailed T0006 synoptic table has been produced, (`http://terapix.iap.fr/cplt/table_syn_T0006.html`). This Table provides a single access point a complete overview of the data of the release content and of the properties of the Deep and Wide CFHTLS surveys;

- Finally, following CFHTLS users requests, CADC and TERAPIX now archive the most recent set of weight-maps for CFHTLS input images at CADC and provide them to users. All individual weight-map images of the Deep and Wide surveys produced at TERAPIX have been transferred. This corresponds to about 15000 weight-maps, one corresponding to each input image used in T0006.

A significant fraction of T0006 has been processed with `Youpi`[7] the latest pipeline and processing interface at TERAPIX.

In this document, the naming of MegaCam CCDs follows the CEA-CFHT naming convention . The camera is composed of 36 CCDs numbered from CCD#00 to CCD#35 (Boulade et al 2000, SPIE 4008, 657). CCD#00 is at top-left (extreme North-East position) and numbers increase from left to right and top to bottom. When 1/2 missing CCDs are reported it means that one of the MegaCam output amplifiers did not work. In that case a 1/2-size CCD rectangle, as drawn in Fig. 3 has no data. These failures are indeed very rare, less than 0.3% of the data[8], and demand special handling in the pipeline, but they have almost no impact on the science.

In the document a *MegaCam pointing*, or a *tile*, denotes a $1 \times 1$ deg$^2$ field corresponding to a target position of the Wide survey listed in Tables 4 to 8 .

[7] Monnerville & Sémah 2009 Youpi at ADASS 2009 ; `http://youpi.terapix.fr/`
[8] See the MegaCam failure history page at `http://www.cfht.hawaii.edu/Instruments/Imaging/MegaPrime/megaprimehistory.htm`

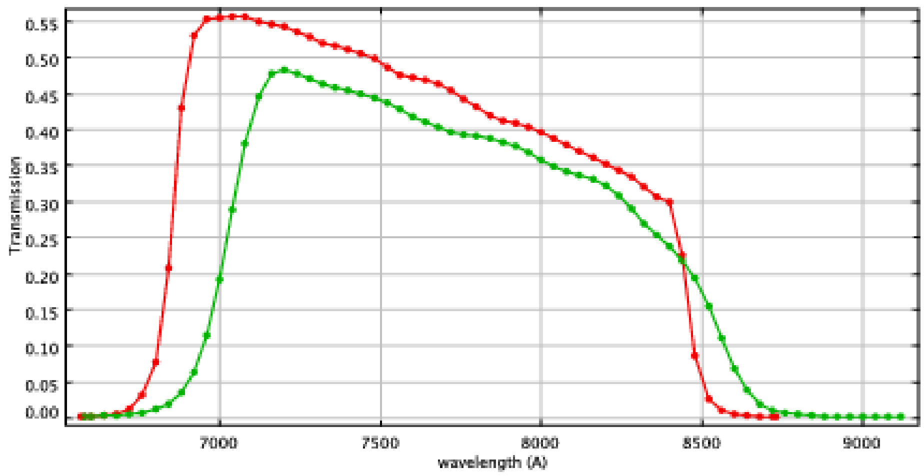



Figure 2: Transmission curves of the Telescope×Instrument×CCD×filter for the the two $i$-filters used for the CFHTLS. The red curve is the new i.MP9702 filter ("$y$"-band) and the green is i.MP9701 ($i$-band). The differences are significant: i.MP9702 is bluer and has a sharper red cut off, while i.MP9701 is slightly redder. The transmission curves of the other CFHTLS filters are shown at `http://www.cfht.hawaii.edu/Instruments/Imaging/MegaPrime/specsinformation.html`.

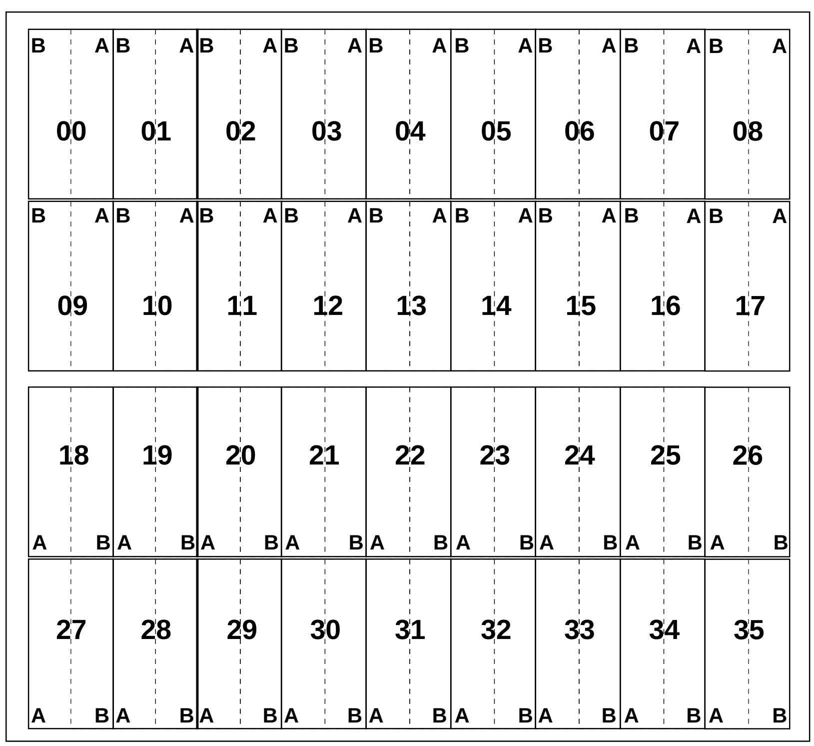



Figure 3: MegaCam readout layout and CEA-CFHT CCD numbering convention used in this report. Each rectangle represents a MegaCam CCD. When mounted on MegaPrime, North is at the top, East to the left and each CCD covers a field of view of about $7' \times 14'$ . The dotted lines separate the 2 1/2 CCDs read by each amplifier of a detector. The positions of the two amplifiers are indicated by A or B. Note the organisation of MegaCam into two sub-mosaics. They are separated by a large horizontal gap of 82" width.

# 3 Description of the CFHTLS T0006 Wide survey

## 3.1 Overview

The T0006 release of the Wide survey covers 171 MegaCam pointings (or tiles) divided into the W1, W2, W3 and W4 fields and is complete in all filters. In total the are 855 $u^*, g, r, i/y$ and $z$ stacks and 171 chisquared images (2052 including the weight-maps). The positions and geometry of the four wide fields comprising T0006, namely W1, W2, W3 and W4, are shown on Fig. 4 and summarised in Table 1.

The image selection criteria applied to the 6410 CFHTLS *Validated* images for the production of the T0006 CFHTLS Wide survey are the following:

- CFHTLS L02 and L05 Wide observation period: between May 26, 2003 and February 02, 2009;
- Terapix selection of CFHT *Validated* images, with `QualityFITS` grade A or B (images within the survey specifications);
- exposure time $> 60$ $s$;
- airmass $< 1.7$;
- images with missing data on more than one entire CCD have been removed from the parent sample. However, all images with missing data on only half of CCD detectors have been preserved;
- all pre-Wide survey images and all photometric short exposures. They will be included in the set of images used for the `SCAMP` astrometric/photometric calibration process;
- images with seeing (FWHM[9]) $< 1.4$" in $u^*$, and $< 1.2$" in $g$, $r$, $i$ and $z$ are selected for the calibration process;
- images with seeing (FWHM) $< 1.3$" in $u^*$, and $< 0.95$" in $g$, $r$, $i$ and $z$, are selected for the stack production;

The parent sample of images after observing period and `QualityFITS` selections is composed of 935 $u^*$, 978 $g$, 1669 $r$, 1064 $i$, 220 $y$ and 1177 $z$-band images. 25% of the sample are short photometric or Pre-Wide exposures that are only used for calibration but are not combined into stacks.

All stacks have the same pixel scale and cover exactly $1 \times 1$ deg$^2$ ($19354 \times 19354$ pixels of 0.1860"). The stacks only combine images that are part of a CFHTLS Wide observing sequence and that are within 3 arcminutes of the CFHTLS pre-defined stack centre

[9] As defined in Section 3.3

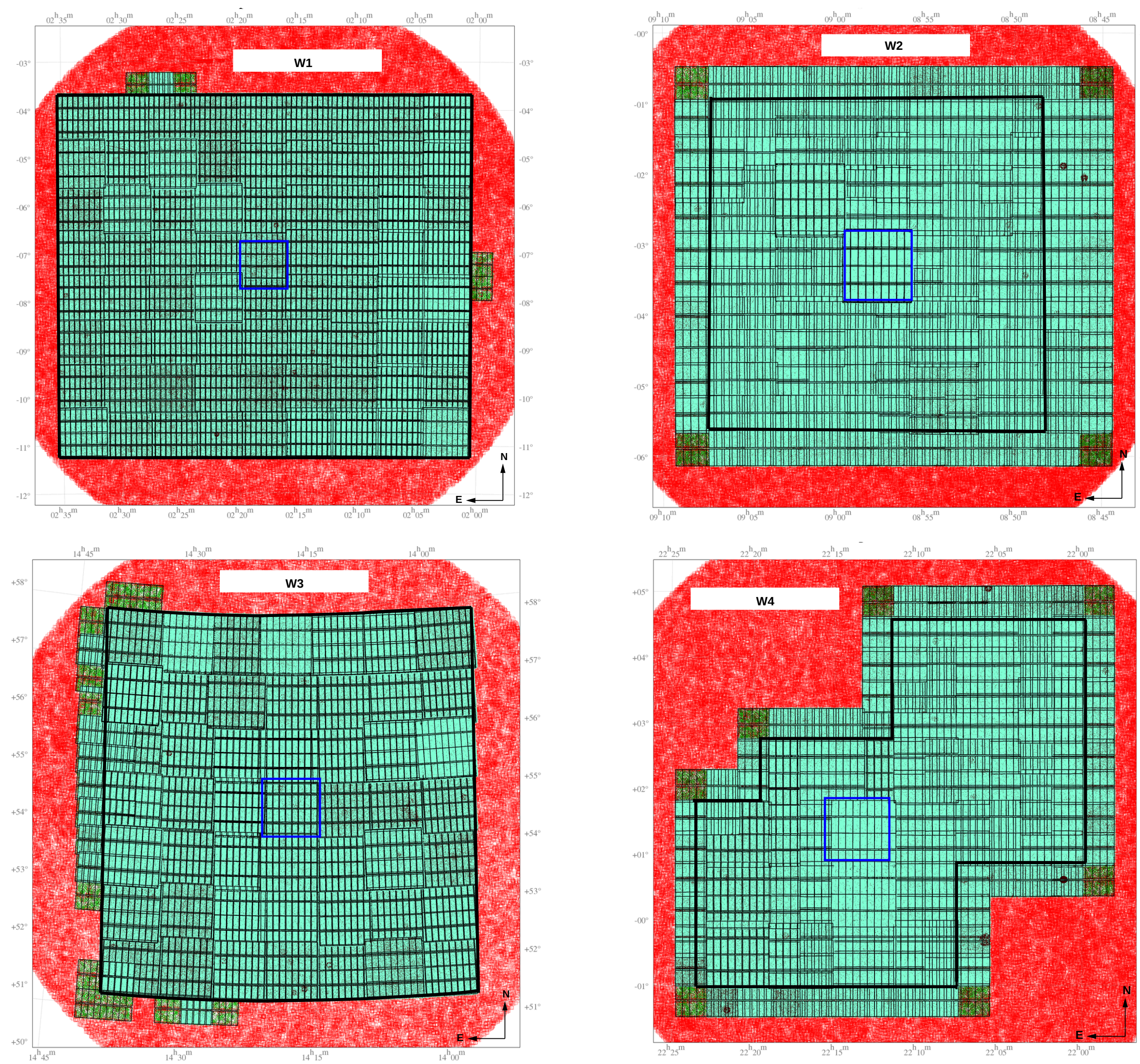



Figure 4: Positions and geometry of the CFHTLS Wide fields. The black thick contours show the total field of view composing the $u^*, g, r, i/y$ and $z$ stacks of the T0006 release. The fields located outside these regions are supplementary astrometric calibration data but are not included in the stacks. W1, W2, W3 and W4 do not cover the same field of view, so the four Wide regions are not shown with the same scale in this figure. The blue squares show a typical MegaCam field of view and indicate the positions of the reference center field. The MegaCam images included in the release are in green They reveal the tiling and mosaicing of each CFHTLS wide area. The small rectangles indicate individual MegaCam CCDs. These plots have been produced by `SCAMP` during the calibration step of W1, W2, W3 and W4.

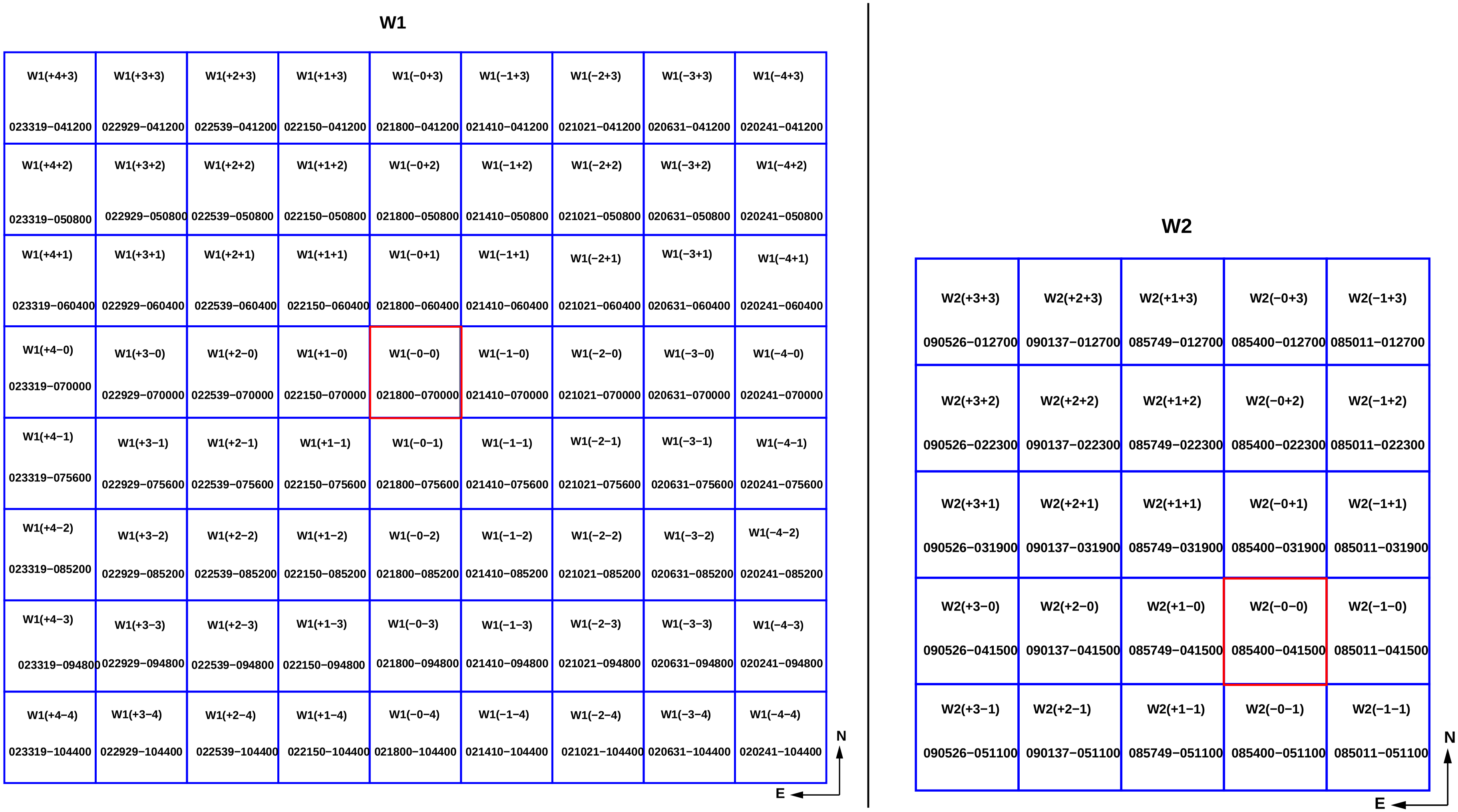



Figure 5: Positions, identification and naming conventions of CFHTLS stacks for the CFHTLS Wide survey. The figure shows the positions of each "tile" (blue square corresponding to the field of view of Megacam) covering the W1 and W2 Wide fields. Each tile is labelled by its early Cartesian name on top (see `http://terapix.iap.fr/cplt/oldSite/Descart/summarycfhtlswide.html`) and the official CFHTLS below. The early identification names set W*(0,0) (in red) at the approximate center field of each survey patch, before the survey strategy changes.

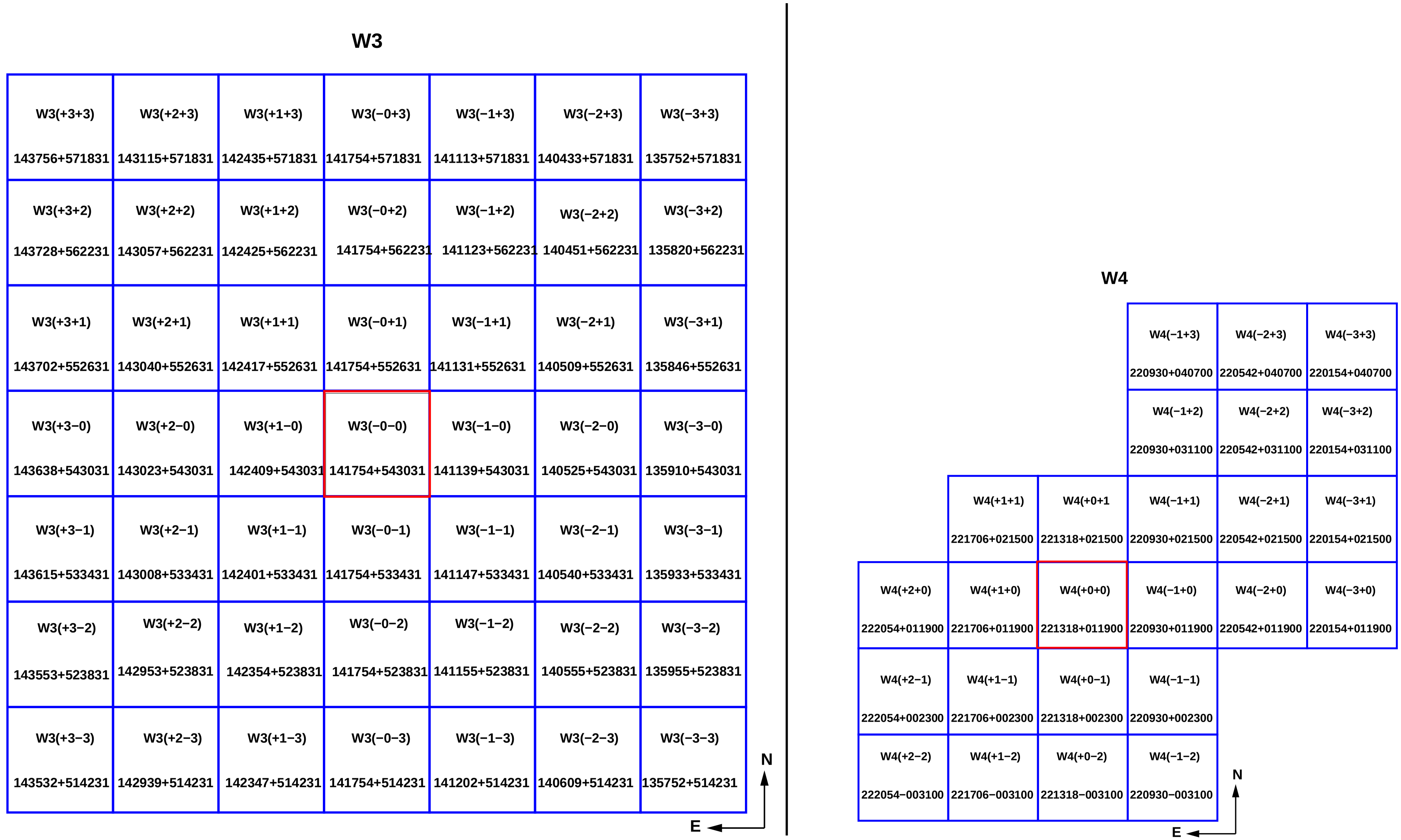



Figure 6: Positions, identification and naming conventions of CFHTLS stacks for the CFHTLS Wide survey. The figure shows the positions of each "tile" (blue square corresponding to the field of view of Megacam) covering the W3 and W4 Wide fields. Each tile is labelled by its early Cartesian name on top (see `http://terapix.iap.fr/cplt/oldSite/Descart/summarycfhtlswide.html`) and the official CFHTLS below. The early identification names set W*(0,0) (in red) at the approximate center field of each survey patch, before the survey strategy changes.

| CFHTLS field name | Reference center RA [J2000] | DEC [J2000] | Total pointings [n×p] | Total sky coverage [deg$^2$] | Filters | Comment |
|---|---|---|---|---|---|---|
| W1 | 02:18:00 | −07:00:00 | 9×8 | 8.5×7.5 | $u^*, g, r, i/y, z$ | 14 $y$ |
| W2 | 08:57:49 | −03:19:00 | 5×5 | 4.8×4.7 | $u^*, g, r, i/y, z$ | New center; 2$y$ |
| W3 | 14:17:54 | +54:30:31 | 7×7 | 6.7×6.6 | $u^*, g, r, i/y, z$ | 7 $y$ |
| W4 | 22:13:18 | +01:19:00 | 25 | 23.3 | $u^*, g, r, i/y, z$ | SE-NW elongated; 7 $y$ |

Table 1: Overview of the CFHTLS Wide fields. The pointings "n×p" refer to the numbers of tiles along the horizontal and vertical axes of MegaCam (*i.e.* the E-W and N-S axes). Sky coverage is expressed along RA and DEC axes.

| Filter | Mean number of exposures | Mean exposure time [s] | Mean limiting magnitude [MegaCam AB system] | Mean seeing ["] |
|---|---|---|---|---|
| $u^*$ | 5 | 3000 | 25.34 | 0.850 |
| $g$ | 5 | 2500 | 25.47 | 0.780 |
| $r$ | 4 | 2000 | 24.82 | 0.720 |
| $i/y$ | 7 | 4300 | 24.48 | 0.640 |
| $z$ | 6 | 3600 | 23.60 | 0.680 |

Table 2: Mean properties of the CFHTLS Wide survey. The $i$ and $y$ are not split into two sub-samples. The Mean limiting magnitude corresponds to the 50% completeness limit for a point-like source. The Mean seeing is the mean FWHM of stellar sources over the whole MegaCam field.

Each stack comprises a sequence of short exposure of a few hundred seconds. After each exposure the telescope is shifted a small amount (typically a few arcseconds, see the right panel of Fig. 7) to fill the gaps between CCDs, to enable a better sky-subtraction and rejection of bad pixels and cosmic rays during subsequent processing steps.

The adjacent fields have an overlapping region of several arcminutes width to constrain the field-to-field astrometric and photometric calibrations. The size of the overlaps is 4 arcminutes in DEC and 3 arcminutes in RA (see Fig. 7). The overlaps between fields reduce the sky coverage of the 171 CFHTLS Wide tiles to about 155 deg$^2$.

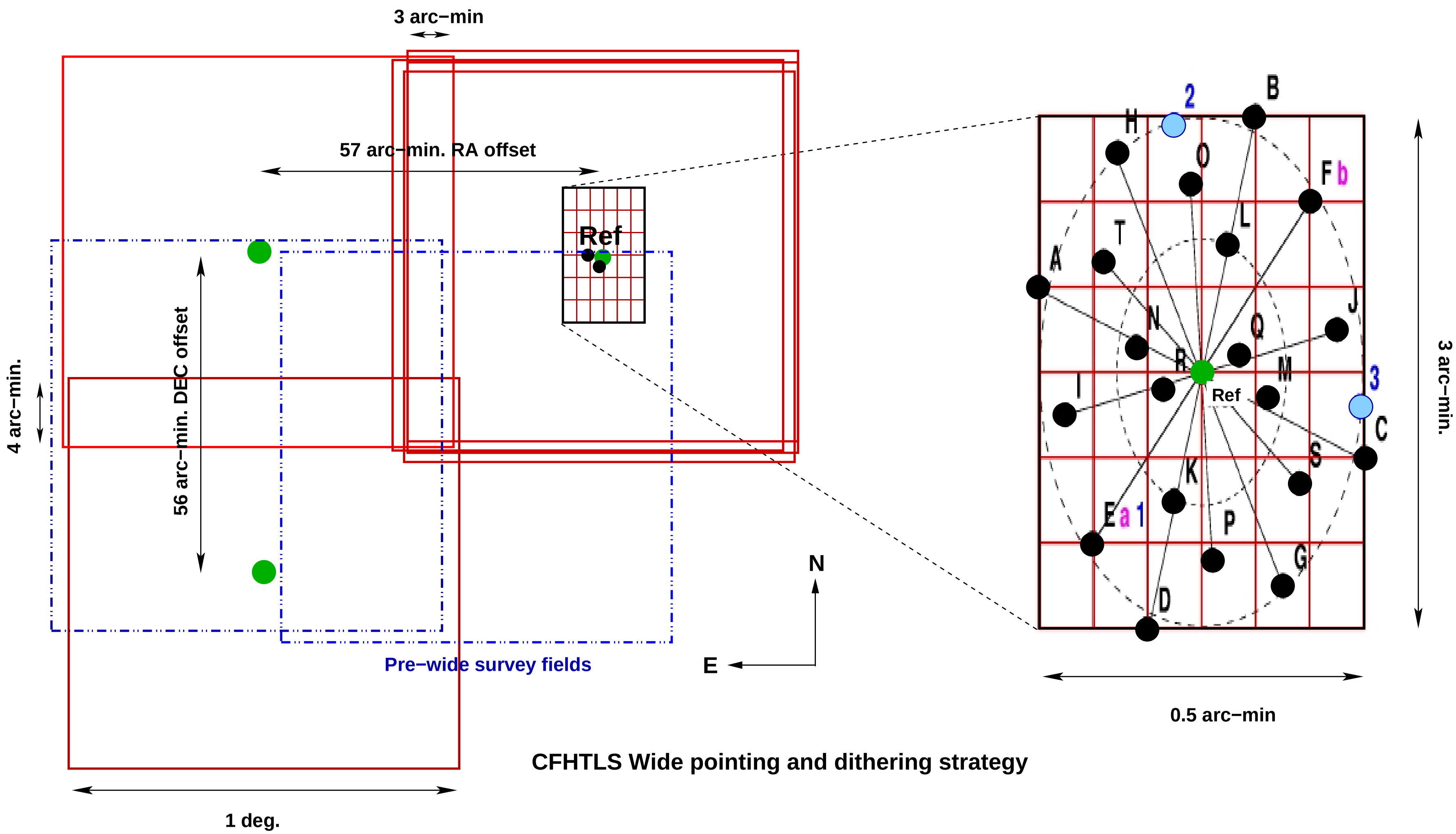



Figure 7: Offsets between adjacent pointings (left) and dithering (right) inside a pointing of the CFHTLS Wide survey. Each pointing (or tile) overlaps along the RA and DEC directions with its nearest neighbours. In addition to the large offsets, the observations at each CFHT Wide reference position ("Ref" and green filled circles) are split into an observing sequence of exposures, with a small dither between each. The dithering pattern depends on the number of exposure per sequence and is different for each filter (see Table 2). In all configurations the dithered positions (black filled circles) are among those located inside a 30"×180" ellipse centered at the reference position of a Wide pointing. This is illustrated on the right hand of the figure (drawn from the CFHT dithering pattern plot: `http://www.cfht.hawaii.edu/Instruments/Imaging/MegaPrime/specsinformation.html`. The details of this figure are given at this URL). The offsets and the dithers along the DEC direction are sufficiently large to fill the central 82" horizontal gap between the CCDs (see Fig. 3) with a fraction of exposures of each sequence. The dash-dot-dot blue squares on the left show the positions of Pre-Wide images. They are shifted by a half-MegaCam field of view, in both directions, in order to provide very large overlaps between pointings and ease the astrometric calibration and the field-to-field flux rescaling. The Pre-Wide images are short exposures (3 $mn$) only done in $r$-band.

Each tile is centered at a well-defined position. The coordinates of a stack centre position are identical for all filters. W1, W2, W3 and W4 are therefore composed of a complete set of $u^*, g, r, i, y$ and $z$ adjacent square tiles of 1 deg$^2$ each.

The integer part of the centre position of each tile is used to name the final stacks and other data products. (This naming convention was agreed by CADC, TERAPIX and the CFHTLS Steering Group and is valid for all releases.) Each release is identified by the extension `T000n`, where `n` is the release number.

In addition to the official astronomical CFHTLS naming convention, Terapix defined in 2002 a shorter naming convention based on a Cartesian grid coordinate system, where the increment unit is a MegaCam-size field and the center positions of the grid points are the center positions of the tiles (see `http://terapix.iap.fr/cplt/oldSite/Descart/summarycfhtlswide.html`).

The reference center of each Wide field of view is defined as the reference W[1, 2, 3, 4](0,0) and the Cartesian field names increase toward the East and North. The tiling and field naming conventions are drawn on Fig. 5 and 6 and the complete list of the T0006 Wide stacks is given on Tables 4 to 8.

The total exposure time per filter is approximately the same for each tile (see Tables 4 to 8, and `http://terapix.iap.fr/cplt/table_syn_T0006.html`). It results in very sharp exposure time distributions for all filters (see Fig. 8). Some observations have been adjusted to take into account unexpected events (like absorption by clouds/cirrus or technical problems). There are a few fields that have deeper $u^*$-band and $z$-band exposures which explains the small tails shown in the inset of Fig. 8. These longer exposures were taken before it was decided to cut the $u^*$ and $z$ exposure times by a factor of two.

All $r$-band stacks combine data taken during two epochs separated by at least two years and totalling 2×500 $s$ each.

In all filters except $u^*$, observations were carried out only when the seeing (FHWM) was below 0.95". For the $u^*$-band, this rule was relaxed to 1.3" .

The complete list of CFHTLS input images that were combined into the Wide stacks is given in the Appendix, in Tables 37 to 47.

The mean properties of the CFHTLS Wide survey are summarized in Table 2. Overall, they meet survey specifications, but the homogeneity of the survey over a Wide patch scale must be assessed carefully. The Wide field-to-field and MegaCam tile-to-tile scatters will be explored in detail in the following sections. The depth, the seeing, the photometric errors analyses are presented in the next parts of the document.

Finally, the complete set of configuration files used for the T0006 release is presented in the Appendix. They clarify technical details that are not discussed over the document concerning the production of all stacks and catalogues forming the "official" CFHTLS Deep and Wide surveys. They can be used as baselines for users who would prefer to re-process the preprocessed or the stacked images with better tuned parameters for their own scientific projects. The configuration files can be provided on request from TERAPIX.

| Field | Parameter | $u^*$ | $g$ | $r$ | $i$ | $y$ | $z$ |
|---|---|---|---|---|---|---|---|
| W1 | Nb stacks | 72 | 72 | 72 | 58 | 14 | 72 |
| | Seeing ["] | 0.84 ±0.11 | 0.78 ±0.09 | 0.70 ±0.07 | 0.65 ±0.09 | 0.65 ±0.09 | 0.69 ±0.07 |
| | 80% Compl. (stellar) | 25.36 ±0.08 | 25.45 ±0.09 | 24.84 ±0.06 | 24.50 ±0.09 | 24.50 ±0.09 | 23.60 ±0.15 |
| | 80% Compl. (extended) | 24.67 ± 0.09 | 24.71 ± 0.06 | 24.03 ± 0.07 | 23.70 ± 0.09 | 23.70 ± 0.09 | 22.87 ± 0.11 |
| | Int. astrom. err. | (0.029",0.028") | (0.029",0.028") | (0.021",0.019") | (0.021",0.019") | (0.021",0.019") | (0.021",0.019") |
| | Ext. astrom. err. | (0.238",0.228") | (0.252",0.242") | (0.258",0.246") | (0.255",0.245") | (0.255",0.245") | (0.260",0.247") |
| | Mag. err. [mag.] | 0.05 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.04 ±0.01 |
| | CFHTLS-SDSS $\langle\delta_m\rangle$ [mag.] | +0.01 ±0.05 | +0.01 ±0.03 | +0.01 ±0.02 | +0.04 ±0.03 | - | +0.01 ±0.02 |
| W2 | Nb stacks | 25 | 25 | 25 | 23 | 2 | 25 |
| | Seeing ["] | 0.89 ±0.21 | 0.79 ±0.18 | 0.72 ±0.17 | 0.63 ±0.18 | 0.63 ±0.18 | 0.72 ±0.17 |
| | 80% Compl. (stellar) | 25.37 ±0.13 | 25.48 ±0.15 | 24.86 ±0.05 | 24.50 ±0.10 | 24.50 ±0.10 | 23.65 ±0.16 |
| | 80% Compl. (extended) | 24.69 ±0.14 | 24.74 ±0.12 | 24.07 ±0.07 | 23.70 ±0.09 | 23.70 ±0.09 | 22.92 ±0.13 |
| | Int. astrom. err. | (0.024",0.022") | (0.024",0.022") | (0.024",0.022") | (0.024",0.022") | (0.024",0.022") | (0.024",0.022") |
| | Ext. astrom. err. | (0.183",0.188") | (0.207",0.211") | (0.211",0.213") | (0.208",0.212") | (0.208",0.212") | (0.211",0.212") |
| | Mag. err. [mag.] | 0.05 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.04 ±0.01 |
| | CFHTLS-SDSS $\langle\delta_m\rangle$ [mag.] | - | - | - | - | - | - |
| W3 | Nb stacks | 49 | 49 | 49 | 42 | 7 | 42 |
| | Seeing ["] | 0.85 ±0.11 | 0.81 ±0.10 | 0.75 ±0.08 | 0.65 ±0.12 | 0.65 ±0.12 | 0.67 ±0.11 |
| | 80% Compl. (stellar) | 25.32 ±0.17 | 25.48 ±0.09 | 24.86 ±0.07 | 24.45 ±0.09 | 24.45 ±0.09 | 23.60 ±0.23 |
| | 80% Compl. (extended) | 24.62 ±0.18 | 24.73 ±0.08 | 24.06 ±0.08 | 23.65 ±0.11 | 23.65 ±0.11 | 22.87 ±0.19 |
| | Int. astrom. err. | (0.037",0.034") | (0.037",0.034") | (0.037",0.034") | (0.037",0.034") | (0.037",0.034") | (0.037",0.034") |
| | Ext. astrom. err. | (0.236",0.225") | (0.248",0.241") | (0.258",0.249") | (0.250",0.245") | (0.250",0.245") | (0.257",0.250") |
| | Mag. err. [mag.] | 0.05 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.04 ±0.01 |
| | CFHTLS-SDSS $\langle\delta_m\rangle$ [mag.] | +0.07 ±0.03 | +0.01 ±0.01 | +0.03 ±0.02 | +0.02 ±0.02 | - | +0.00 ±0.03 |
| W4 | Nb stacks | 25 | 25 | 25 | 18 | 7 | 25 |
| | Seeing ["] | 0.81 ±0.11 | 0.75 ±0.06 | 0.67 ±0.07 | 0.60 ±0.10 | 0.60 ±0.10 | 0.64 ±0.08 |
| | 80% Compl. (stellar) | 25.31 ±0.15 | 25.47 ±0.13 | 24.77 ±0.08 | 24.48 ±0.16 | 24.48 ±0.16 | 23.55 ±0.15 |
| | 80% Compl. (extended) | 24.62 ± 0.15 | 24.73 ± 0.12 | 23.95 ± 0.09 | 23.69 ± 0.17 | 23.69 ± 0.17 | 22.83 ± 0.12 |
| | Int. astrom. err. | (0.024",0.021") | (0.024",0.021") | (0.024",0.021") | (0.024",0.021") | (0.024",0.021") | (0.024",0.021") |
| | Ext. astrom. err. | (0.194",0.187") | (0.218",0.213") | (0.222",0.217") | (0.218",0.216") | (0.218",0.216") | (0.215",0.212") |
| | Mag. err. [mag.] | 0.05 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.04 ±0.01 |
| | CFHTLS-SDSS $\langle\delta_m\rangle$ [mag.] | +0.09 ±0.03 | +0.02 ±0.02 | +0.02 ±0.02 | +0.02 ±0.02 | - | −0.00 ±0.03 |

Table 3: Summary of the W1, W2, W3 and W4 mean survey parameters. The $i$ and $y$ data have been combined. "80% Compl." is the 80% completeness limit. The seeing is the median FWHM and the errors is the field-to-field scatter. Astrometric errors are given along the two (X,Y)=(NS,EW) axes. The internal astrometric errors are from the (global) astrometric calibration errors step; the external astrometric errors are from the (ensemble average) astrometric accuracy of CFHTLS stacks. The "CFHTLS-SDSS $\langle\delta_m\rangle$ mag." denotes the mean magnitude offset between the CFHTLS and the SDSS surveys, averaged over a Wide field. It is derived from a sample of common stars to both surveys in W1, W3 and W4 (no data for W2). The "Mag. err." is estimated from the external and internal magnitude errors discussed in the document. For W2, it is based on the internal mag. error and extrapolated from the W1, W3 and W4 CFHTLS-SDSS comparisons.

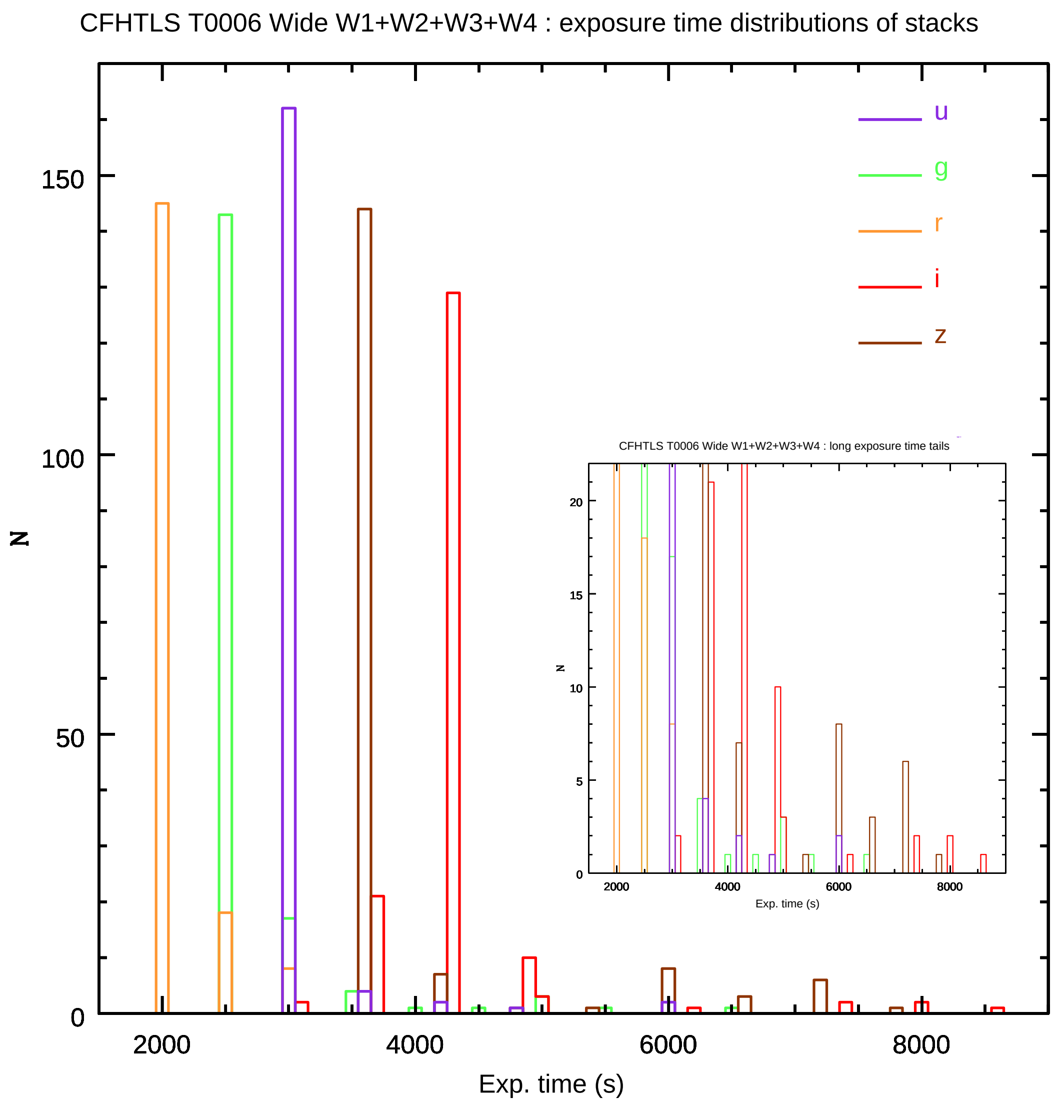



Figure 8: Distribution of exposure times over the Wide fields. The inset is a close-up view of the long exposure tails.

| W Cartesian Ident name | CFHTLS Ident name | RA [J2000] | DEC [J2000] | Filters | Exp. Time $u^*$ [s] | Exp. Time $g$ [s] | Exp. Time $r$ [s] | Exp. Time $i/y$ [s] | Exp. Time $z$ [s] |
|---|---|---|---|---|---|---|---|---|---|
| W1(−4 − 4) | 020241−104400 | 02:02:41.15 | −10:44:00 | $u^*, g, r, y, z$ | 3000.0 | 2500.0 | 2000.0 | 7380.0 | 3600.0 |
| W1(−4 − 3) | 020241−094800 | 02:02:41.15 | −09:48:00 | $u^*, g, r, i, z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−4 − 2) | 020241−085200 | 02:02:41.15 | −08:52:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4920.0 | 4200.0 |
| W1(−4 − 1) | 020241−075600 | 02:02:41.15 | −07:56:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−4 − 0) | 020241−070000 | 02:02:41.15 | −07:00:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−4 + 1) | 020241−060400 | 02:02:41.15 | −06:04:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−4 + 2) | 020241−050800 | 02:02:41.15 | −05:08:00 | $u^*, g, r, i, z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−4 + 3) | 020241−041200 | 02:02:41.15 | −04:12:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−3 − 4) | 020631−104400 | 02:06:30.86 | −10:44:00 | $u^*, g, r, y, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−3 − 3) | 020631−094800 | 02:06:30.86 | −09:48:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−3 − 2) | 020631−085200 | 02:06:30.86 | −08:52:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−3 − 1) | 020631−075600 | 02:06:30.86 | −07:56:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4920.0 | 3600.0 |
| W1(−3 − 0) | 020631−070000 | 02:06:30.86 | −07:00:00 | $u^*, g, r, i, z$ | 3000.0 | 6500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−3 + 1) | 020631−060400 | 02:06:30.86 | −06:04:00 | $u^*, g, r, i, z$ | 3000.0 | 3500.0 | 2000.0 | 3690.0 | 3600.0 |
| W1(−3 + 2) | 020631−050800 | 02:06:30.86 | −05:08:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 6600.0 |
| W1(−3 + 3) | 020631−041200 | 02:06:30.86 | −04:12:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−2 − 4) | 021021−104400 | 02:10:20.58 | −10:44:00 | $u^*, g, r, y, z$ | 3600.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−2 − 3) | 021021−094800 | 02:10:20.58 | −09:48:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−2 − 2) | 021021−085200 | 02:10:20.58 | −08:52:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2500.0 | 4305.0 | 3600.0 |
| W1(−2 − 1) | 021021−075600 | 02:10:20.58 | −07:56:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2500.0 | 4305.0 | 3600.0 |
| W1(−2 − 0) | 021021−070000 | 02:10:20.58 | −07:00:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2500.0 | 4305.0 | 3600.0 |
| W1(−2 + 1) | 021021−060400 | 02:10:20.58 | −06:04:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 3690.0 | 3600.0 |
| W1(−2 + 2) | 021021−050800 | 02:10:20.58 | −05:08:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−2 + 3) | 021021−041200 | 02:10:20.58 | −04:12:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−1 − 4) | 021410−104400 | 02:14:10.29 | −10:44:00 | $u^*, g, r, y, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−1 − 3) | 021410−094800 | 02:14:10.29 | −09:48:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−1 − 2) | 021410−085200 | 02:14:10.29 | −08:52:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4920.0 | 3600.0 |
| W1(−1 − 1) | 021410−075600 | 02:14:10.29 | −07:56:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−1 − 0) | 021410−070000 | 02:14:10.29 | −07:00:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−1 + 1) | 021410−060400 | 02:14:10.29 | −06:04:00 | $u^*, g, r, i, z$ | 3600.0 | 3500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−1 + 2) | 021410−050800 | 02:14:10.29 | −05:08:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2500.0 | 4305.0 | 6601.0 |
| W1(−1 + 3) | 021410−041200 | 02:14:10.29 | −04:12:00 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 3690.0 | 6000.0 |
| W1(−0 − 4) | 021800−104400 | 02:18:00.00 | −10:44:00 | $u^*, g, r, y, z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |

Table 4: The CFHTLS T0006 Wide stack list. The last columns of the table quote the total exposure times of combined T0006 images provided by TERAPIX. The relative positions of all fields of the list are shown in Fig. 5 and 6. The complete set of CFHTLS input images combined into each stack are listed in Tables 37 to 47.

| W Cartesian Ident name | CFHTLS Ident name | RA [J2000] | DEC [J2000] | Filters | Exp. Time $u^*$ [s] | Exp. Time $g$ [s] | Exp. Time $r$ [s] | Exp. Time $i/y$ [s] | Exp. Time $z$ [s] |
|---|---|---|---|---|---|---|---|---|---|
| W1(−0 − 3) | 021800−094800 | 02:18:00.00 | −09:48:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 3500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−0 − 2) | 021800−085200 | 02:18:00.00 | −08:52:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 3000.0 | 4305.0 | 3600.0 |
| W1(−0 − 1) | 021800−075600 | 02:18:00.00 | −07:56:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(−0 − 0) | 021800−070000 | 02:18:00.00 | −07:00:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4920.0 | 3600.0 |
| W1(−0 + 1) | 021800−060400 | 02:18:00.00 | −06:04:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2500.0 | 4305.0 | 6601.0 |
| W1(−0 + 2) | 021800−050800 | 02:18:00.00 | −05:08:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 6000.0 |
| W1(−0 + 3) | 021800−041200 | 02:18:00.00 | −04:12:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 6000.0 |
| W1(+1 − 4) | 022150−104400 | 02:21:49.71 | −10:44:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(+1 − 3) | 022150−094800 | 02:21:49.71 | −09:48:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(+1 − 2) | 022150−085200 | 02:21:49.71 | −08:52:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4920.0 | 3600.0 |
| W1(+1 − 1) | 022150−075600 | 02:21:49.71 | −07:56:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4920.0 | 3600.0 |
| W1(+1 − 0) | 022150−070000 | 02:21:49.71 | −07:00:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(+1 + 1) | 022150−060400 | 02:21:49.71 | −06:04:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 4500.0 | 2000.0 | 3690.0 | 7201.0 |
| W1(+1 + 2) | 022150−050800 | 02:21:49.71 | −05:08:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 6001.0 |
| W1(+1 + 3) | 022150−041200 | 02:21:49.71 | −04:12:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2500.0 | 4920.0 | 6001.0 |
| W1(+2 − 4) | 022539−104400 | 02:25:39.42 | −10:44:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(+2 − 3) | 022539−094800 | 02:25:39.42 | −09:48:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 4200.0 |
| W1(+2 − 2) | 022539−085200 | 02:25:39.42 | −08:52:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(+2 − 1) | 022539−075600 | 02:25:39.42 | −07:56:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3690.0 | 4200.0 |
| W1(+2 − 0) | 022539−070000 | 02:25:39.42 | −07:00:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 3000.0 | 3690.0 | 3600.0 |
| W1(+2 + 1) | 022539−060400 | 02:25:39.42 | −06:04:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3720.0 | 6000.0 |
| W1(+2 + 2) | 022539−050800 | 02:25:39.42 | −05:08:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4920.0 | 6000.0 |
| W1(+2 + 3) | 022539−041200 | 02:25:39.42 | −04:12:00 | $u^*$, $g$, $r$, $i$, $z$ | 5950.0 | 2500.0 | 3000.0 | 4340.0 | 7200.0 |
| W1(+3 − 4) | 022929−104400 | 02:29:29.14 | −10:44:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(+3 − 3) | 022929−094800 | 02:29:29.14 | −09:48:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2500.0 | 4305.0 | 3600.0 |
| W1(+3 − 2) | 022929−085200 | 02:29:29.14 | −08:52:00 | $u^*$, $g$, $r$, $i$, $z$ | 4200.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(+3 − 1) | 022929−075600 | 02:29:29.14 | −07:56:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4920.0 | 3600.0 |
| W1(+3 − 0) | 022929−070000 | 02:29:29.14 | −07:00:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4340.0 | 7201.0 |
| W1(+3 + 1) | 022929−060400 | 02:29:29.14 | −06:04:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 3000.0 | 2000.0 | 3075.0 | 3600.0 |
| W1(+3 + 2) | 022929−050800 | 02:29:29.14 | −05:08:00 | $u^*$, $g$, $r$, $i$, $z$ | 4800.0 | 2500.0 | 2000.0 | 4340.0 | 3600.0 |
| W1(+3 + 3) | 022929−041200 | 02:29:29.14 | −04:12:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3720.0 | 3600.0 |
| W1(+4 − 4) | 023319−104400 | 02:33:18.85 | −10:44:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 7380.0 | 3600.0 |
| W1(+4 − 3) | 023319−094800 | 02:33:18.85 | −09:48:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(+4 − 2) | 023319−085200 | 02:33:18.85 | −08:52:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W1(+4 − 1) | 023319−075600 | 02:33:18.85 | −07:56:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |

Table 5: The CFHTLS T0006 Wide stack list (cont'd)

| W Cartesian Ident name | CFHTLS Ident name | RA [J2000] | DEC [J2000] | Filters | Exp. Time $u^*$ [s] | Exp. Time $g$ [s] | Exp. Time $r$ [s] | Exp. Time $i/y$ [s] | Exp. Time $z$ [s] |
|---|---|---|---|---|---|---|---|---|---|
| W1(+4 − 0) | 023319−070000 | 02:33:18.85 | −07:00:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4960.0 | 3600.0 |
| W1(+4 + 1) | 023319−060400 | 02:33:18.85 | −06:04:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4340.0 | 3600.0 |
| W1(+4 + 2) | 023319−050800 | 02:33:18.85 | −05:08:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3075.0 | 3600.0 |
| W1(+4 + 3) | 023319−041200 | 02:33:18.85 | −04:12:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3720.0 | 3600.0 |
| | | | | | | | | | |
| W2(−1 − 1) | 085011−051100 | 08:50:11.37 | −05:11:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(−1 − 0) | 085011−041500 | 08:50:11.37 | −04:15:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(−1 + 1) | 085011−031900 | 08:50:11.37 | −03:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 4000.0 | 2500.0 | 4305.0 | 3600.0 |
| W2(−1 + 2) | 085011−022300 | 08:50:11.37 | −02:23:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(−1 + 3) | 085011−012700 | 08:50:11.37 | −01:27:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2500.0 | 3690.0 | 3600.0 |
| W2(−0 − 1) | 085400−051100 | 08:54:00.00 | −05:11:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(−0 − 0) | 085400−041500 | 08:54:00.00 | −04:15:00 | $u^*$, $g$, $r$, $i$, $z$ | 3600.0 | 3000.0 | 2000.0 | 4305.0 | 4200.0 |
| W2(−0 + 1) | 085400−031900 | 08:54:00.00 | −03:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(−0 + 2) | 085400−022300 | 08:54:00.00 | −02:23:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(−0 + 3) | 085400−012700 | 08:54:00.00 | −01:27:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 3000.0 | 4305.0 | 3600.0 |
| W2(+1 − 1) | 085749−051100 | 08:57:48.63 | −05:11:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3690.0 | 3600.0 |
| W2(+1 − 0) | 085749−041500 | 08:57:48.63 | −04:15:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(+1 + 1) | 085749−031900 | 08:57:48.63 | −03:19:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 3000.0 | 3000.0 | 4305.0 | 3600.0 |
| W2(+1 + 2) | 085749−022300 | 08:57:48.63 | −02:23:00 | $u^*$, $g$, $r$, $i$, $z$ | 3600.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(+1 + 3) | 085749−012700 | 08:57:48.63 | −01:27:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 3000.0 | 2000.0 | 3690.0 | 3600.0 |
| W2(+2 − 1) | 090137−051100 | 09:01:37.26 | −05:11:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(+2 − 0) | 090137−041500 | 09:01:37.26 | −04:15:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(+2 + 1) | 090137−031900 | 09:01:37.26 | −03:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(+2 + 2) | 090137−022300 | 09:01:37.26 | −02:23:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(+2 + 3) | 090137−012700 | 09:01:37.26 | −01:27:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(+3 − 1) | 090526−051100 | 09:05:25.89 | −05:11:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(+3 − 0) | 090526−041500 | 09:05:25.89 | −04:15:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W2(+3 + 1) | 090526−031900 | 09:05:25.89 | −03:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3690.0 | 3600.0 |
| W2(+3 + 2) | 090526−022300 | 09:05:25.89 | −02:23:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4325.0 | 7201.0 |
| W2(+3 + 3) | 090526−012700 | 09:05:25.89 | −01:27:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| | | | | | | | | | |
| W3(−3 − 3) | 140016+514231 | 14:00:16.28 | +51:42:31 | $u^*$, $g$, $r$, $i$, $z$ | 3001.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−3 − 2) | 135955+523831 | 13:59:55.42 | +52:38:31 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4306.0 | 4201.0 |
| W3(−3 − 1) | 135933+533431 | 13:59:33.41 | +53:34:31 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3720.0 | 3601.0 |
| W3(−3 − 0) | 135910+543031 | 13:59:10.19 | +54:30:31 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |

Table 6: The CFHTLS T0006 Wide stack list (cont'd)

| W Cartesian Ident name | CFHTLS Ident name | RA [J2000] | DEC [J2000] | Filters | Exp. Time $u^*$ [s] | Exp. Time $g$ [s] | Exp. Time $r$ [s] | Exp. Time $i/y$ [s] | Exp. Time $z$ [s] |
|---|---|---|---|---|---|---|---|---|---|
| W3(−3 + 1) | 135846+552631 | 13:58:45.65 | +55:26:31 | $u^*, g, r, y, z$ | 3001.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−3 + 2) | 135820+562231 | 13:58:19.70 | +56:22:31 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2500.0 | 4306.0 | 3601.0 |
| W3(−3 + 3) | 135752+571831 | 13:57:52.22 | +57:18:31 | $u^*, g, r, i, z$ | 3000.0 | 2501.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−2 − 3) | 140609+514231 | 14:06:08.85 | +51:42:31 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−2 − 2) | 140555+523831 | 14:05:54.95 | +52:38:31 | $u^*, g, r, i, z$ | 3001.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−2 − 1) | 140540+533431 | 14:05:40.27 | +53:34:31 | $u^*, g, r, y, z$ | 3000.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−2 − 0) | 140525+543031 | 14:05:24.79 | +54:30:31 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 3691.0 | 3601.0 |
| W3(−2 + 1) | 140509+552631 | 14:05:08.43 | +55:26:31 | $u^*, g, r, y, z$ | 3000.0 | 2501.0 | 2501.0 | 4306.0 | 3601.0 |
| W3(−2 + 2) | 140451+562231 | 14:04:51.13 | +56:22:31 | $u^*, g, r, i, z$ | 3000.0 | 2501.0 | 2000.0 | 3691.0 | 3601.0 |
| W3(−2 + 3) | 140433+571831 | 14:04:32.82 | +57:18:31 | $u^*, g, r, y, z$ | 3000.0 | 2501.0 | 3001.0 | 4306.0 | 3601.0 |
| W3(−1 − 3) | 141202+514231 | 14:12:01.43 | +51:42:31 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 6152.0 | 3601.0 |
| W3(−1 − 2) | 141155+523831 | 14:11:54.47 | +52:38:31 | $u^*, g, r, i, z$ | 3000.0 | 2501.0 | 2501.0 | 4306.0 | 3601.0 |
| W3(−1 − 1) | 141147+533431 | 14:11:47.14 | +53:34:31 | $u^*, g, r, i, z$ | 3001.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−1 − 0) | 141139+543031 | 14:11:39.40 | +54:30:31 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−1 + 1) | 141131+552631 | 14:11:31.22 | +55:26:31 | $u^*, g, r, i, z$ | 3000.0 | 2501.0 | 2001.0 | 3691.0 | 3601.0 |
| W3(−1 + 2) | 141123+562231 | 14:11:22.56 | +56:22:31 | $u^*, g, r, i, z$ | 3000.0 | 2501.0 | 2001.0 | 4306.0 | 3601.0 |
| W3(−1 + 3) | 141113+571831 | 14:11:13.41 | +57:18:31 | $u^*, g, r, y, z$ | 3001.0 | 2501.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−0 − 3) | 141754+514231 | 14:17:54.00 | +51:42:31 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 3001.0 | 4341.0 | 3601.0 |
| W3(−0 − 2) | 141754+523831 | 14:17:54.00 | +52:38:31 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2501.0 | 4341.0 | 3601.0 |
| W3(−0 − 1) | 141754+533431 | 14:17:54.00 | +53:34:31 | $u^*, g, r, i, z$ | 3001.0 | 2500.0 | 2500.0 | 3721.0 | 3601.0 |
| W3(−0 − 0) | 141754+543031 | 14:17:54.00 | +54:30:31 | $u^*, g, r, i, z$ | 3000.0 | 2500.0 | 2000.0 | 4341.0 | 3601.0 |
| W3(−0 + 1) | 141754+552631 | 14:17:54.00 | +55:26:31 | $u^*, g, r, i, z$ | 3000.0 | 2501.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(−0 + 2) | 141754+562231 | 14:17:54.00 | +56:22:31 | $u^*, g, r, i, z$ | 3001.0 | 2501.0 | 2001.0 | 4306.0 | 3601.0 |
| W3(−0 + 3) | 141754+571831 | 14:17:54.00 | +57:18:31 | $u^*, g, r, i, z$ | 3001.0 | 2501.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(+1 − 3) | 142347+514231 | 14:23:46.57 | +51:42:31 | $u^*, g, r, i, z$ | 3000.0 | 3001.0 | 2501.0 | 4341.0 | 4201.0 |
| W3(+1 − 2) | 142354+523831 | 14:23:53.53 | +52:38:31 | $u^*, g, r, i, z$ | 3001.0 | 2501.0 | 2000.0 | 4341.0 | 3601.0 |
| W3(+1 − 1) | 142401+533431 | 14:24:00.86 | +53:34:31 | $u^*, g, r, i, z$ | 3000.0 | 2501.0 | 2000.0 | 4341.0 | 6002.0 |
| W3(+1 − 0) | 142409+543031 | 14:24:08.61 | +54:30:31 | $u^*, g, r, i, z$ | 3001.0 | 2501.0 | 2000.0 | 4341.0 | 5401.0 |
| W3(+1 + 1) | 142417+552631 | 14:24:16.79 | +55:26:31 | $u^*, g, r, i, z$ | 3001.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(+1 + 2) | 142425+562231 | 14:24:25.44 | +56:22:31 | $u^*, g, r, i, z$ | 6001.0 | 2501.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(+1 + 3) | 142435+571831 | 14:24:34.59 | +57:18:31 | $u^*, g, r, i, z$ | 3001.0 | 2501.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(+2 − 3) | 142939+514231 | 14:29:39.15 | +51:42:31 | $u^*, g, r, i, z$ | 3001.0 | 2501.0 | 2000.0 | 4961.0 | 4201.0 |
| W3(+2 − 2) | 142953+523831 | 14:29:53.05 | +52:38:31 | $u^*, g, r, i, z$ | 3000.0 | 3501.0 | 2000.0 | 4341.0 | 3600.0 |
| W3(+2 − 1) | 143008+533431 | 14:30:07.72 | +53:34:31 | $u^*, g, r, i, z$ | 3000.0 | 2501.0 | 2000.0 | 4961.0 | 3601.0 |
| W3(+2 − 0) | 143023+543031 | 14:30:23.21 | +54:30:31 | $u^*, g, r, i, z$ | 3001.0 | 2501.0 | 2000.0 | 4306.0 | 3601.0 |

Table 7: The CFHTLS T0006 Wide stack list (cont'd)

| W Cartesian Ident name | CFHTLS Ident name | RA [J2000] | DEC [J2000] | Filters | Exp. Time $u^*$ [s] | Exp. Time $g$ [s] | Exp. Time $r$ [s] | Exp. Time $i/y$ [s] | Exp. Time $z$ [s] |
|---|---|---|---|---|---|---|---|---|---|
| W3(+2 + 1) | 143040+552631 | 14:30:39.57 | +55:26:31 | $u^*$, $g$, $r$, $i$, $z$ | 3001.0 | 2500.0 | 2000.0 | 4306.0 | 4801.0 |
| W3(+2 + 2) | 143057+562231 | 14:30:56.87 | +56:22:31 | $u^*$, $g$, $r$, $i$, $z$ | 3001.0 | 2501.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(+2 + 3) | 143115+571831 | 14:31:15.18 | +57:18:31 | $u^*$, $g$, $r$, $i$, $z$ | 3001.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(+3 − 3) | 143532+514231 | 14:35:31.73 | +51:42:31 | $u^*$, $g$, $r$, $i$, $z$ | 3001.0 | 2500.0 | 2000.0 | 3691.0 | 3601.0 |
| W3(+3 − 2) | 143553+523831 | 14:35:52.59 | +52:38:31 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3691.0 | 3601.0 |
| W3(+3 − 1) | 143615+533431 | 14:36:14.59 | +53:34:31 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(+3 − 0) | 143638+543031 | 14:36:37.81 | +54:30:31 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(+3 + 1) | 143702+552631 | 14:37:02.35 | +55:26:31 | $u^*$, $g$, $r$, $i$, $z$ | 3001.0 | 2501.0 | 2000.0 | 4306.0 | 3601.0 |
| W3(+3 + 2) | 143728+562231 | 14:37:28.30 | +56:22:31 | $u^*$, $g$, $r$, $y$, $z$ | 3001.0 | 2500.0 | 2000.0 | 4921.0 | 3601.0 |
| W3(+3 + 3) | 143756+571831 | 14:37:55.78 | +57:18:31 | $u^*$, $g$, $r$, $i$, $z$ | 3001.0 | 2500.0 | 2000.0 | 4306.0 | 3601.0 |
| W4(+2 − 2) | 222054−003100 | 22:20:53.78 | −00:31:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 7995.0 | 7800.0 |
| W4(+2 − 1) | 222054+002300 | 22:20:53.77 | +00:23:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 7200.0 |
| W4(+2 + 0) | 222054+011900 | 22:20:53.88 | +01:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(+1 − 2) | 221706−003100 | 22:17:05.77 | −00:31:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 3690.0 | 3600.0 |
| W4(+1 − 1) | 221706+002300 | 22:17:05.77 | +00:23:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 8611.0 | 3600.0 |
| W4(+1 + 0) | 221706+011900 | 22:17:05.82 | +01:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(+1 + 1) | 221706+021500 | 22:17:05.94 | +02:15:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(+0 − 2) | 221318−003100 | 22:13:17.76 | −00:31:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 5000.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(+0 − 1) | 221318+002300 | 22:13:17.76 | +00:23:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 5000.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(+0 + 0) | 221318+011900 | 22:13:17.76 | +01:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2500.0 | 4305.0 | 7200.0 |
| W4(+0 + 1) | 221318+021500 | 22:13:17.76 | +02:15:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−1 − 2) | 220930−003100 | 22:09:29.75 | −00:31:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 3000.0 | 4305.0 | 3600.0 |
| W4(−1 − 1) | 220930+002300 | 22:09:29.76 | +00:23:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 5500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−1 + 0) | 220930+011900 | 22:09:29.70 | +01:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−1 + 1) | 220930+021500 | 22:09:29.59 | +02:15:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 5000.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−1 + 2) | 220930+031100 | 22:09:29.41 | +03:11:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−1 + 3) | 220930+040700 | 22:09:29.17 | +04:07:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−2 + 0) | 220542+011900 | 22:05:41.64 | +01:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2500.0 | 7995.0 | 3600.0 |
| W4(−2 + 1) | 220542+021500 | 22:05:41.41 | +02:15:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−2 + 2) | 220542+031100 | 22:05:41.06 | +03:11:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−2 + 3) | 220542+040700 | 22:05:40.58 | +04:07:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−3 + 0) | 220154+011900 | 22:01:53.58 | +01:19:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−3 + 1) | 220154+021500 | 22:01:53.23 | +02:15:00 | $u^*$, $g$, $r$, $i$, $z$ | 4200.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−3 + 2) | 220154+031100 | 22:01:52.70 | +03:11:00 | $u^*$, $g$, $r$, $i$, $z$ | 3000.0 | 2500.0 | 2000.0 | 4305.0 | 3600.0 |
| W4(−3 + 3) | 220154+040700 | 22:01:51.99 | +04:07:00 | $u^*$, $g$, $r$, $y$, $z$ | 3000.0 | 3000.0 | 2000.0 | 4305.0 | 3600.0 |

Table 8: The CFHTLS T0006 Wide stack list (cont'd)

### 3.2 Depth and completeness limit

The depth of the survey is measured by the completeness limit parameter. It is determined for each stack and each filter separately. The depth is also checked by using the galaxy counts computed after the production of each stack, during the `QualityFITS` analysis. All the completeness limit and galaxy count plots are available at `http://terapix.iap.fr/cplt/table_syn_T0006.html`.

To compute the completeness limit, we used image simulations produced by `SkyMaker`[10]. Noiseless images of point-like (stars or galaxy bulges) and disk-like (spiral galaxies) sources have been simulated by combining spheroid and disk models, using de Vaucouleur and exponential light profiles, respectively. The star and galaxy number densities of simulated sources correspond to the expectations for typical CFHTLS exposure times. Their slope and normalisation are based on realistic luminosity function in a standard Λ-CDM cosmology (for the galaxies), and are calibrated according to the transmission of MegaPrime filters.

The sources are then convolved by a PSF that takes into account the pupil of the CFHT telescope (mirrors and arms) and other components of the PSF. The PSF is built by using the diffraction and the simplest aberration components of the CFHT telescope, as well as the typical atmospheric contributions that degrade long exposures. The model produces a symmetric PSF with 0.7" FHWM. All simulated images have a constant seeing of 0.7", regardless the position on the MegaCam field or the filter.

The completeness limit is then derived from the averaged completeness value over the central 10000×10000 MegaCam fields. The statistics is computed in each fields separately and for each filter. The output is the fraction of sources detected and measured as function of magnitude. The magnitudes at 80% and 50% completeness are given for point-like (star or bulge) and for extended (disks) sources.

The 80% and 50% completeness values are calculated from an automated fitting process applied to the catalogues of real and simulated sources without tuning. The limiting magnitudes are derived automatically by an empirical two parameter $(x_0; \alpha)$ fitting function

$$y = 100.0 \times \left(1 - \frac{\mathrm{erf}\,[x - x_0]^{\alpha} + 1.0}{2.0}\right) \qquad (1)$$

where $x_0$ provides the turn-over position of the completeness function and $\alpha$ is the function slope at $x_0$. The parameters $(x_0; \alpha)$ are found from a standard $\chi^2$ minimization. The 50% and 80% completeness limits are derived from a linear interpolation. An example of fit is given in Fig. 9. In some cases, the fit and the interpolation are not good and the completeness value is then poorly estimated. Therefore, if exact values of completeness limits are needed, we recommend the CFHTLS user to double check the results.

The completeness distributions over the whole Wide fields and inside a wide field are presented in Table 3 as well as in the histograms of Fig. 11. A series of completeness maps show the mean depth over a MegaCam field, and the MegaCam-to-MegaCam depth fluctuations over the four Wide fields (see Fig. 12). The maps are produced for each Wide field and for each filter.

The histograms together with a detailed inspection of the data show that the mean scatter of the depth is ±0.10 magnitude, with significant variations from filter to filter. The completeness distribution in $z$-band is broader than other filters, with a tail that spreads over one magnitude. In contrast, the $r$ band distribution is much narrower (± 0.08 mag.).

Fig. 10 shows that the width of the distributions cannot be only related to the broad range of

[10] `http://adsabs.harvard.edu/abs/2009MmSAI..80..422B`

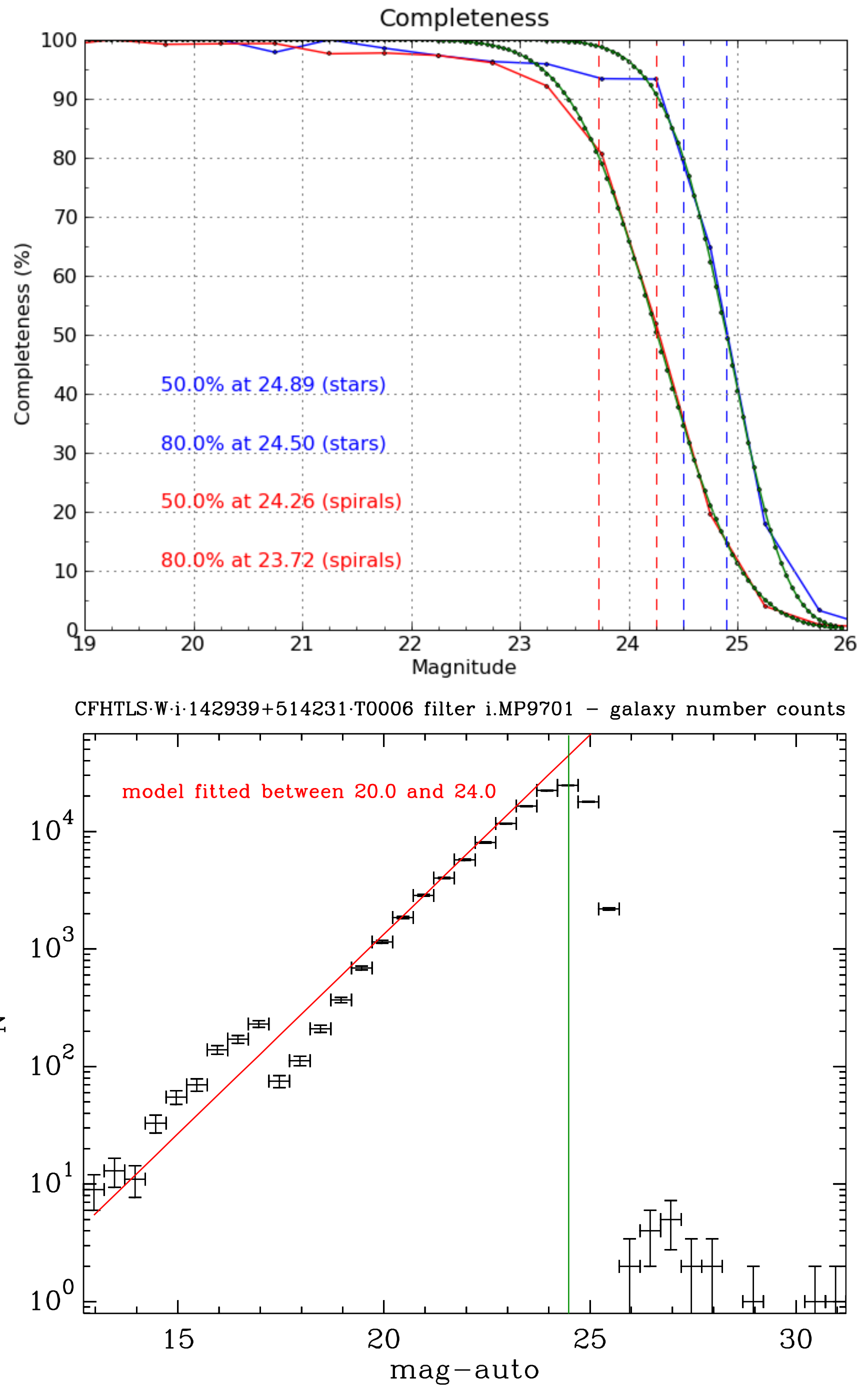



Figure 9: Completeness limit (top) for the W3 stack `CFHTLS_W_i_142939+514231` . The completeness is derived by adding a well-defined sample of simulated point-like and extended sources to real images. The sources are simulated by combining spheroid and disk models using de Vaucouleur and exponential light profiles respectively. The simulated images have all been produced with a constant seeing of 0.7", regardless the position in the MegaCam field or the filter. The images are then re-processed in the same way as the survey and the detections are compared to the initial simulated sample. The blue line shown on the plot connects the values of the completeness for point-like sources. The red line is for extended sources. The green dots show the best fitting functions which are used to derive the completeness values. For comparison, the bottom panel show the galaxy counts derived automatically by `QualityFITS` on this stack. The red line shows the expectations for the MegaCam *i*-filter. All magnitudes are in the MegaCam AB system.

exposure times. It mainly explains the $u^*$ and $z$ band observations, as the early CFHTLS Wide observing sequences for these filters had exposure times of 6000 and 7200 seconds respectively. However, for all filters most of the exposure times are indeed sharply distributed, so the large scatter of completeness distributions is mainly produced by other factors. For the $z$ band data the scatter in the completeness limits is probably dominated by the background left by the fringe subtraction residuals on some images. For the $u^*$ band, the broad range of limiting depth is likely produced by the diversity of observing conditions (Moon, extinction, seeing), but no clear correlation exists between any given parameter and depth for the $u^*$ band images. Although image quality is an important parameter we cannot assess how the depth degrades as function of the seeing from our analysis because our simulations have all been done with a constant seeing of 0.7" in all bands for each tile.

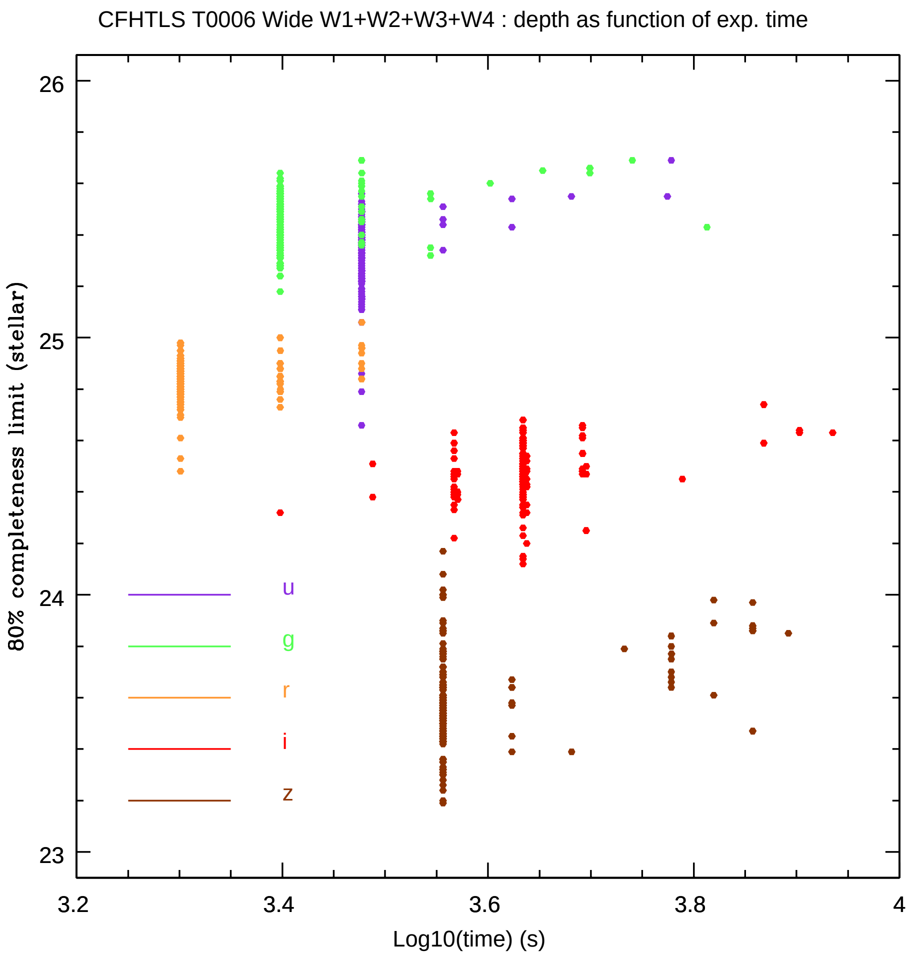



Figure 10: Completeness limit of Wide stacks as function of exposure time. A trend of increasing depth with increasing observing time is apparent. The effect is however diluted by the broad spread in depth at a given exposure time. The broad sky and weather conditions (extinction by cirrus or clouds, Moon, etc...) during observations explain the scatter of this distribution. The depth of some $z$-band stacks is also reduced by persistent residuals from the fringe subtraction.

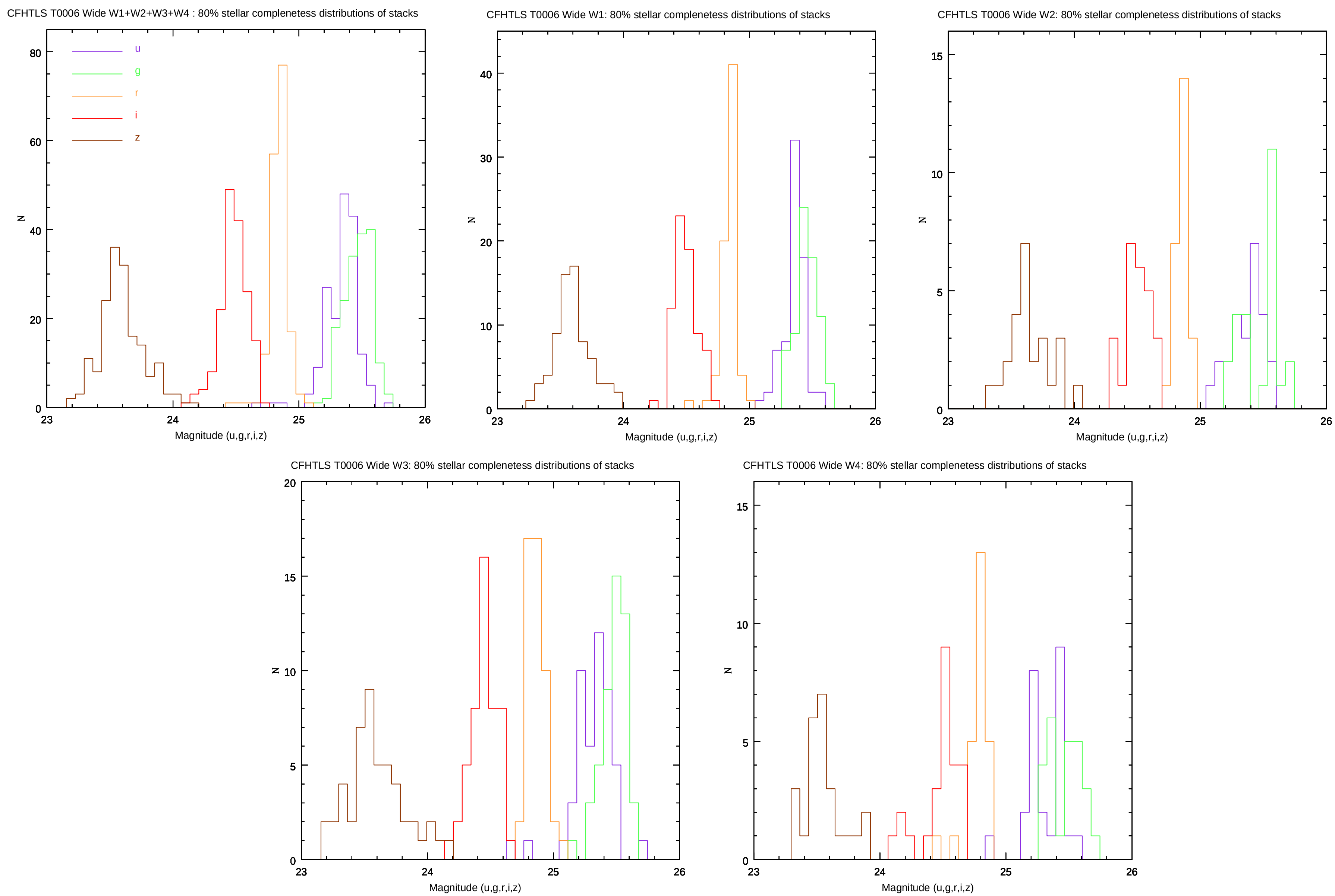



Figure 11: Distribution of completeness over the Wide fields. The left panel show the whole sample (W1+W2+W3+W4). The other panels show each Wide field separately. The horizontal axes are MegaCam AB magnitudes.

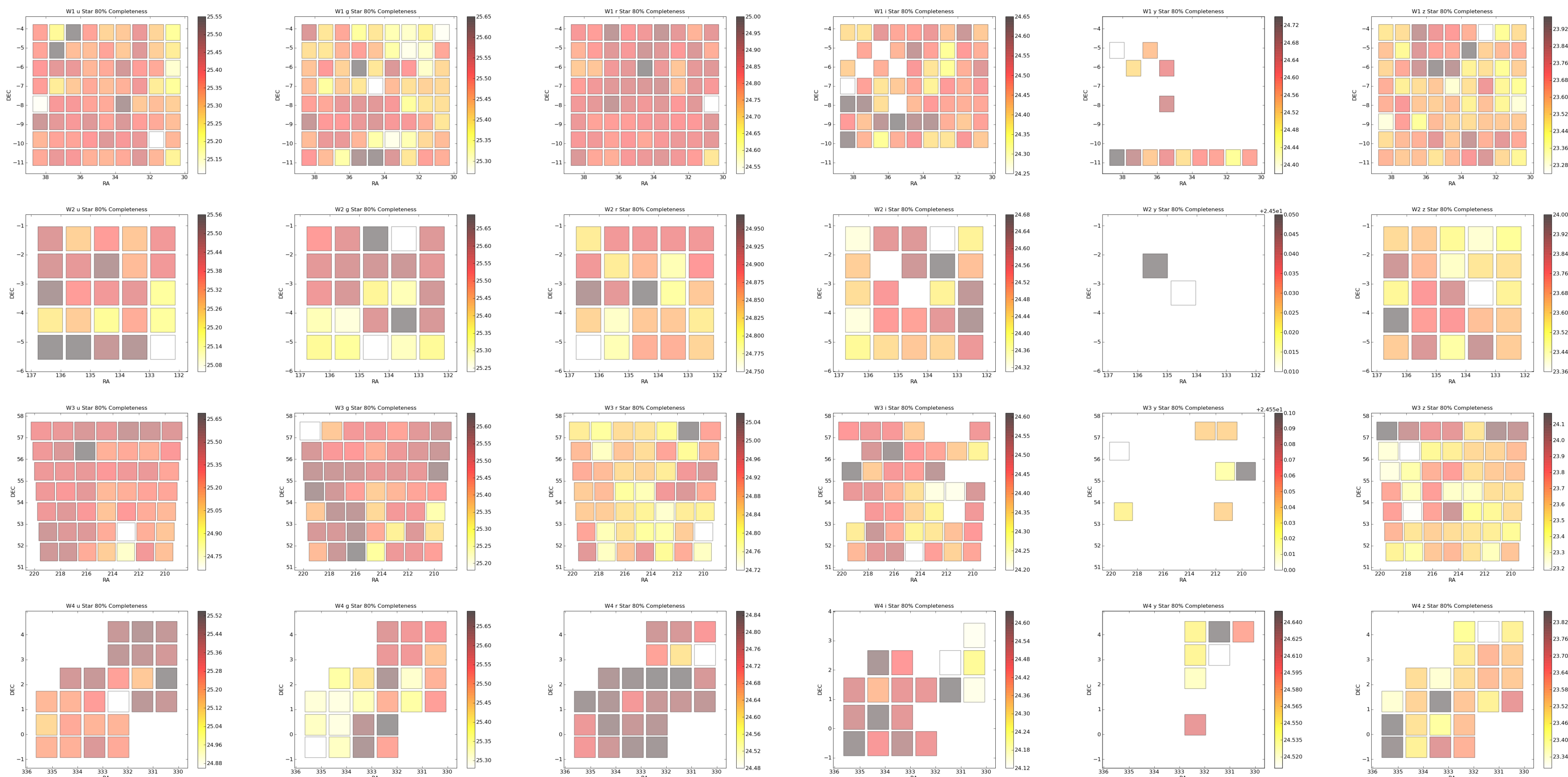



Figure 12: Maps of 80% completeness limits in W1, W2, W3 and W4 (from top to bottom). Each colored square represents a 1×1 deg$^2$ tile. Square colour indicates the seeing value, with darker squares have poorer seeing. From left to right: $u^*, g, r, i, y$ and $z$ bands.

### 3.3 Seeing and image quality

As in T0005, the seeing measurement provided by TERAPIX corresponds to the Gaussian Full Width Half Maximum (FWHM) of point sources, and not the half light radius as previously. All seeing values reported in this document and in tables are computed using `PSFEX`[11]. The seeing is measured from a two-dimensional Moffat model of the PSF. The FWHM is defined from the ellipticity parameters of the PSF as FHWM=$\sqrt{a\ b}$, where $a$ and $b$ are the size of the major and minor axes derived from the model. For single CFHTLS input images, the seeing is sampled over a CCD ($\sim 7' \times 14'$, see Fig. 13), and for T0006 stacks it is sampled over a $5' \times 5'$ grid.

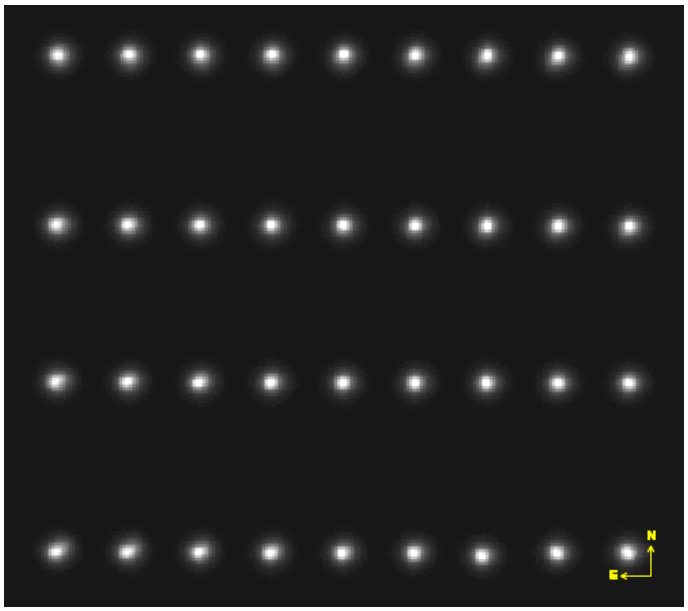



Figure 13: Seeing (FWHM) mapped over the input $i$-band image `743065p.fits` by `QualityFITS`-in. This image was taken before the MegaPrime optics were optimized (fall 2004) to deliver a uniform PSF across the entire field. It is used as an illustration of the image quality issue on MegaCam from May 2003 to Nov. 2004. Each spot shows an image of the PSF computed by `PSFEX` from a model of stars detected on the CCD. The optical distortion of the wide field corrector is clearly visible from PSF variation over the field. The median seeing over the MegaCam field is 0.692", but it is 0.642" at the center, on CCD#22 (spot 23 from the top left corner), and 0.795" at the bottom left corner.

The PSF model of each stack (Wide and Deep) is determined using stellar sources selected by `PSFex`. All unsaturated and sufficiently bright stellar sources identified over the entire MegaCam field are used.

The median seeing values of the survey are given in Table 2 and Table 3. The details of each stack can be found at `http://terapix.iap.fr/cplt/table_syn_T0006.html`. Overall, the CFHTLS Wide is within or better than expectations, thanks to the high ranking of the program which brought a realization on the sky in median conditions for a very fraction of the survey. The histograms drawn in Fig. 14 show the median seeing increases from $z$ to $u^*$. However, more than 98% of $g, r, i, y, z$ and more than 70% or $u^*$ band stacks have seeing better than 0.9". Note that the histograms show the distributions of seeing over the whole period of the survey. They merge together data obtained before (Dec. 4, 2004) and after the flip of the L3 lens of the MegaPrime Wide Field Corrector. The flip produced a spectacular improvement of the image quality and our merging of the pre-flip and post-flip periods contribute to the large scatter of the seeing

[11] Bertin et al 2009, in prep.

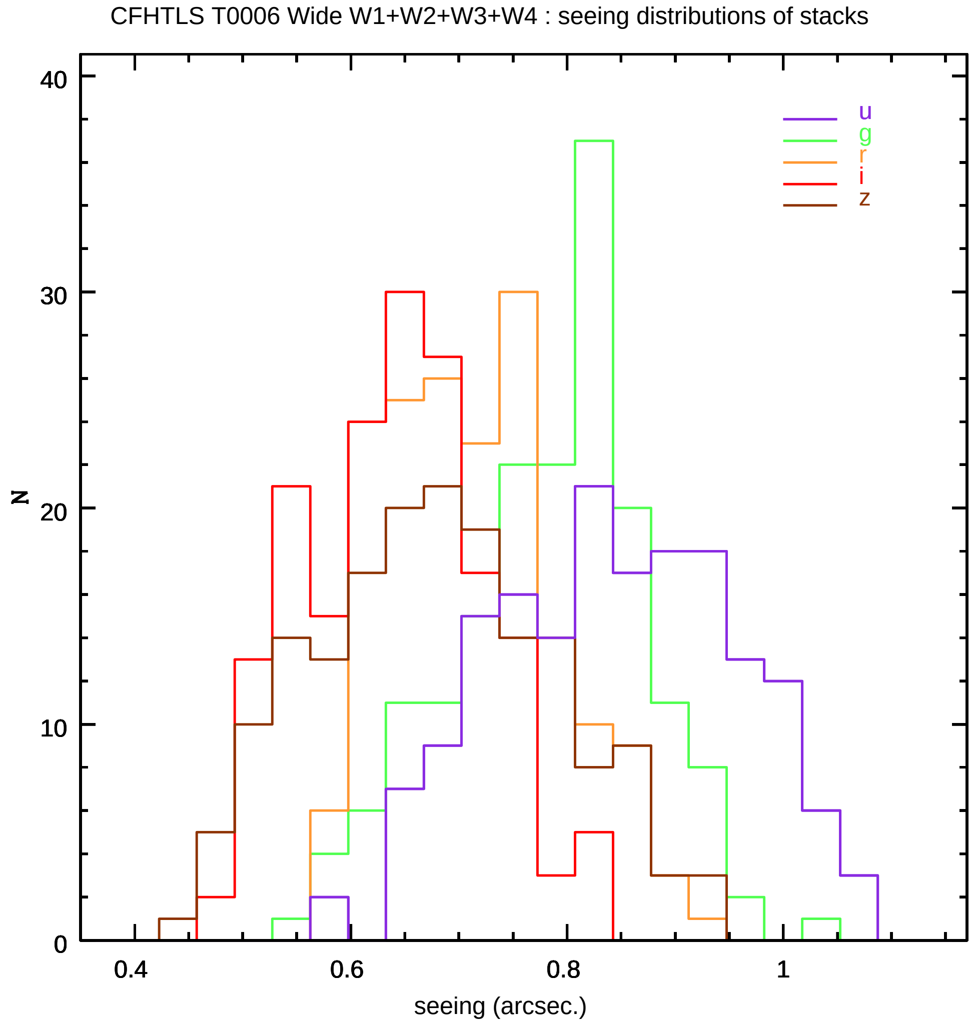



Figure 14: Distribution of the median seeing over the Wide tiles. The seeing is the FWHM=$\sqrt{a\ b}$ derived with PSFEX, from the fitting of a 2-dimension Moffat model of the PSF. The mean seeing value over the MegaCan field of each stack is available at `http://terapix.iap.fr/cplt/table_syn_T0006.html`.

distributions. Despite this extra-scatter term, the image quality of the CFHTLS Wide survey is excellent and unique compared to other wide field surveys.

Figure 15 shows maps of the spatial distribution of seeings in all Wide stacks and for each filter. No bias is observed, the median seeing of each stack appears randomly distributed over the four Wide fields.

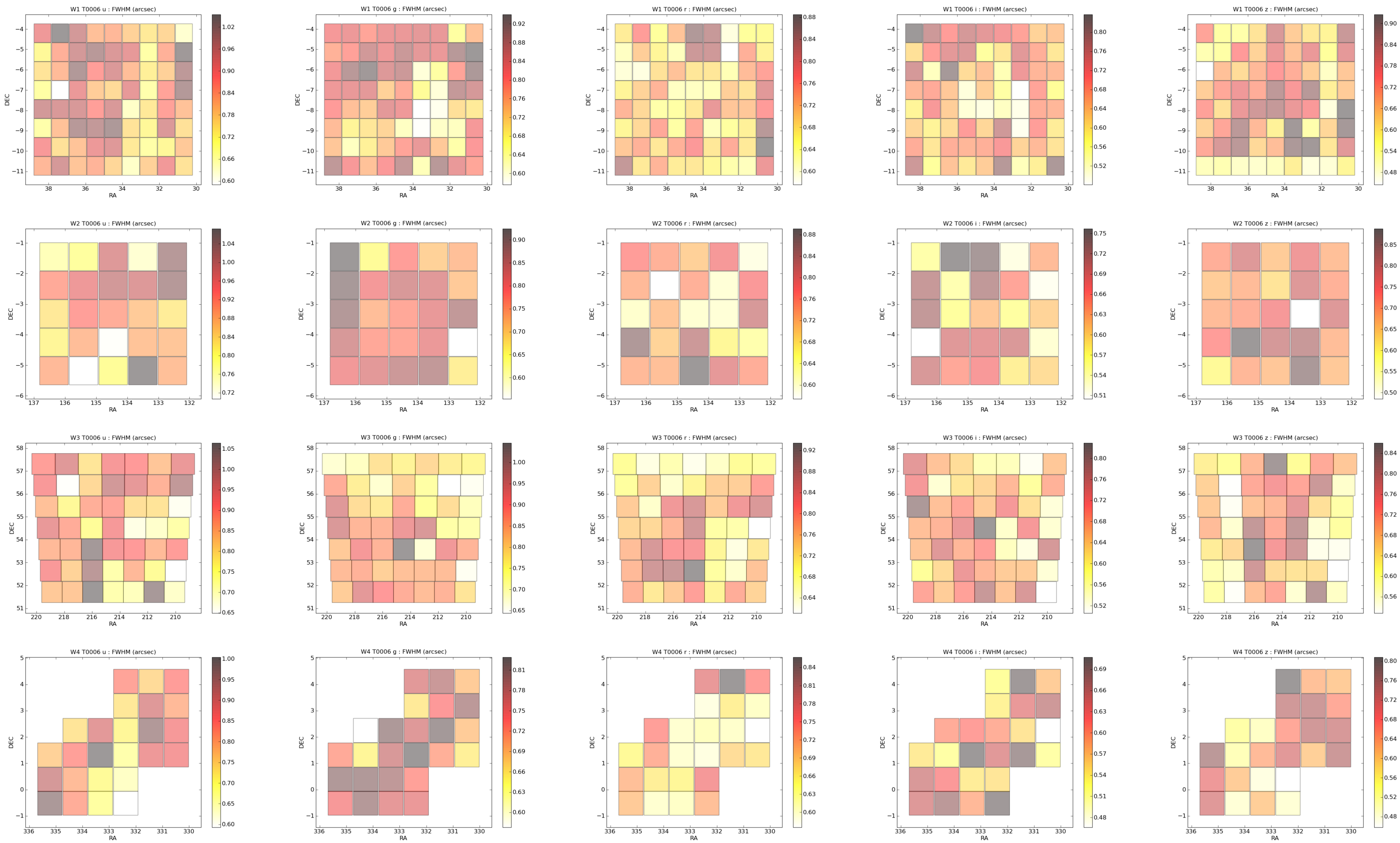



Figure 15: Maps of seeing (FWHM) in the CFHTLS Wide. Each small square represents a median seeing value over a $1^o \times 1^o$ tile (or a stack) of the wide survey. The panels show, from left to right, the $u^*$, $g$, $r$, $i/y$ and $z$ CFHTLS stacks. From top to bottom: W1, W2, W3 and W4.

Due to the optical distortion of the MegaPrime wide field corrector, image quality is not constant over the field. This well-known problem is responsible for a significant degradation of the PSF from the center to the edge of the MegaCam field of view (see Fig.13).

Figure 16 shows the seeing fluctuations on MegaCam. The seeing is averaged over a CCD field of view and compared to the mean seeing over the whole MegaCam field. The statistics is based on 6043 input images used for the CFHTLS Wide. For CCDs at the edges of the detector, the differences are important but never exceed 0.065", and the maximum peak-to-peak amplitude is less than 0.1" . This upper limit is acceptable. It still preserves the mean seeing over the whole MegaCam field of view below one arcsecond for all input images that will be combined into stacks.

In addition to the smearing, the PSF elongation also increases with radial distance to the center field (see Fig. 13). It results in an non-isotropic degradation of the mean seeing at the extreme boundary of the field that can be as large as 0.25", to rise up by 20% at radial distance beyond 40' from the center of the MegaCam field. The median seeing values and the shape of the PSF quoted in this report are therefore not correct at the very edge of MegaCam. We recommend using the T0006 masks to discard the sources located in these extreme regions.

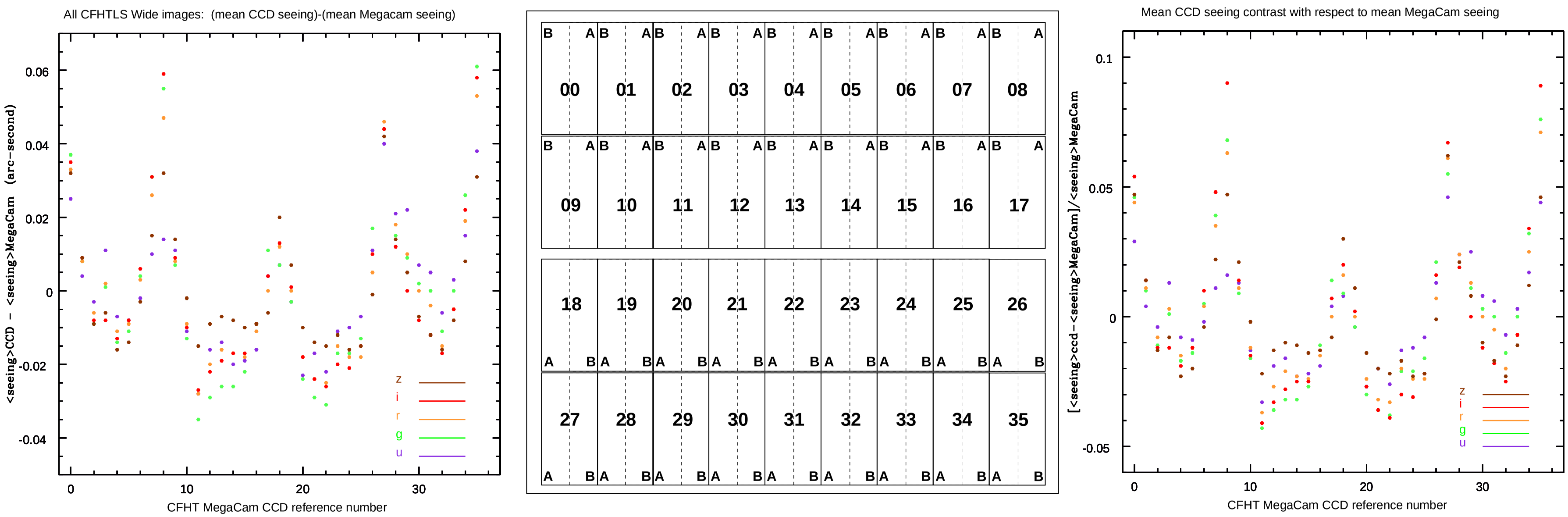



Figure 16: PSF variations as function of the position on MegaCam (CCD positions) and wavelength (filters), produced by the optical distortion of the MegaPrime Wide field corrector. These statistics are based on 935 $u^*$, 978 $g$, 1669 $r$, 1064 $i$ and 1177 $z$-band images (the 220 $y$-band images have been discarded). The variations are estimated from the comparison between the mean seeing (FWHM) averaged over the MegaCam field of view and the mean seeing averaged over a CCD field of view. The statistics are computed over the 36 CCDs composing the mosaic. The CCDs are numbered using the CEA-CFHT CCD reference number laid out on the central figure. The left panel show the difference $\langle \mathrm{FHWM} \rangle_{\mathrm{CCD}} - \langle \mathrm{FHWM} \rangle_{\mathrm{MegaCam}}$ expressed in arcseconds. The horizontal axis is the CEA-CFHT CCD reference number. One can see that for the CCDs at the edges of the detector, the differences never exceed 0.065", and the highest peak-to-peak amplitude is less than 0.1". The right panel shows the seeing contrast $\frac{|\langle \mathrm{FHWM} \rangle_{\mathrm{CCD}} - \langle \mathrm{FWHM} \rangle_{\mathrm{MegaCam}}|}{\langle \mathrm{FWHM} \rangle_{\mathrm{MegaCam}}}$. The contrast is always lower than 10% and the highest peak-to-peak contrast amplitudes are always less than 15%. Overall, the range of seeing values over the MegaCam field of view is acceptable. However, at the corners of MegaCam, the seeing difference with the mean value can be as large as 0.25". Only the most extreme positions have a large PSF degradation and images that no longer meet the specifications of the surveys. We discard these regions by adding extra polygons to the T0006 `.reg` files that mask the edges of all stacks. The fraction of the MegaCam field lost is less than 3%.

## 3.4 Photometric accuracy

The photometric calibration of the CFHTLS Wide survey relies on the CFHTLS magnitude zero-point (ZP) provided by CFHT in the FITS header. The images flagged as photometric by CFHT are considered as photometric "anchor" points. The field-to-field rescaling is computed by the SCAMP software using sources located in the overlapping regions of all input images (see Fig. 7) tied to these photometric exposures. The photometric field-to-field flux rescaling of each MegaCam image is carried out with the 2MASS reference source catalogue[12] in order to have a homogeneous calibration scheme for the four Wide patches (some are not covered by SDSS).

Although SCAMP provides estimates of the internal photometric errors we do not use them for the measurements below. We instead focus on the photometric errors in the final stack products of T0006. In this way, initial calibration errors and any other subsequent source of errors, inside each stack and field-to-field are better taken into account. The analyses should provide a more realistic error.

### 3.4.1 Internal photometric errors of Wide stacks from simulations

The internal photometric errors are derived using the same simulations used in the completeness analyses. The use of simulations enables a better control of the input and output sources. It also guarantees that all Wide stacks are evaluated in a consistent way.

As for the completeness tests simulated sources are added to the real T0006 Wide stacks and processed the same way as real sources. Their photometry is then compared to the input simulated values. The simulated sources are added within the central 10000×10000 pixel and consequently are expected to be free from border effects.

The test has been applied to the 855 Wide stacks, using simulated stars and galaxies. For each sample, the magnitude difference between the input and the output simulated sources as function of magnitude is computed and the FWHM of the magnitude distribution is derived after 3-$\sigma$ clipping. The internal error is then given by $\sigma_{mag}$ =FWHM/2.35 .

Error estimates are computed for sources selected with signal-to-noise ratios of 10, 30 and 100, respectively, or as a function of magnitude Fig. 17 shows an example result for internal photometric analysis of the CFHTLS T0006 Wide stack CFHTLS_W_g_020241-041200_T0006. The statistics compare the MAG_AUTO magnitude calculated by SExtractor for several thousands of stellar and extended sources. It is interesting to notice that the results are very stable down to signal-to-noise values of 10. Note that the difference between the input and output magnitudes as function of magnitude is not flat, but tilted. The tilt may artificially increase the dispersion inside a magnitude bin and may spoil the internal error estimates, if the bin is large. The mean inside a bin is then corrected from the tilt prior to derive a *rms* or a FWHM.

The internal errors per magnitude bin are listed in Table 9. The sources comprise both stars and galaxies. The results are only shown for the magnitude intervals below the completeness limit and for which all sources have signal-to-noise ratio larger than 10.

[12] Cutri et al 2006; http://www.ipac.caltech.edu/2mass/releases/allsky/doc/explsup.html

| Wide Field | Magnitude range [MegaCam AB] | $u^*$ [mag.] | $g$ [mag.] | $r$ [mag.] | $i$ [mag.] | $y$ [mag.] | $z$ [mag.] |
|---|---|---|---|---|---|---|---|
| W1 | [19.0 – 20.0] | 0.003 | 0.004 | 0.004 | 0.006 | 0.005 | 0.014 |
| | [20.0 – 21.0] | 0.007 | 0.006 | 0.008 | 0.011 | 0.010 | 0.032 |
| | [21.0 – 22.0] | 0.012 | 0.011 | 0.017 | 0.026 | 0.025 | 0.076 |
| | [22.0 – 23.0] | 0.028 | 0.025 | 0.042 | 0.063 | 0.058 | - |
| W2 | [19.0 – 20.0] | 0.003 | 0.003 | 0.005 | 0.006 | - | 0.014 |
| | [20.0 – 21.0] | 0.008 | 0.007 | 0.009 | 0.012 | - | 0.032 |
| | [21.0 – 22.0] | 0.012 | 0.012 | 0.018 | 0.027 | - | 0.075 |
| | [22.0 – 23.0] | 0.029 | 0.027 | 0.044 | 0.065 | - | - |
| W3 | [19.0 – 20.0] | 0.003 | 0.004 | 0.004 | 0.006 | 0.007 | 0.013 |
| | [20.0 – 21.0] | 0.007 | 0.007 | 0.008 | 0.012 | 0.011 | 0.031 |
| | [21.0 – 22.0] | 0.012 | 0.012 | 0.017 | 0.027 | 0.024 | 0.075 |
| | [22.0 – 23.0] | 0.029 | 0.025 | 0.041 | 0.073 | 0.061 | - |
| W4 | [19.0 – 20.0] | 0.003 | 0.004 | 0.004 | 0.006 | 0.007 | 0.013 |
| | [20.0 – 21.0] | 0.007 | 0.007 | 0.011 | 0.012 | 0.011 | 0.031 |
| | [21.0 – 22.0] | 0.012 | 0.012 | 0.020 | 0.028 | 0.024 | 0.075 |
| | [22.0 – 23.0] | 0.029 | 0.034 | 0.047 | 0.068 | 0.062 | - |

Table 9: Internal photometric errors per magnitude bins derived for each CFHTLS Wide field. The simulated sources include stars and galaxies and are detected and analysed as real sources. The errors are the FWHM/2.35, as shown in Fig. 17. They are corrected from the amplitude of the tilt from horizontal of the difference between of the input and output magnitudes as function of magnitude inside the bin. The magnitude ranges quoted in the table only comprise bins with all sources below the completeness limits and with all sources having a signal-to-noise ratio larger than 10. The W2 $y$-band is not quoted because it only concerns 2 stacks and the statistics are meaningless for these fields.

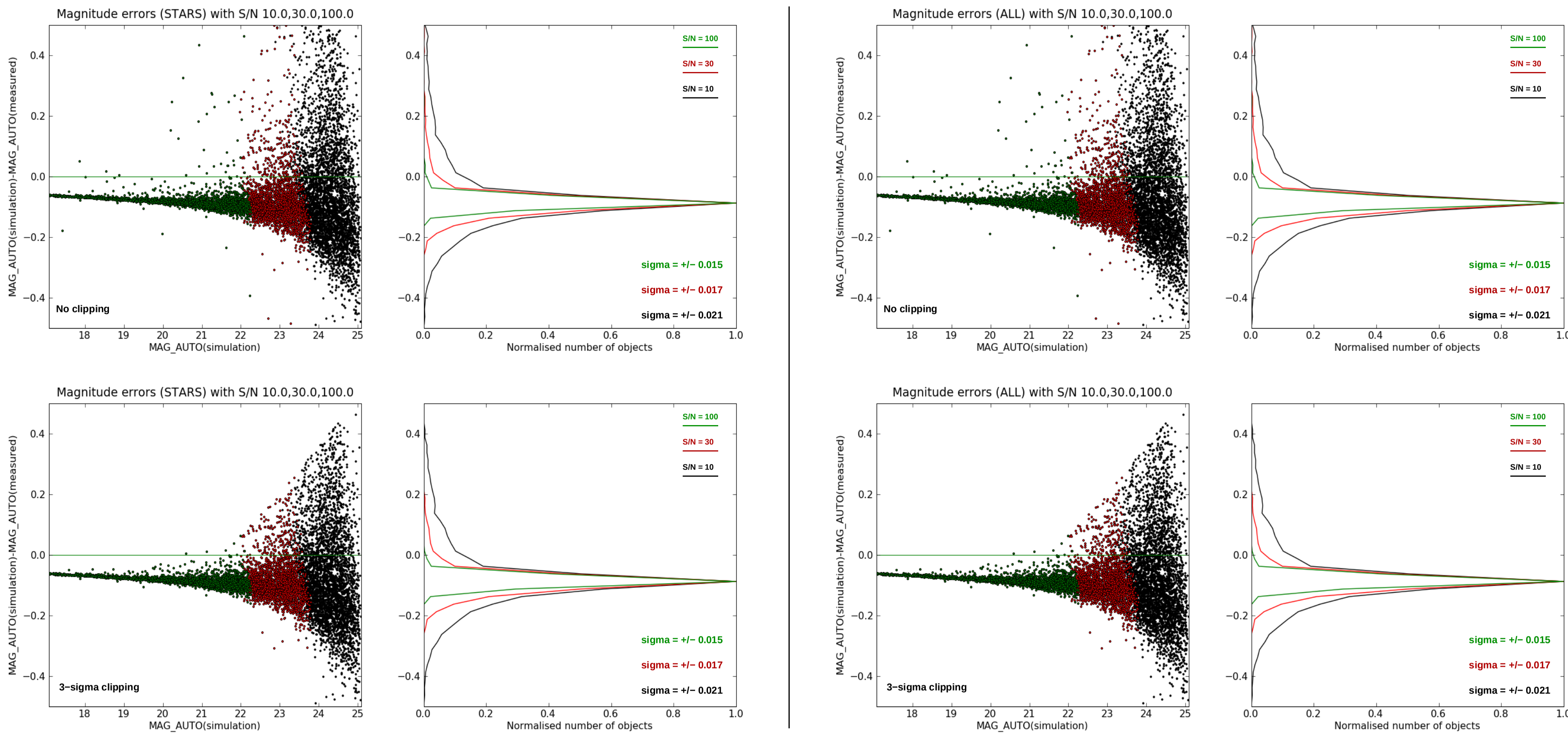



Figure 17: Analysis of the internal photometric errors in CFHTLS_W_g_020241-041200_T0006 using simulations. The left panels show the results based on stellar sources only, and the right with stars and disks. The top panels are analysed without clipping on the parent sample and the bottom panels after a 3-$\sigma$ clipping. The figures show the results for three sub-samples selected from signal-to-noise ratio (not magnitudes): S/N=10 (black), 30 (red) and 100 (green). Each panel is split into two plots. On the left the magnitude differences between the *true* input and the *measured* output magnitudes of simulated sources are drawn as function of magnitude. The sub-samples are shown in green, red and black colors. On the right, the normalised distributions for the three sub-samples are shown. The derivation of the FWHM and the errors, $\sigma$=FWHM/2.35, quoted on the bottom right are derived from the histograms. Note that the magnitude difference as function of magnitude is not constant. The tilt is corrected prior to compute the FWHM and the errors inside a magnitude bin quoted in Table 9.

### 3.4.2 Error estimation from Wide fields

The internal photometric errors of the Wide survey can also be estimated using common sources between overlapping tiles. Since each tile is shifted by 56 arcminutes in RA and 57 arcminutes in DEC with respect to its nearest tiles overlap regions are $4' \times 1^o$ or $3' \times 1^o$ (see Fig. 7).

We use the $u^*$, $g$, $r$, $i$ and $z$-band MAG_AUTO sources located in these regions to compare the photometry of sources detected in two adjacent stacks. The internal error is derived from the mean of the absolute magnitude differences of all source pairs. The use of the overlap regions provide a very useful insight of the "real" internal errors inside the data. However, it can only be applied on thin strips located and the edges of images where the stack quality is the most questionable. So the analysis of source pairs in the overlap region is complementary to the previous statistics based on simulations.

For the parent samples, only unsaturated $i$-bright sources outside masked regions with

$$17. < i < 20. \text{ and } u^* < 23 \text{ and } g < 23 \text{ and } z < 22 \ , \tag{2}$$

are selected and compared. Both galaxies and stars are used. Around 200 different overlapping regions, with 50 to 450 sources per region, have been used. The four W1, W2, W3 and W4 fields are equally sampled, according to their extension and sky coverage.

The derived errors are listed in table 10. The errors are larger in $u^*$ and $z$ bands for several reasons: the rather broad range of signal-to-noise of sources in in these filters, the residuals from fringe subtractions in $z$, the image degradation in $u^*$ and at the edges of the stacks, and the residuals from the internal calibration errors. These results are in good agreement with the simulations shown on Fig. 9.

Note that due to the dithering patterns set during the observing sequences, the signal-to-noise is lower and non-uniform in the overlapping regions and drops near the field boundary. This contributes to degrade flux measurements and other parameter estimates.

### 3.4.3 Systematic offsets between CFHTLS and SDSS

External photometric error estimates cannot be reliably measured from the photometric output of `SCAMP` given the different wavelength coverage of the CFHTLS and 2MASS.

The SDSS-R6 catalogue is a better candidate to compute photometric errors. Unfortunately, it only partially overlaps with CFHTLS; only 97 Wide fields amongst 171 have sources common with SDSS. External photometric accuracy and errors computed using these overlaps are discussed in this section, first by comparing directly with the SDSS sub-samples and secondly by an analysis of stellar color-color tracks.

As in T0004 and T0005 releases, the photometric calibration has been verified by comparing the CFHTLS and SDSS bright sources in regions where the SDSS R6 overlaps with the W1, W3 and W4 fields. Unfortunately, there is no overlap with W2.

The CFHTLS photometry is first transformed into the SDSS system using the equations derived by Regnault et al (2009, arXiv:0908.3808) for $u^*$, $g$, $r$, $i$ and $z$, and from CFHT (private communication) for the $y$ band:

| Wide field | $\sigma_{u^*}$ [mag. $\pm rms$] | $\sigma_g$ [mag. $\pm rms$] | $\sigma_r$ [mag. $\pm rms$] | $\sigma_i$ [mag. $\pm rms$] | $\sigma_z$ [mag. $\pm rms$] |
|---|---|---|---|---|---|
| Wide-ALL | 0.04 ±0.02 | 0.02 ±0.01 | 0.02 ±0.01 | 0.02 ±0.01 | 0.03 ±0.02 |
| W1 | 0.04 ±0.02 | 0.02 ±0.01 | 0.02 ±0.01 | 0.02 ±0.01 | 0.03 ±0.01 |
| W2 | 0.04 ±0.01 | 0.03 ±0.01 | 0.03 ±0.01 | 0.02 ±0.01 | 0.03 ±0.02 |
| W3 | 0.04 ±0.02 | 0.02 ±0.01 | 0.02 ±0.01 | 0.01 ±0.01 | 0.02 ±0.01 |
| W4 | 0.04 ±0.01 | 0.02 ±0.01 | 0.02 ±0.01 | 0.02 ±0.01 | 0.03 ±0.02 |

Table 10: Check of the internal photometric errors in the T0006 CFHTLS Wide release derived from the comparison of magnitudes of sources located in the overlap regions of adjacent stacks. The internal errors are computed from the final T0006 "merged source catalogues" (M-SC, see Section 5.3) which contains all MAG_AUTO magnitudes of sources detected on the $u^*$, $g$, $r$, $i/y$, $z$ and chi2 images. They are derived from the mean of the absolute magnitude differences of source pairs, averaged over overlapping regions of neighboring stacks. Only source pairs with photometric data in 5 filters, with $17. < i < 20.$ , and $u^* < 23$ , and $g$ ,$< 23$ and ,$z < 22$ have been selected. Both point-like and extended sources are used. Due to the dithering patterns the signal-to-noise is lower and non-uniform in the overlapping regions and degrades when we get closer to the edge. This contributes to artificially increase the internal errors derived from source pairs. The results are in good agreement with the previous study, based on image simulations (see Table 9). For a faint source with the following set of magnitudes ($u^*$,$g$,$r$,$i/y$,$z$)≃(24,24,24,24,22.5), the photometric errors increase significantly. As a result, the errors quoted in Table 3 increase by a factor of $\sim 2$ in all bands for sources with ($u^*$,$g$,$r$,$i/y$,$z$)≃(24,24,24,24,22.5).

$$\begin{array}{lclcll} u_{\mathrm{CFHTLS}} - u_{\mathrm{SDSS}} & = & -0.211 & \times & (u-g)_{\mathrm{SDSS}} & , \\ g_{\mathrm{CFHTLS}} - g_{\mathrm{SDSS}} & = & -0.155 & \times & (g-r)_{\mathrm{SDSS}} & , \\ r_{\mathrm{CFHTLS}} - r_{\mathrm{SDSS}} & = & -0.030 & \times & (r-i)_{\mathrm{SDSS}} & , \\ i_{\mathrm{CFHTLS}} - i_{\mathrm{SDSS}} & = & -0.102 & \times & (r-i)_{\mathrm{SDSS}} & , \text{ for the } i \text{ (i.9701) filter ,} \\ y_{\mathrm{CFHTLS}} - i_{\mathrm{SDSS}} & = & -0.003 & \times & (r-i)_{\mathrm{SDSS}} & , \text{ for the } y \text{ (i.9702) filter , and} \\ z_{\mathrm{CFHTLS}} - z_{\mathrm{SDSS}} & = & +0.036 & \times & (i-z)_{\mathrm{SDSS}} & . \end{array} \quad (3)$$

These equations are mean transformation equations that apply over the MegaCam camera. Note that they are slightly different from those used in the previous releases. Compared with T0005 there is a slight change in the $r-$ offset, with minimal difference in the other filters. The CFHTLS and SDSS sources have been cross-identified using the public SDSS catalogue (Data Release DR6; `http://www.sdss.org`) and the MAG_AUTO magnitudes of the CFHTLS M-SC catalogue. The CFHTLS and SDSS photometry data have been compared using a well-defined common sample bright stars in unmasked regions of CFHTLS stacks. For W1, W2 and W3, only unsaturated stellar objects with $17 < i < 21$ (i.e the limiting magnitude for a clear star/galaxy separation) located inside a cross-identification radius of 2" have been used. For W4, which is more contaminated by very bright stars, we only used stellar sources ranging within $17 < i < 20$.

The mean offset for the $m$-band inside a MegaCam field, $\delta_m$, is calculated using a weighted

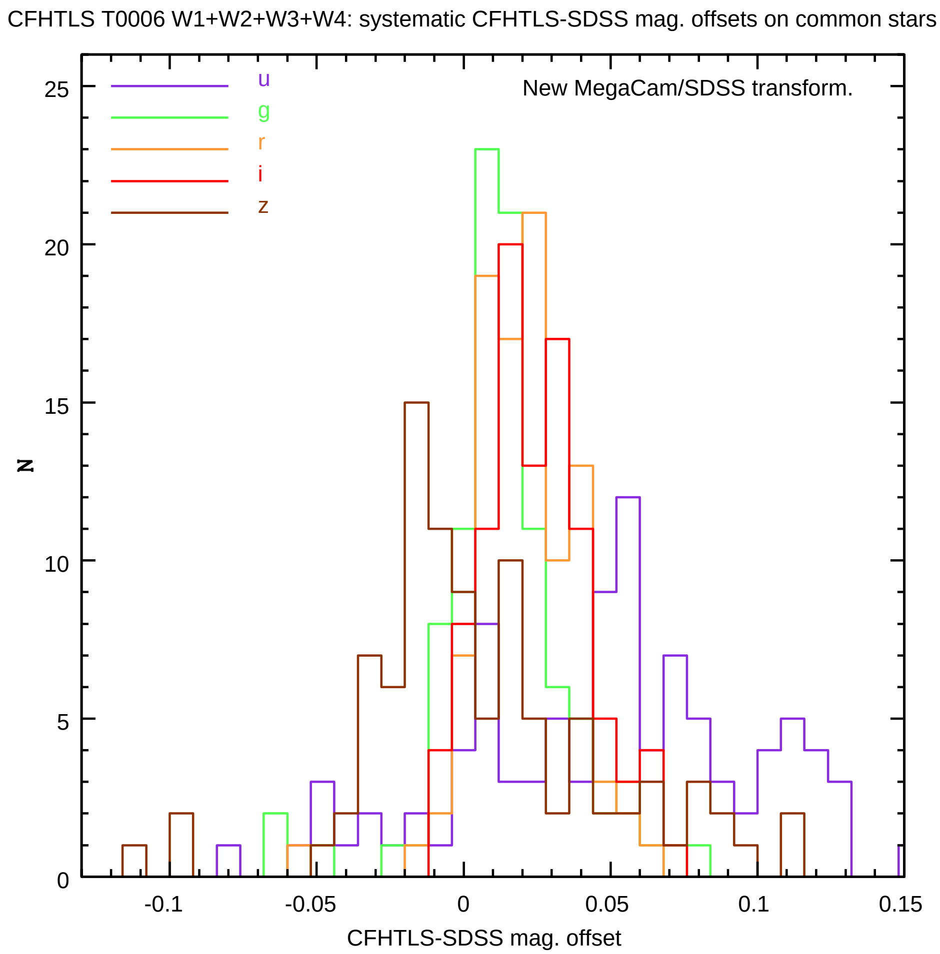



Figure 18: Distributions of photometric offsets, $\delta_{m=u^*,g,r,i/y,z}$, between CFHTLS Wide and SDSS, based of stars common to both surveys.

mean :

$$\delta_m = \frac{\sum_i w_i \left(m_{\mathrm{CFHTLS}_i} - m_{\mathrm{SDSS}_i}\right)}{\sum_i w_i} \quad , \text{ with } \quad w_i = \frac{1}{\sigma^2_{\mathrm{CFHTLS}_i} + \sigma^2_{\mathrm{SDSS}_i}} \quad , \tag{4}$$

where $i$ is the index for each common star, $m_i$ denote the magnitudes, and $\sigma_i$ the magnitude errors as listed in the CFHTLS and the SDSS catalogues. Note that the offsets calculated here are averaged over a full MegaCam field. As shown by the SuperNovae Legacy Survey (SNLS) team, these offsets can vary from CCD to CCD and produces some residuals on CCD scale.

From this star sample, we define three different mean magnitude offset values, depending on the angular scale over which the offset is averaged:

- the 97 mean offsets, $\delta_{m=u^*,g,r,i/y,z}$, averaged over a MegaCam field. They are computed for all stacks with common stars between CFHTLS and SDSS. The offset values are listed in Tables 12, 13 and 14 as well as at `http://terapix.iap.fr/cplt/table_syn_T0006.html`;
- the W1, W2, W3 and W4 offsets, averaged over each wide field, $\langle\delta_{m=u^*,g,r,i/y,z}\rangle$. They are summarized in Table 3 and in the histograms of Fig. 18 and 19;

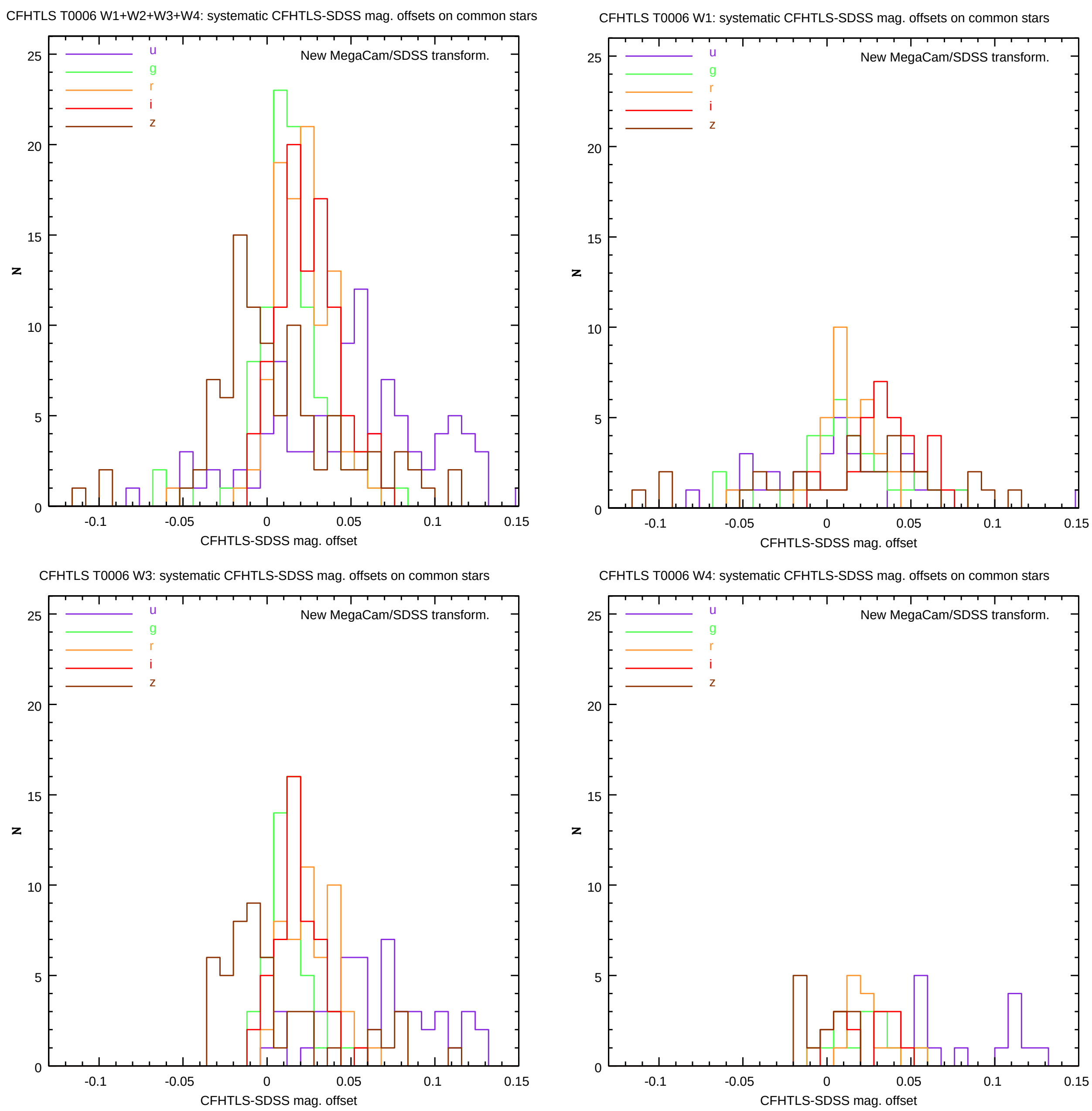



Figure 19: Distributions of photometric offsets, $\delta_{m=u^*,g,r,i/y,z}$, between CFHTLS Wide and SDSS for W1, W3 and W4. The top left plot is the same as the previous figure, where all fields are merged together.

| Filter | CFHTLS-SDSS magnitude offset (W1+W3+W4) | | |
|---|---|---|---|
| | Mean [mag.] | Median [mag.] | *rms* [mag.] |
| $\langle\Delta_{u^*}\rangle$ | +0.049 | +0.049 | 0.048 |
| $\langle\Delta g\rangle$ | +0.013 | +0.013 | 0.022 |
| $\langle\Delta_r\rangle$ | +0.021 | +0.018 | 0.017 |
| $\langle\Delta_{i/y}\rangle$ | +0.024 | +0.023 | 0.018 |
| $\langle\Delta_z\rangle$ | +0.007 | −0.004 | 0.041 |

Table 11: Mean magnitude offsets, $\langle\Delta_{m=u^*,g,r,i/y,z}\rangle$, between the CFHTLS and the SDSS R6 surveys, using the whole sample of common stars found in W1, W3 and W4. The *rms* errors are a combination of variance from the true errors and an additional source of uncertainty arising from the different mean offsets of W1, W3 and W4 with respect to SDSS. The values quoted for each Wide in Table 15 are more appropriate measurements of the external errors. The mean offsets for W1, W3 and W4 are also given in Table 3, and the values which should be applied to apply to each stack are listed in Table 12, 13 and 14 (see also `http://terapix.iap.fr/cplt/table_syn_T0006.html`). The distribution over the 97 fields are shown on Fig. 18. Note the large scatter on $\langle\Delta_z\rangle$, the values found $\langle\delta_z\rangle$, and the difference between the mean and median values. The offsets found in $z$ are indeed compatible with zero.

- the mean CFHTLS Wide offsets averaged over whole Wide survey, $\langle\Delta_{m=u^*,g,r,i/y,z}\rangle$, are listed in Table 11.

The external photometric errors are then derived by applying the 97 mean offset values for each tile tiles and by computing the *rms* of the distribution. The results are presented in the next section following the discussion of magnitude offsets.

The mean offsets between the whole CFHTLS Wide and the SDSS are listed in Table 11. We verified that if we used the old MegaCam to SDSS transformations, the offsets are similar to T0005.

The histograms of Fig. 18 are more accurate views of the whole sample. The $z$ band shows a trend toward a negative offset which is not apparent from the mean value only, while the $u^*$ shows an opposite trend. The distributions of the magnitude offsets seem skewed towards positive values, which biases the derivation of the means. The skewness is more pronounced in $z$-band. The $z$-band offset distribution is broad and has a negative mode value, which, together with the large positive skewness, explains the difference between the mean and median values for this filter.

Fig. 19 separates W1, W3 and W4. There is no large visible difference between the 3 fields. In particular the histograms confirm that the $g$ and $r$ mean and *rms* offset values are small and stable from field to field. We therefore consider that *the $g$ and $r$ band offsets as most reliable and the $i/y$ as reliable, although in all cases, the $g, r$ and $i/y$ offsets are small and close to the rms internal photometric errors.*

The distributions of photometric offsets in W3 and W4 are similar in all bands. However, the W4 sample is small and the interpretation of the W4 histograms is somewhat speculative. The W1 distributions look broader than W3 and W4 and show less pronounced maxima in the $u^*$ and $z$-bands. As compared to other Wide fields, the W1 $u^*$-band offset is shifted towards low

| W Cartesian Ident name | CFHTLS Ident name | $\delta_{u^*}$ [mag.] | $\delta_g$ [mag.] | $\delta_r$ [mag.] | $\delta_{i/y}$ [mag.] | $\delta_z$ [mag.] |
|---|---|---|---|---|---|---|
| W1(−4 − 4) | 020241−104400 | −0.084 | −0.050 | −0.002 | +0.004 | −0.097 |
| W1(−4 − 3) | 020241−094800 | −0.048 | +0.017 | +0.027 | +0.045 | −0.040 |
| W1(−4 − 2) | 020241−085200 | −0.030 | +0.066 | +0.030 | +0.045 | −0.036 |
| W1(−4 − 1) | 020241−075600 | −0.014 | +0.060 | +0.024 | +0.049 | −0.023 |
| W1(−3 − 4) | 020631−104400 | −0.037 | −0.061 | −0.052 | −0.008 | −0.112 |
| W1(−3 − 3) | 020631−094800 | −0.011 | −0.005 | −0.005 | +0.037 | −0.031 |
| W1(−3 − 2) | 020631−085200 | +0.068 | +0.039 | +0.009 | +0.053 | −0.046 |
| W1(−3 − 1) | 020631−075600 | +0.005 | +0.084 | +0.006 | +0.062 | −0.093 |
| W1(−2 − 3) | 021021−094800 | +0.009 | +0.004 | +0.007 | +0.042 | +0.097 |
| W1(−2 − 2) | 021021−085200 | +0.016 | +0.025 | +0.025 | +0.065 | +0.053 |
| W1(−2 − 1) | 021021−075600 | −0.001 | −0.001 | +0.038 | +0.065 | +0.046 |
| W1(−1 − 3) | 021410−094800 | +0.016 | +0.025 | −0.003 | +0.040 | +0.111 |
| W1(−1 − 2) | 021410−085200 | +0.007 | −0.005 | +0.011 | +0.055 | +0.040 |
| W1(−1 − 1) | 021410−075600 | −0.050 | −0.019 | +0.038 | +0.038 | +0.032 |
| W1(−0 − 3) | 021800−094800 | +0.053 | +0.014 | +0.004 | +0.040 | +0.068 |
| W1(−0 − 0) | 021800−070000 | −0.048 | −0.064 | −0.017 | +0.034 | −0.014 |
| W1(−0 − 2) | 021800−085200 | +0.051 | −0.010 | +0.029 | +0.033 | −0.001 |
| W1(−0 − 1) | 021800−075600 | −0.021 | +0.013 | +0.027 | +0.052 | +0.047 |
| W1(+1 − 3) | 022150−094800 | −0.031 | +0.001 | +0.008 | +0.025 | +0.087 |
| W1(+1 − 2) | 022150−085200 | +0.024 | +0.009 | +0.016 | +0.031 | −0.011 |
| W1(+1 − 1) | 022150−075600 | +0.148 | +0.028 | +0.030 | +0.015 | +0.053 |
| W1(+1 − 0) | 022150−070000 | +0.000 | −0.024 | +0.005 | +0.072 | +0.037 |
| W1(+2 − 3) | 022539−094800 | +0.025 | +0.007 | +0.004 | +0.024 | +0.092 |
| W1(+2 − 2) | 022539−085200 | −0.017 | +0.007 | +0.016 | +0.028 | +0.028 |
| W1(+2 − 1) | 022539−075600 | +0.033 | +0.004 | +0.011 | +0.031 | +0.032 |
| W1(+2 − 0) | 022539−070000 | +0.079 | +0.032 | +0.017 | +0.063 | +0.039 |
| W1(+3 − 3) | 022929−094800 | +0.000 | −0.001 | +0.017 | +0.003 | +0.040 |
| W1(+3 − 2) | 022929−085200 | +0.006 | +0.025 | +0.006 | +0.021 | +0.018 |
| W1(+3 − 1) | 022929−075600 | +0.035 | +0.008 | +0.021 | +0.034 | −0.017 |
| W1(+3 − 0) | 022929−070000 | +0.050 | +0.048 | +0.011 | +0.033 | +0.028 |
| W1(+4 − 3) | 023319−094800 | +0.011 | −0.008 | −0.003 | −0.004 | +0.019 |
| W1(+4 − 2) | 023319−085200 | −0.054 | +0.018 | +0.003 | +0.018 | +0.007 |
| W1(+4 − 1) | 023319−075600 | +0.018 | +0.001 | +0.023 | +0.022 | +0.016 |
| W1(+4 − 0) | 023319−070000 | +0.045 | +0.058 | +0.018 | +0.022 | +0.018 |
| W3(−3 − 3) | 140016+514231 | +0.031 | +0.014 | +0.055 | +0.018 | −0.007 |
| W3(−3 − 2) | 135955+523831 | +0.063 | +0.007 | +0.065 | +0.023 | −0.005 |

Table 12: Mean magnitude offsets, averaged over a MegaCam field, between the CFHTLS Wide and the SDSS R6 surveys. The offsets are computed in the 97 stacks that overlap with SDSS (also available at `http://terapix.iap.fr/cplt/table_syn_T0006.html`). The mean values in W1, W3 and W4 are given in Table 3, and the distribution over the 97 fields are shown on Fig. 18.

| W Cartesian Ident name | CFHTLS Ident name | $\delta_{u^*}$ [mag.] | $\delta_g$ [mag.] | $\delta_r$ [mag.] | $\delta_{i/y}$ [mag.] | $\delta_z$ [mag.] |
|---|---|---|---|---|---|---|
| W3(−3 − 1) | 135933+533431 | +0.123 | +0.009 | +0.003 | +0.015 | −0.014 |
| W3(−3 − 0) | 135910+543031 | +0.072 | +0.015 | +0.016 | +0.037 | +0.021 |
| W3(−3 + 1) | 135846+552631 | +0.067 | +0.015 | +0.038 | −0.002 | −0.008 |
| W3(−3 + 2) | 135820+562231 | +0.120 | +0.015 | +0.048 | +0.017 | −0.019 |
| W3(−3 + 3) | 135752+571831 | +0.075 | +0.020 | +0.041 | +0.008 | +0.077 |
| W3(−2 − 3) | 140609+514231 | +0.103 | +0.020 | +0.023 | +0.028 | +0.021 |
| W3(−2 − 2) | 140555+523831 | +0.058 | +0.020 | +0.029 | +0.021 | −0.012 |
| W3(−2 − 1) | 140540+533431 | +0.103 | +0.046 | +0.002 | −0.001 | −0.019 |
| W3(−2 − 0) | 140525+543031 | +0.087 | +0.015 | +0.012 | +0.054 | −0.023 |
| W3(−2 + 1) | 140509+552631 | +0.072 | +0.020 | +0.029 | −0.011 | −0.014 |
| W3(−2 + 2) | 140451+562231 | +0.099 | −0.003 | +0.038 | +0.028 | +0.017 |
| W3(−2 + 3) | 140433+571831 | +0.045 | +0.020 | +0.040 | +0.004 | +0.069 |
| W3(−1 − 3) | 141202+514231 | +0.037 | +0.010 | +0.046 | +0.018 | −0.030 |
| W3(−1 − 2) | 141155+523831 | +0.091 | +0.025 | +0.020 | +0.029 | −0.024 |
| W3(−1 − 1) | 141147+533431 | +0.113 | +0.011 | +0.012 | +0.038 | +0.024 |
| W3(−1 − 0) | 141139+543031 | +0.122 | +0.040 | +0.008 | +0.024 | +0.043 |
| W3(−1 + 1) | 141131+552631 | +0.075 | +0.002 | +0.022 | +0.031 | −0.017 |
| W3(−1 + 2) | 141123+562231 | +0.091 | +0.003 | +0.030 | +0.041 | −0.014 |
| W3(−1 + 3) | 141113+571831 | +0.035 | +0.036 | +0.021 | +0.015 | +0.062 |
| W3(−0 − 3) | 141754+514231 | +0.060 | +0.002 | +0.036 | +0.016 | −0.006 |
| W3(−0 − 2) | 141754+523831 | +0.083 | +0.005 | +0.037 | +0.014 | −0.004 |
| W3(−0 − 1) | 141754+533431 | +0.073 | +0.028 | +0.038 | +0.022 | +0.006 |
| W3(−0 − 0) | 141754+543031 | +0.070 | +0.016 | +0.018 | −0.002 | −0.028 |
| W3(−0 + 1) | 141754+552631 | +0.097 | +0.017 | +0.028 | +0.014 | −0.013 |
| W3(−0 + 2) | 141754+562231 | +0.082 | −0.005 | +0.008 | +0.031 | +0.016 |
| W3(−0 + 3) | 141754+571831 | +0.047 | +0.019 | +0.024 | +0.025 | +0.113 |
| W3(+1 − 3) | 142347+514231 | +0.131 | −0.003 | +0.037 | +0.018 | −0.033 |
| W3(+1 − 2) | 142354+523831 | +0.125 | +0.005 | +0.040 | +0.013 | −0.004 |
| W3(+1 − 1) | 142401+533431 | +0.103 | +0.013 | +0.032 | +0.011 | −0.002 |
| W3(+1 − 0) | 142409+543031 | +0.049 | +0.014 | +0.025 | +0.015 | −0.011 |
| W3(+1 + 1) | 142417+552631 | +0.068 | +0.012 | +0.035 | +0.013 | −0.004 |
| W3(+1 + 2) | 142425+562231 | +0.050 | +0.013 | +0.018 | +0.029 | +0.014 |
| W3(+1 + 3) | 142435+571831 | +0.011 | +0.016 | +0.016 | +0.012 | +0.082 |
| W3(+2 − 3) | 142939+514231 | +0.056 | +0.018 | +0.038 | +0.009 | −0.024 |
| W3(+2 − 2) | 142953+523831 | +0.028 | +0.010 | +0.050 | +0.017 | +0.002 |
| W3(+2 − 1) | 143008+533431 | +0.052 | +0.009 | +0.035 | +0.005 | −0.025 |
| W3(+2 − 0) | 143023+543031 | +0.043 | +0.010 | +0.022 | +0.030 | −0.032 |
| W3(+2 + 1) | 143040+552631 | +0.008 | +0.008 | +0.025 | +0.023 | −0.021 |
| W3(+2 + 2) | 143057+562231 | +0.005 | +0.005 | +0.021 | +0.014 | −0.001 |

Table 13: CFHTLS-SDSS magnitude offsets, averaged over a MegaCam field (cont'd).

| W Cartesian Ident name | CFHTLS Ident name | $\delta_{u^*}$ [mag.] | $\delta_g$ [mag.] | $\delta_r$ [mag.] | $\delta_{i/y}$ [mag.] | $\delta_z$ [mag.] |
|---|---|---|---|---|---|---|
| W3(+2 + 3) | 143115+571831 | +0.080 | −0.008 | +0.012 | +0.017 | +0.078 |
| W3(+3 − 3) | 143532+514231 | +0.029 | +0.004 | +0.012 | +0.032 | −0.014 |
| W3(+3 − 2) | 143553+523831 | +0.054 | −0.008 | +0.024 | −0.002 | −0.012 |
| W3(+3 − 1) | 143615+533431 | +0.049 | +0.024 | +0.013 | −0.010 | −0.032 |
| W3(+3 − 0) | 143638+543031 | +0.040 | +0.039 | +0.006 | +0.002 | +0.001 |
| W3(+3 + 1) | 143702+552631 | −0.001 | +0.009 | +0.006 | +0.012 | −0.028 |
| W3(+3 + 2) | 143728+562231 | +0.045 | +0.023 | +0.005 | +0.024 | −0.006 |
| W3(+3 + 3) | 143756+571831 | +0.056 | +0.000 | +0.009 | +0.005 | +0.067 |
| W4(+2 − 2) | 222054−003100 | +0.123 | −0.005 | +0.037 | +0.029 | +0.015 |
| W4(+2 − 1) | 222054+002300 | +0.112 | +0.009 | +0.021 | +0.001 | +0.005 |
| W4(+2 + 0) | 222054+011900 | +0.111 | +0.003 | +0.025 | +0.017 | +0.008 |
| W4(+1 − 2) | 221706−003100 | +0.061 | +0.029 | +0.014 | +0.041 | −0.014 |
| W4(+1 − 1) | 221706+002300 | +0.080 | +0.041 | +0.009 | +0.032 | −0.006 |
| W4(+1 + 0) | 221706+011900 | +0.100 | +0.024 | +0.035 | +0.001 | −0.020 |
| W4(+0 − 2) | 221318−003100 | +0.060 | +0.030 | +0.020 | +0.030 | +0.003 |
| W4(+0 − 1) | 221318+002300 | +0.055 | +0.024 | +0.015 | +0.010 | −0.016 |
| W4(+0 + 0) | 221318+011900 | +0.115 | +0.029 | −0.010 | +0.043 | +0.001 |
| W4(−1 − 2) | 220930−003100 | +0.052 | +0.005 | +0.053 | +0.042 | −0.017 |
| W4(−1 − 1) | 220930+002300 | +0.058 | +0.056 | +0.021 | +0.011 | −0.001 |
| W4(−1 + 0) | 220930+011900 | +0.053 | +0.027 | +0.021 | +0.009 | +0.014 |
| W4(−2 + 0) | 220542+011900 | +0.111 | +0.006 | +0.015 | +0.020 | −0.015 |
| W4(−3 + 0) | 220154+011900 | +0.126 | +0.017 | +0.014 | +0.044 | +0.015 |

Table 14: CFHTLS-SDSS magnitude offsets, averaged over a MegaCam field (cont'd).

values. It is confirmed from the offset reported in Table 3.

From the large scatter on $\langle\Delta_z\rangle$, the values found $\langle\delta_z\rangle$, and the difference between the mean and median values, *there is no conclusive evidence that the offset in z-band is not zero.*

The spatial distribution of mag. offset are shown on the maps of Fig. 20. They do not reveal significant systematic gradients over the Wide fields, in any filters. However, the offsets are not all randomly distributed. There are localised systematic trends observed in some regions of each Wide field:

- The W1 $z$-band stacks located westwards, in the 2 strips with the lowest RA, show a systematic offset of $\delta_z - \langle\delta_z\rangle = -0.085$ with respect to the mean offset, $\langle\delta_z\rangle$, of W1 $z$ stacks;
- The W3 $z$-band stacks located on the northern strip with highest DEC show a high offset value of about $\delta_z - \langle\delta_z\rangle = 0.080$ mag. with respect to the mean offset of W3 $z$ stacks ;
- The top left (NE) corner of the W4 $u^*$ stack shows a systematic offset of $\delta_{u^*} - \langle\delta_{u^*}\rangle = +0.12$ mag. with respect to other W $u^*$ stacks.

We computed the CFHTLS-SDSS offset residuals on each CCD after the mean CFHTLS-SDSS offset is applied over the MegaCam field. In general, the corrections are very small and clearly depend on the CCD and the filter (See Fig. 21). However, for few CCDs, the amplitude of the residual rises up to 4% in $u^*$ and up to 2% in other bands.

The offsets derived in this section can be applied to the T0006 release source catalogues. The corrections to TERAPIX magnitudes, $m_{T0006}$, should be done as follows:

$$m_{cor} = m_{T0006} + \delta_m \ , \qquad (5)$$

but the choice between $\delta_{m=u^*,g,r,i/y,z}$, $\langle\delta_{m=u^*,g,r,i/y,z}\rangle$ and $\langle\Delta_{m=u^*,g,r,i/y,z}\rangle$ is left to the user. Fig. 19 shows that the offsets in $g$, $r$ and $i$ are stable and constant from field to field, so for these bands the mag. offsets $\langle\Delta_{m=u^*,g,r,i/y,z}\rangle$ seem to be a reasonable choice.

In summary, the T0006 Wide photometric data show a small, marginally significant, offset between the CFHTLS and SDSS magnitudes in $g$ and $r$ bands, a small offset in $i$ and $y$ that seems more significant than for the $g$ and $r$ filters, no significant offset in $z$-band, and a significant offset in $u^*$. The patch-to-patch and tile-to-tile scatters of the offset values are large in $u^*$ and $z$ bands.

The origin of these offsets are still unclear. It is likely a photometric calibration problem in $u^*$, since all previous CFHTLS releases also showed an offset of about 0.06 magnitude. We are working with CFHT in order to understand and fix this problem. For the other bands we are still wondering whether the offsets are significant and we have not found yet what could produce them, if real, in the calibration process. It may be our photometric flux rescaling is not sufficiently optimised (improper source selection in the overlapping regions of adjacent fields, or unsuited weighting scheme during the minimisation process to derive the flux rescaling values, or unsuited reference source catalogue. We have not explored all these options yet). However, if necessary, the offsets can be corrected in W1, W3 and W4, using the SDSS sources in these fields. This is more problematic for W2 because there is no overlaps with SDSS.

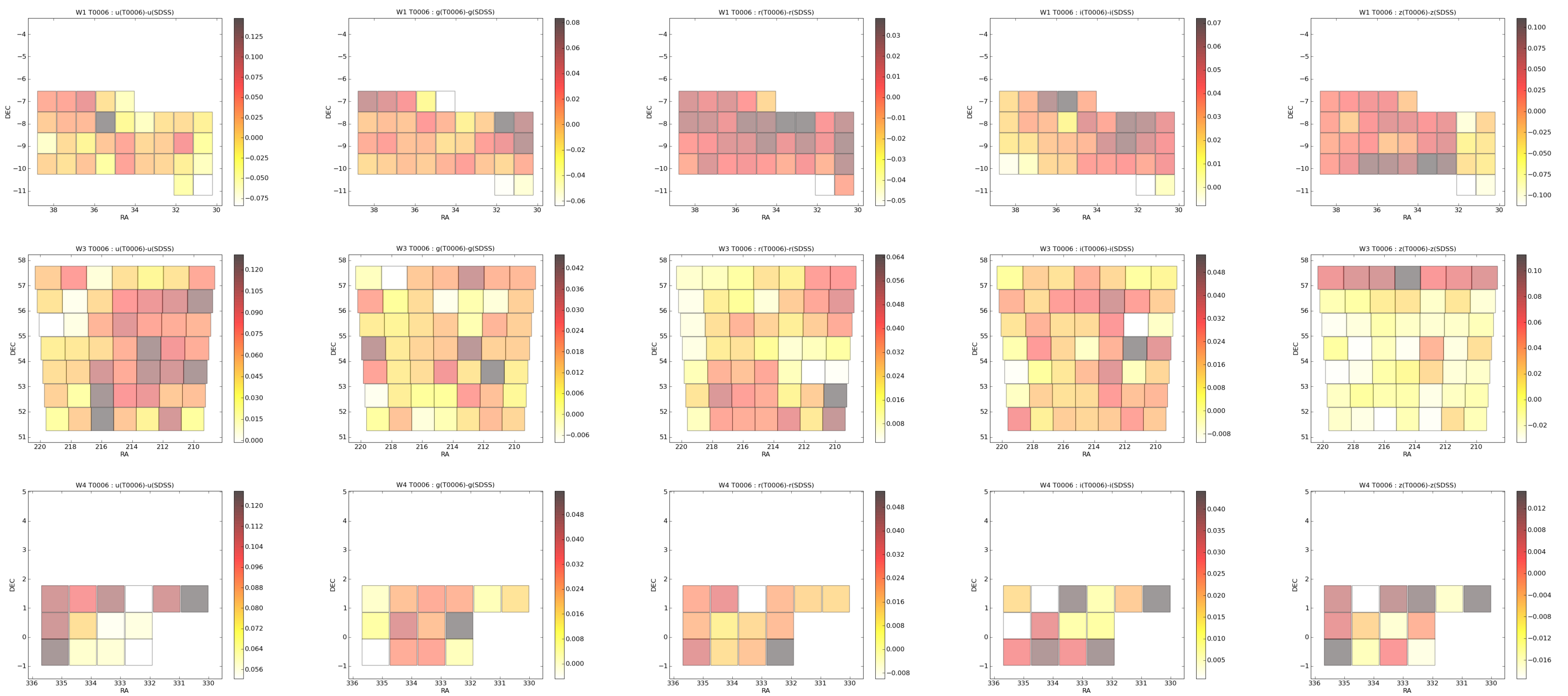



Figure 20: Maps of photometric offsets between CFHTLS Wide and SDSS R6, based on stars common to both surveys (97 Wide stacks). Each square represents a $1^o \times 1^o$ tile (or a stack) of the CFHTLS Wide. The top panels show, from left to right, the $u^*$, $g$, $r$, $i/y$ and $z$ magnitude offsets for W1. The middle panels are the same for W3, and the bottom for W4. The offsets being derived from CFHTLS-SDSS color transformations averaged over a MegaCam field, there are some residuals on CCD scales because the CCDs do not have exactly the same response. The residuals are shown in the next figure (Fig. 21)

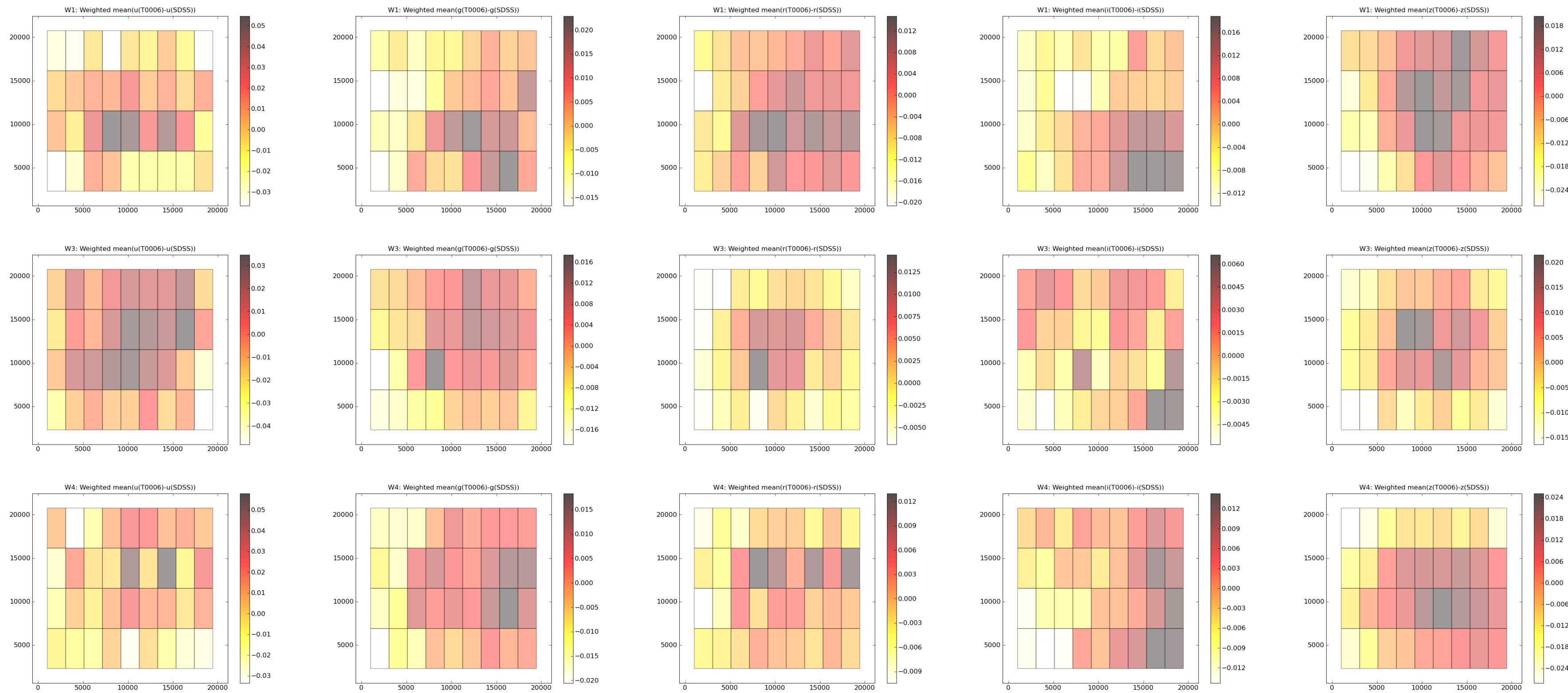



Figure 21: For each filter in the W4 field, maps of the average photometric offset residuals for each CCD after the subtraction of the mean CFHTLS-SDSS offset. These residuals averaged over all tiles in the field. These residuals are due the different quantum efficiencies of the detectors CCDs composing MegaCam compared to the mean properties of the camera. The scales of each plot are similar: the $u^*$-bands residuals are within ±4% and the $g$, $r$, $i/y$ and $z$ are within ±2%.

| Wide field | External $rms$ errors with respect to SDSS | | | | |
|---|---|---|---|---|---|
| | $\sigma_{u^*}$ $rms$ [mag.] | $\sigma_g$ $rms$ [mag.] | $\sigma_r$ $rms$ [mag.] | $\sigma_i$ $rms$ [mag.] | $\sigma_z$ $rms$ [mag.] |
| Wide-ALL | 0.04 | 0.02 | 0.02 | 0.02 | 0.03 |
| W1 | 0.05 | 0.03 | 0.02 | 0.03 | 0.02 |
| W3 | 0.03 | 0.01 | 0.02 | 0.02 | 0.03 |
| W4 | 0.03 | 0.02 | 0.02 | 0.02 | 0.03 |

Table 15: External $rms$ errors of the CFHTLS T0006 $u^*i$, $g$, $r$, $i$ and $z$-band Wide surveys. They are derived from the variance of the magnitude offset distributions between the SDSS R6 and the CFHTLS, in the W1, W3 and W4 fields. The error estimates only use 97/171 wide fields and do not contain sources from the W2 field. In contrast with the internal errors, most common source locii are outside the noisy overlapping regions, and the selected stellar sources used for the CFHT-SDSS comparison are brighter.

### 3.4.4 External photometric errors

The external photometric errors are derived from the $rms$ of the mean CFHTLS-SDSS magnitude offset values, $\delta_{m=u^*,g,r,i/y,z}$, in each Wide field separately. They are measured by adding the 97 offsets to CFHTLS-SDSS common sources of each relevant tile (see Tables 12 to 14) and then by computing the $rms$ of the CFHTLS-SDSS residual over the tile.

The external errors are quoted for each Wide in Table 15. As expected the $g$, $r$ and $i$-bands are on the average better than the $u^*$ and $z$. W1 seems slightly worse than W3 and W4, probably due to contamination by several outliers reported in the previous section.

Taking into account the internal and external errors, the mean MAG_AUTO magnitude errors quoted in Table 3 are definitely valid for sources (stars or galaxies) with ($u^* < 22$ and $g < 23$ and $r < 23$ and $i < 20$, and $z < 22$). The following errors are reasonably good and conservative estimates of the $rms$ photometric errors over a rather broad magnitude range of the CFHTLS Wide survey:

- 5% in $u^*$;
- 3% in $g, r$ and $i/y$, and
- 4% in $z$ .

For a faint source with the following set of magnitudes ($u^*$,$g$,$r$,$i/y$,$z$)$\simeq$(24,24,24,24,22.5), the photometric errors rise by a factor of $\sim 2$ in all bands with respect to the magnitude range quoted above and in Table 3. As pointed out before, this may be a pessimistic estimate because it relies on the statistics of magnitude differences of source pairs inside the overlapping regions, which are more non-uniform and noisier than the rest of the MegaCam fields.

### 3.4.5 Stellar color-color tracks

Stellar color-color tracks have been used in the previous releases to compare the locii of CFHTLS stellar colors with Pickles tracks and to assess the stability of CFHTLS photometry from tile to tile and over the whole Wide fields. For the T0006 release, we used the same tracks as in previous releases, but we also derived color corrections, by fitting them with SDSS color-color track models. This point will be discussed in the next section.

The stellar color-color tracks are derived from a sample of well-defined bright stars located in unmasked regions of CFHTLS stacks. The sources are selected in the T0006 M-SC merged source catalogues (see Section 5.3). Only unsaturated objects with $17 < i < 21$ and a TERAPIX object flag 1, corresponding to stellar sources are selected. The MAG_AUTO magnitudes of the sources are plotted in the $(u^* - g)/(g - r)$, $(g - r)/(r - i)$ and $(r - i)/(i - z)$ color-color diagrams, together with the color tracks of Pickles stellar models.

The tracks are used to identify quickly source catalogues that show deviations from standard CFHTLS data or variations with respect to the T0005 release. These fields may have photometric problems or show unusual contaminations (for example detector problems, background subtraction, photometric calibration, contaminations by very bright stars or big foreground galaxies).

The color-color plots shown in Fig. 22 show a typical case and an example with "smearing" features. The smearing in the W4 $(r - i)/(i - z)$ plot (center) is the result of the large number of bright stars in the W4 `CFHTLS_W_220154+021500` field that spoils the bright end photometry of the stellar sample. Several other W4 fields show this smearing of the color-color tracks. As compared to T0005, we reduced the degradation by selecting stars and rejecting bright sources more carefully. The stellar color-color plots for the complete sets of Wide fields are available at `http://terapix.iap.fr/cplt/table_syn_T0006.html`.

The comparison between the T0005 and T0006 color-color tracks (see the example on Fig. 23) shows that the results are very stable. We could not find any field with significant changes in the color-color diagrams between the two releases.

### 3.4.6 Color offsets between CFHTLS and SDSS from the stellar locii

The nearly blackbody emission spectra of stars places them in a narrow line in optical and infrared color-color space. Under the assumption that stellar locii in the *ugriz* color space are intrinsically universal, one can identify this locus and use it to calibrate the colors (and magnitudes) of the CFHTLS sources. The differences between the locii of CFHTLS and SDSS stars in color-color tracks can be used to determine the color offsets, $\Delta^{SLR}_{m-m'}$ between the two surveys. As compared to the "Direct" method which can only provide color offsets for the 97 stacks that have common stars with SDSS, this method uses universal SDSS color-color tracks and can potentially be applied to any field.

To perform the analysis, we used the High's code "Stellar Locus Regression"[13] (hereafter SLR) which is an implementation of the stellar color fitting method presented in High et al (2009, `http://arxiv.org/abs/0903.5302`). A reference stellar locus is shifted (by applying color shifts) to match the observed stellar distributions. A goodness of fit (GOF) is then calculated and refined by an iterative process. Although this method can also deal with extinction and additional color terms, we limited this analysis to determining basic color shifts. However, prior to running the SLR method on whole CFHTLS star samples, we introduced a calibration step to

[13] `http://code.google.com/p/stellar-locus-regression/`

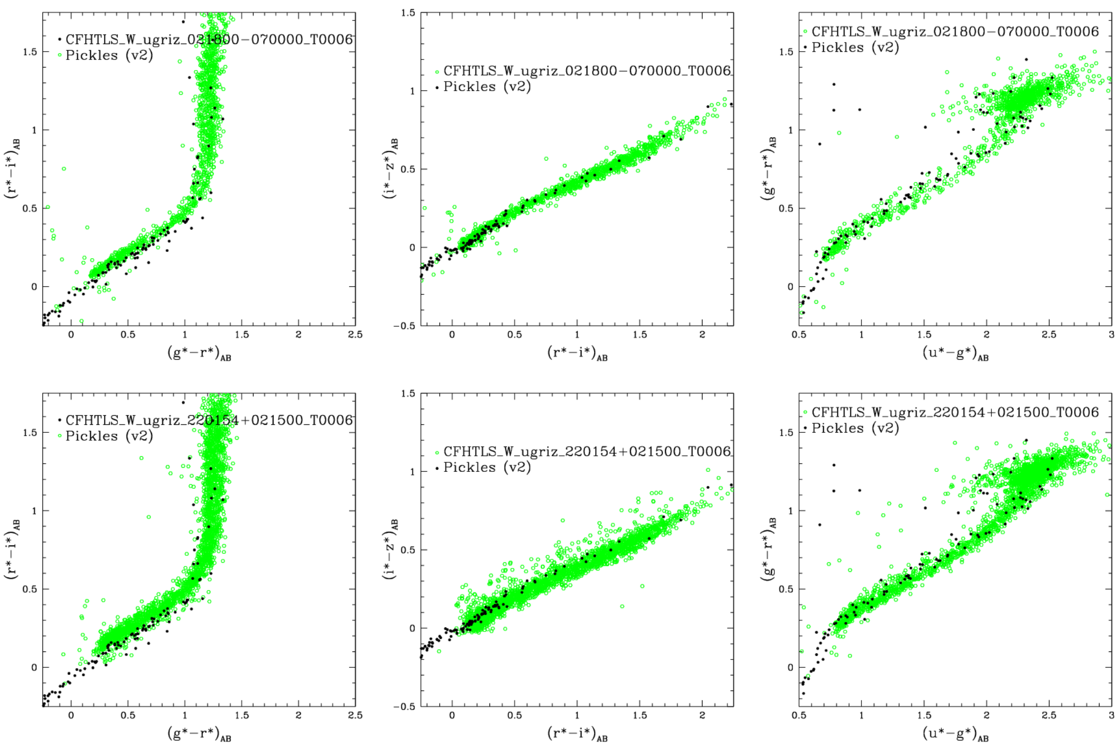



Figure 22: $(u^* - g)/(g - r)$, $(g - r)/(r - i)$ and $(r - i)/(i - z)$ color-color plots of stellar sources extracted from the W1 `CFHTLS_W_021800-070000` and the W4 `CFHTLS_W_220154+021500` stacks. The green open circles are the CFHTLS stars, the black filled circles are the predictions from the Pickles stellar models. The W1 plots are standard tracks in CFHTLS Wide field. The smearing of the color-color track on the W4 $(r - i)/(i - z)$ plot (bottom center) is due to the large number of very bright stars in the W4 `CFHTLS_W_220154+021500` field. For these outlying sources the TERAPIX T0006 photometric analysis parameters are not well suited and demand more careful "a la carte" tuning.

take into account the differences between the CFHTLS and SDSS stellar populations (see next paragraphs). To calculate the GOF, the algorithm identifies for each observed stellar color the closest point on the reference track and computes a weighted distance including the observational error quoted on the source catalogues. The GOF is then the sum of these weighted distances.

To derive the color offsets in the T0006 Wide survey, we analyse the 171 Wide fields as follows (see Fig. 24):

- We use the reference stellar locus model provided by K. Covey[14]. Stellar locii in optical and NIR filters are determined by fitting polynomial tracks to observations extracted from the SDSS and 2MASS surveys.
- The SDSS tracks are then converted into the CFHTLS filters using the color equations of Regnault et al (2009, arXiv:0908.3808), for the $u^*$, $g$, $r$ and $i$ bands, and supplied by CFHT for the $y$ band.
- We then apply first the SLR regression to the sub-samples of CFHTLS stars located in the 97 fields (34 W1, 49 W3 and 14 W4) that are common to the CFHTLS and the SDSS surveys (see Fig. 25). The calibration step is done on W1, W3 and W4 separately. It

[14] `http://astrosun2.astro.cornell.edu/ kcovey/research/medianlocus.tbl`

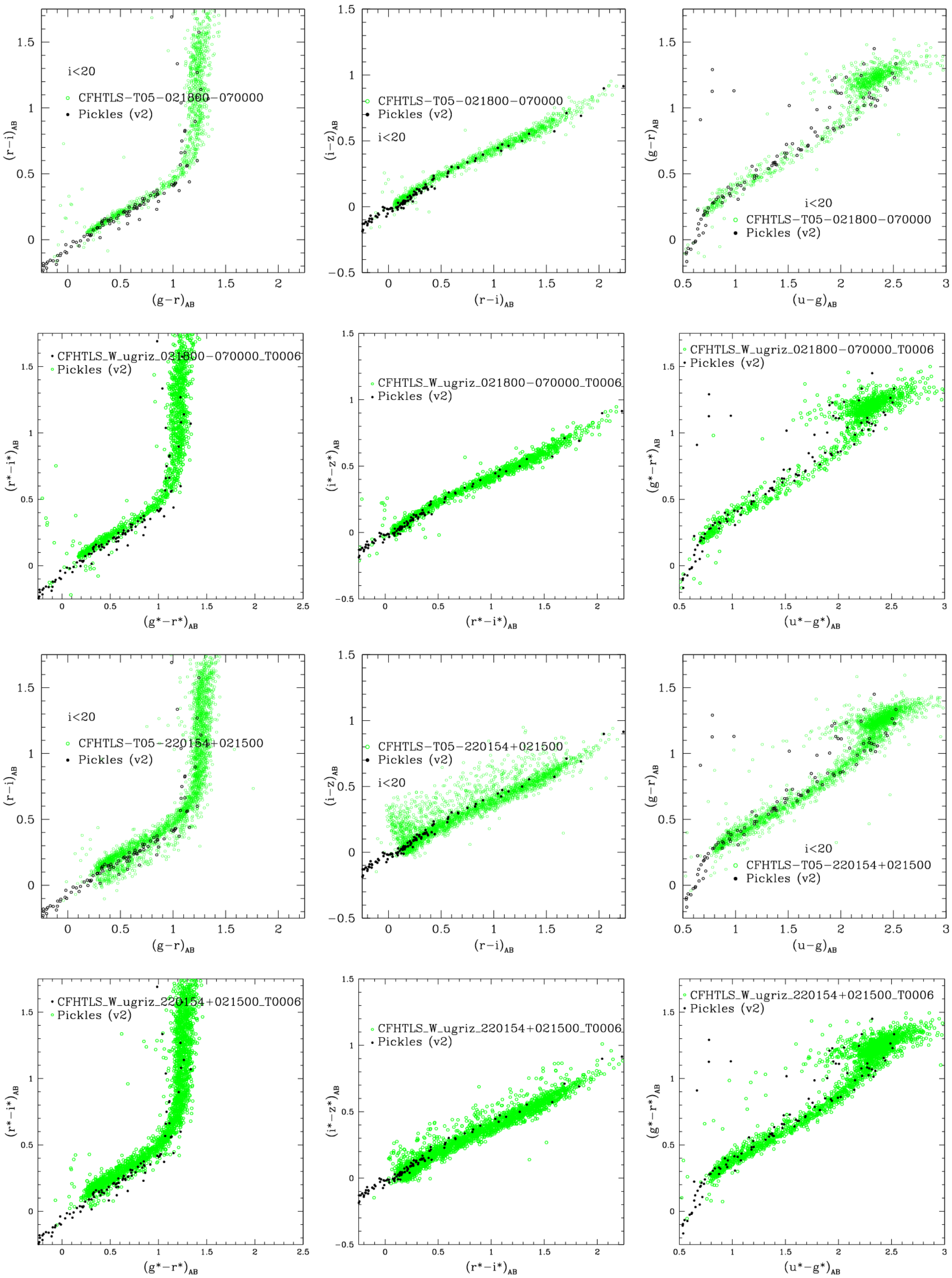



Figure 23: Comparison of stellar color-color tracks of the same field, derived from the T0005 and T0006 releases. In general for all stacks common to both releases we could not find significant differences in the colour-colour plots. The two panels on top show the W1 `CFHTLS_W_021800-070000` field, the two at the bottom show W4 `CFHTLS_W_220154+021500`. The tracks are identical. The visual differences observed in the plot are due to the broader star selection in T0006, where the magnitude range is $17 < i < 21$, instead of $17 < i < 20$ for T0005. The selection of stars in W4, however, has been carried out with more caution on T0006, which reduced the smearing of color tracks.

| Wide Field | Color offset zero-points | | | |
|---|---|---|---|---|
| | $\Delta^{SLR_{Wi0}}_{u^*-g}$ | $\Delta^{SLR_{Wi0}}_{g-r}$ | $\Delta^{SLR_{Wi0}}_{r-i}$ | $\Delta^{SLR_{Wi0}}_{i-z}$ |
| W1 | −0.139 | +0.000 | +0.005 | +0.021 |
| W3 | −0.167 | −0.010 | +0.003 | +0.018 |
| W4 | −0.077 | +0.045 | +0.040 | +0.046 |

Table 16: Calibration of the SLR regression to the CFHTLS stars in W1, W3 and W4 (= $Wi$). The values are the color offset to apply to SDSS stars located in the CFHTLS fields, prior to run SLR on the whole populations of CFHTLS stars. These corrections are denoted "color offset zero-points"

is necessary to take into account the differences of stellar populations between the stars of the SDSS reference stellar locus and those that dominate each Wide field. As shown by Karatas et al. (2009, PASP 26 1, 29) the four CFHTLS Wide fields contain different metallicity distributions arising from from the thick-disk and the halo stars which need to be corrected, compared to solar metallicity tracks from SLR. This affects mostly the $u^* - g$ filter which is very sensitive to metallicity. This additional step also allows us to take into account galactic extinctions. The calibration process provides "local" W1, W3 and W3 *color offset zero-points*, $\Delta^{SLR_{Wi0}}_{m-m'}$ (where $m - m' = u^* - g$, $g - r$, $r - i$ and $i - z$, and $Wi = 1, 3, 4$ stands for W1, W3 and W4).

- The SLR fitting is then applied to all CFHTLS stellar sources until the CFHTLS color tracks matches those of the reference stellar locus model. The best fit returns the $\Delta^{SLR_{Wi}}_{m-m'}$.
- The color offset zero points $\Delta^{SLR_{Wi0}}_{m-m'}$ are then applied to all CFHTLS stellar sources, so the final color corrections are

$$\Delta^{SLR_{Wi}}_{m-m'} - \Delta^{SLR_{Wi0}}_{m-m'} \tag{6}$$

Fig. 25 illustrates the two steps on CFHTLS color-color tracks. The results of the SLR regressions are color differences between the CFHTLS and SDSS stars that can be directly compared to the "Direct" colors, $\Delta^{CFHTLS-SDSS}_{m-m'}$: in principle,

$$\Delta^{CFHTLS-SDSS_{Wi}}_{m-m'} = \Delta^{SLR_{Wi}}_{m-m'} - \Delta^{SLR_{Wi0}}_{m-m'} \tag{7}$$

so they should return identical values.

The color offset zero-points are given in Table 16 for each filter in W1, W3 and W4 fields. The color offset corrections applied to W1, W3 and W4 are then listed in Tables 17, 18, 19 and 20 as well as in the T0006 synoptic table (`http://terapix.iap.fr/cplt/table_syn_T0006.html`).

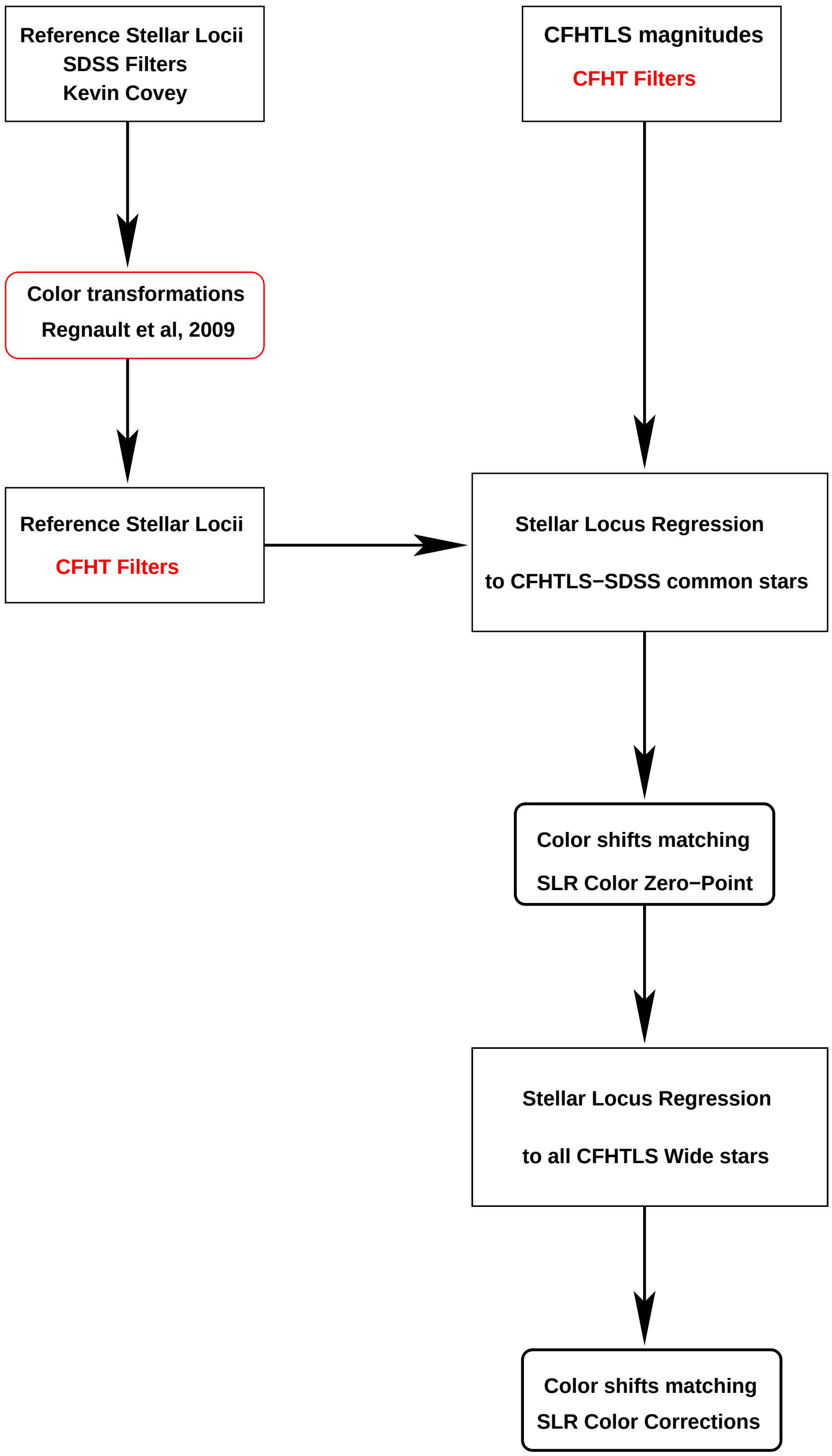



Figure 24: Flow chart of the SLR color offset zero-points and color offset determinations in the CFHTLS fields using the SDSS stellar color-color tracks.

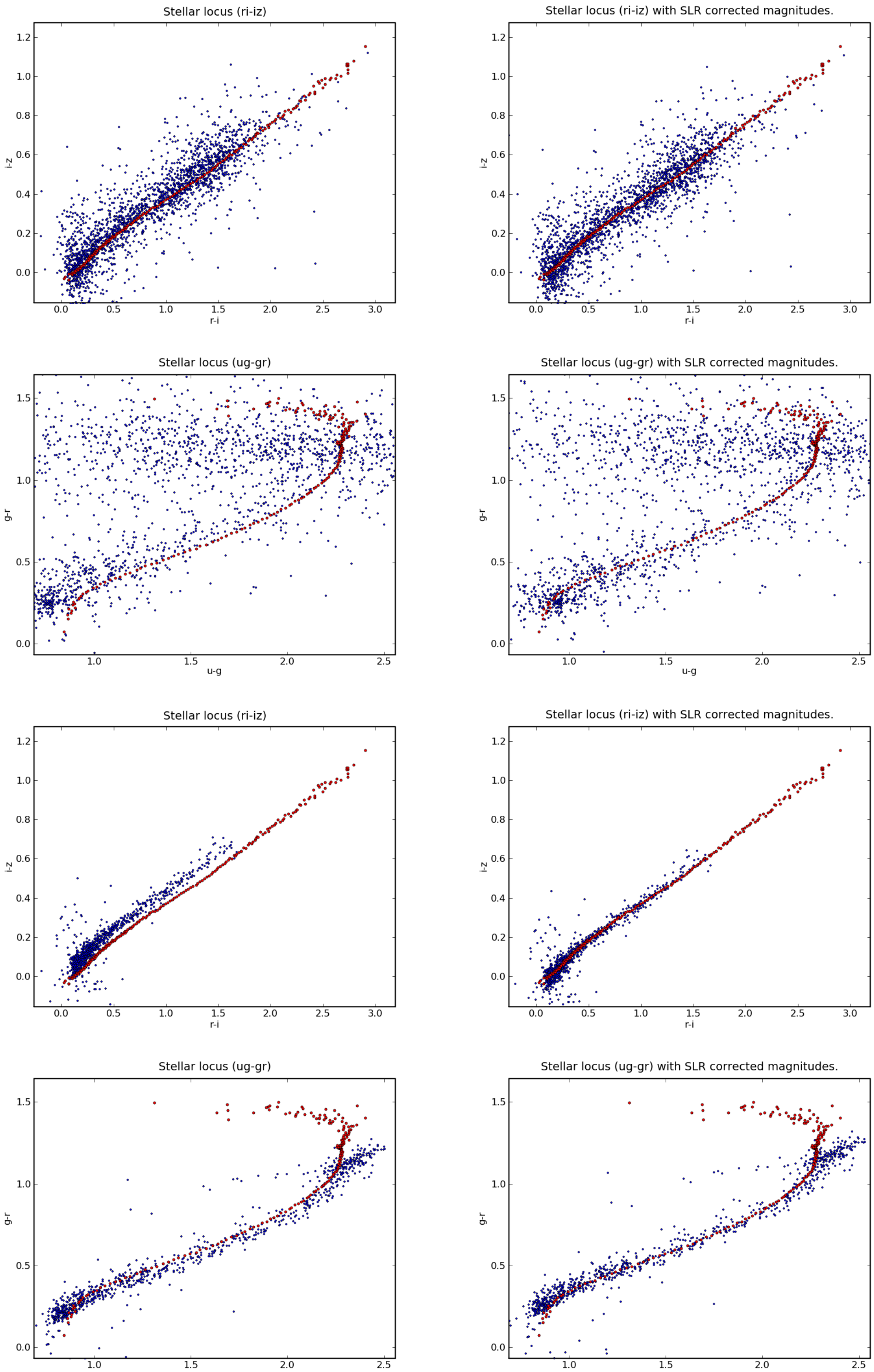



Figure 25: Application of the SLR color fitting on the W3 stacks `CFHTLS_W_142347+514231`. The method works in two steps. First the SLR fitting is applied to stars common to SDSS and CFHTLS, to calibrate the difference of stellar populations between the two samples. This is shown on the top four panels. The first step provides color offset zero-points for each Wide, $\Delta^{SLR_{W_{i0}}}_{m-m'}$. The right panels show the color-color tracks before the SLR fitting and the left panels after. The red lines draw the "universal" SDSS stellar color-color tracks, transformed into the CFHT magnitude system. The blue dots are the stellar sources selected in the `CFHTLS_W_142347+514231` field for the fitting. After the calibration, the method can be applied to all CFHTLS stellar sources. The results are shown on the last four panels.

| W Cartesian Ident name | CFHTLS Ident Name | $\left[\Delta_{u^*-g}^{SLR_{Wi}} - \Delta_{u^*-g}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{g-r}^{SLR_{Wi}} - \Delta_{g-r}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{r-i}^{SLR_{Wi}} - \Delta_{r-i}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{i-z}^{SLR_{Wi}} - \Delta_{i-z}^{SLR_{Wi0}}\right]$ |
|---|---|---|---|---|---|
| W1(−4 − 4) | 020241−104400 | +0.008 | −0.052 | −0.011 | +0.132 |
| W1(−4 − 3) | 020241−094800 | −0.038 | −0.016 | −0.009 | +0.091 |
| W1(−4 − 2) | 020241−085200 | −0.114 | +0.025 | +0.008 | +0.058 |
| W1(−4 − 1) | 020241−075600 | −0.047 | +0.022 | −0.014 | +0.051 |
| W1(−4 − 0) | 020241−070000 | +0.001 | −0.006 | +0.068 | +0.061 |
| W1(−4 + 1) | 020241−060400 | −0.006 | +0.030 | +0.011 | +0.068 |
| W1(−4 + 2) | 020241−050800 | −0.030 | +0.060 | −0.016 | +0.036 |
| W1(−4 + 3) | 020241−041200 | −0.048 | +0.012 | −0.019 | +0.043 |
| W1(−3 − 4) | 020631−104400 | +0.040 | −0.028 | −0.025 | +0.114 |
| W1(−3 − 3) | 020631−094800 | −0.003 | +0.003 | −0.037 | +0.066 |
| W1(−3 − 2) | 020631−085200 | +0.024 | +0.027 | −0.037 | +0.089 |
| W1(−3 − 1) | 020631−075600 | −0.048 | +0.069 | −0.048 | +0.138 |
| W1(−3 − 0) | 020631−070000 | −0.086 | +0.061 | −0.043 | +0.105 |
| W1(−3 + 1) | 020631−060400 | −0.004 | +0.008 | −0.025 | +0.109 |
| W1(−3 + 2) | 020631−050800 | −0.024 | +0.015 | −0.055 | +0.104 |
| W1(−3 + 3) | 020631−041200 | −0.039 | −0.010 | −0.012 | +0.055 |
| W1(−2 − 4) | 021021−104400 | +0.055 | −0.021 | −0.014 | +0.099 |
| W1(−2 − 3) | 021021−094800 | +0.039 | +0.002 | −0.028 | −0.061 |
| W1(−2 − 2) | 021021−085200 | −0.014 | +0.006 | −0.006 | −0.017 |
| W1(−2 − 1) | 021021−075600 | +0.014 | −0.058 | +0.030 | −0.039 |
| W1(−2 − 0) | 021021−070000 | −0.011 | −0.029 | +0.038 | −0.067 |
| W1(−2 + 1) | 021021−060400 | +0.018 | +0.003 | −0.078 | +0.070 |
| W1(−2 + 2) | 021021−050800 | −0.013 | +0.026 | −0.056 | +0.032 |
| W1(−2 + 3) | 021021−041200 | −0.005 | +0.012 | −0.034 | +0.084 |
| W1(−1 − 4) | 021410−104400 | +0.065 | −0.022 | −0.041 | +0.103 |
| W1(−1 − 3) | 021410−094800 | +0.025 | +0.030 | −0.042 | −0.071 |
| W1(−1 − 2) | 021410−085200 | +0.044 | −0.020 | −0.052 | −0.006 |
| W1(−1 − 1) | 021410−075600 | +0.009 | −0.057 | +0.034 | −0.023 |
| W1(−1 − 0) | 021410−070000 | +0.046 | +0.008 | −0.024 | −0.005 |
| W1(−1 + 1) | 021410−060400 | +0.086 | −0.020 | +0.010 | −0.052 |
| W1(−1 + 2) | 021410−050800 | +0.068 | −0.040 | +0.043 | −0.002 |
| W1(−1 + 3) | 021410−041200 | +0.034 | −0.046 | +0.059 | −0.005 |
| W1(−0 − 4) | 021800−104400 | +0.046 | −0.017 | −0.037 | +0.130 |
| W1(−0 − 3) | 021800−094800 | +0.044 | +0.016 | −0.036 | −0.024 |
| W1(−0 − 2) | 021800−085200 | +0.066 | −0.042 | +0.012 | +0.021 |
| W1(−0 − 1) | 021800−075600 | +0.004 | −0.006 | +0.021 | −0.033 |
| W1(−0 − 0) | 021800−070000 | +0.053 | −0.019 | −0.021 | +0.005 |

Table 17: SLR color offsets of all CFHTLS Wide fields (Cont'd).

| W Cartesian Ident name | CFHTLS Ident Name | $\left[\Delta_{u^*-g}^{SLR_{Wi}} - \Delta_{u^*-g}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{g-r}^{SLR_{Wi}} - \Delta_{g-r}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{r-i}^{SLR_{Wi}} - \Delta_{r-i}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{i-z}^{SLR_{Wi}} - \Delta_{i-z}^{SLR_{Wi0}}\right]$ |
|---|---|---|---|---|---|
| W1(−0 + 1) | 021800−060400 | +0.054 | −0.033 | +0.020 | −0.045 |
| W1(−0 + 2) | 021800−050800 | +0.036 | −0.056 | +0.055 | −0.065 |
| W1(−0 + 3) | 021800−041200 | +0.044 | −0.043 | +0.034 | −0.044 |
| W1(+1 − 4) | 022150−104400 | +0.027 | −0.002 | −0.042 | +0.115 |
| W1(+1 − 3) | 022150−094800 | +0.046 | −0.007 | −0.013 | −0.039 |
| W1(+1 − 2) | 022150−085200 | +0.077 | +0.018 | −0.004 | +0.037 |
| W1(+1 − 1) | 022150−075600 | +0.117 | +0.011 | +0.016 | −0.031 |
| W1(+1 − 0) | 022150−070000 | +0.093 | −0.018 | −0.005 | −0.007 |
| W1(+1 + 1) | 022150−060400 | +0.069 | −0.037 | −0.014 | +0.045 |
| W1(+1 + 2) | 022150−050800 | +0.069 | −0.066 | +0.019 | +0.004 |
| W1(+1 + 3) | 022150−041200 | +0.008 | −0.015 | −0.017 | +0.044 |
| W1(+2 − 4) | 022539−104400 | +0.014 | −0.017 | −0.048 | +0.110 |
| W1(+2 − 3) | 022539−094800 | +0.001 | +0.015 | −0.030 | −0.060 |
| W1(+2 − 2) | 022539−085200 | +0.033 | +0.008 | +0.005 | +0.000 |
| W1(+2 − 1) | 022539−075600 | +0.052 | +0.011 | −0.002 | −0.009 |
| W1(+2 − 0) | 022539−070000 | +0.111 | −0.006 | +0.015 | +0.017 |
| W1(+2 + 1) | 022539−060400 | +0.022 | +0.025 | −0.020 | +0.045 |
| W1(+2 + 2) | 022539−050800 | +0.050 | +0.021 | −0.056 | +0.032 |
| W1(+2 + 3) | 022539−041200 | +0.015 | +0.021 | −0.050 | +0.045 |
| W1(+3 − 4) | 022929−104400 | +0.010 | +0.037 | −0.038 | +0.105 |
| W1(+3 − 3) | 022929−094800 | +0.002 | −0.013 | +0.011 | −0.029 |
| W1(+3 − 2) | 022929−085200 | +0.017 | +0.025 | +0.007 | +0.005 |
| W1(+3 − 1) | 022929−075600 | +0.059 | −0.004 | +0.011 | +0.048 |
| W1(+3 − 0) | 022929−070000 | +0.019 | +0.047 | +0.004 | −0.002 |
| W1(+3 + 1) | 022929−060400 | +0.041 | +0.038 | −0.009 | −0.007 |
| W1(+3 + 2) | 022929−050800 | +0.023 | +0.020 | +0.003 | +0.018 |
| W1(+3 + 3) | 022929−041200 | +0.127 | +0.028 | −0.044 | +0.054 |
| W1(+4 − 4) | 023319−104400 | +0.018 | +0.057 | −0.069 | +0.164 |
| W1(+4 − 3) | 023319−094800 | +0.035 | +0.001 | −0.001 | −0.002 |
| W1(+4 − 2) | 023319−085200 | −0.031 | +0.017 | −0.001 | +0.014 |
| W1(+4 − 1) | 023319−075600 | +0.077 | −0.006 | +0.028 | −0.007 |
| W1(+4 − 0) | 023319−070000 | +0.002 | +0.045 | +0.002 | +0.011 |
| W1(+4 + 1) | 023319−060400 | +0.047 | +0.055 | −0.052 | +0.087 |
| W1(+4 + 2) | 023319−050800 | +0.041 | +0.033 | −0.092 | +0.096 |
| W1(+4 + 3) | 023319−041200 | +0.099 | +0.051 | −0.026 | −0.020 |
| W3(−3 − 3) | 140016+514231 | +0.031 | −0.031 | 0.055 | 0.029 |

Table 18: SLR color offsets of all CFHTLS Wide fields (Cont'd).

| W Cartesian Ident name | CFHTLS Ident Name | $\left[\Delta_{u^*-g}^{SLR_{Wi}} - \Delta_{u^*-g}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{g-r}^{SLR_{Wi}} - \Delta_{g-r}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{r-i}^{SLR_{Wi}} - \Delta_{r-i}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{i-z}^{SLR_{Wi}} - \Delta_{i-z}^{SLR_{Wi0}}\right]$ |
|---|---|---|---|---|---|
| W3(−3 − 2) | 135955+523831 | +0.061 | −0.050 | +0.063 | +0.036 |
| W3(−3 − 1) | 135933+533431 | +0.108 | −0.001 | −0.019 | +0.027 |
| W3(−3 − 0) | 135910+543031 | +0.095 | +0.002 | −0.006 | +0.016 |
| W3(−3 + 1) | 135846+552631 | +0.047 | −0.020 | +0.031 | +0.027 |
| W3(−3 + 2) | 135820+562231 | +0.095 | −0.062 | +0.021 | +0.032 |
| W3(−3 + 3) | 135752+571831 | +0.079 | −0.023 | +0.039 | −0.063 |
| W3(−2 − 3) | 140609+514231 | +0.135 | −0.003 | −0.004 | +0.019 |
| W3(−2 − 2) | 140555+523831 | +0.051 | −0.007 | +0.004 | +0.029 |
| W3(−2 − 1) | 140540+533431 | +0.051 | −0.007 | −0.006 | +0.041 |
| W3(−2 − 0) | 140525+543031 | +0.079 | +0.055 | −0.048 | +0.076 |
| W3(−2 + 1) | 140509+552631 | +0.064 | −0.014 | +0.013 | +0.040 |
| W3(−2 + 2) | 140451+562231 | +0.105 | −0.059 | +0.017 | +0.008 |
| W3(−2 + 3) | 140433+571831 | +0.032 | −0.009 | +0.031 | −0.042 |
| W3(−1 − 3) | 141202+514231 | +0.047 | −0.035 | +0.036 | +0.048 |
| W3(−1 − 2) | 141155+523831 | +0.076 | −0.003 | −0.017 | +0.048 |
| W3(−1 − 1) | 141147+533431 | +0.139 | −0.018 | −0.019 | +0.001 |
| W3(−1 − 0) | 141139+543031 | +0.066 | +0.035 | −0.010 | −0.023 |
| W3(−1 + 1) | 141131+552631 | +0.100 | −0.023 | −0.006 | +0.049 |
| W3(−1 + 2) | 141123+562231 | +0.101 | −0.038 | −0.003 | +0.059 |
| W3(−1 + 3) | 141113+571831 | +0.024 | +0.011 | −0.005 | −0.024 |
| W3(−0 − 3) | 141754+514231 | +0.046 | −0.028 | +0.024 | +0.014 |
| W3(−0 − 2) | 141754+523831 | +0.100 | −0.048 | +0.037 | +0.013 |
| W3(−0 − 1) | 141754+533431 | +0.074 | −0.009 | +0.030 | +0.017 |
| W3(−0 − 0) | 141754+543031 | +0.104 | −0.006 | +0.030 | +0.025 |
| W3(−0 + 1) | 141754+552631 | +0.096 | −0.004 | +0.025 | +0.028 |
| W3(−0 + 2) | 141754+562231 | +0.137 | −0.011 | −0.013 | +0.024 |
| W3(−0 + 3) | 141754+571831 | +0.061 | +0.008 | +0.017 | −0.089 |
| W3(+1 − 3) | 142347+514231 | +0.138 | −0.045 | +0.008 | +0.048 |
| W3(+1 − 2) | 142354+523831 | +0.138 | −0.051 | +0.039 | +0.016 |
| W3(+1 − 1) | 142401+533431 | +0.110 | −0.030 | +0.020 | +0.007 |
| W3(+1 − 0) | 142409+543031 | +0.051 | −0.019 | +0.012 | +0.013 |
| W3(+1 + 1) | 142417+552631 | +0.078 | −0.028 | +0.029 | +0.021 |
| W3(+1 + 2) | 142425+562231 | +0.071 | −0.009 | +0.003 | +0.014 |
| W3(+1 + 3) | 142435+571831 | +0.026 | +0.000 | +0.013 | −0.061 |
| W3(+2 − 3) | 142939+514231 | +0.019 | −0.026 | +0.024 | +0.028 |
| W3(+2 − 2) | 142953+523831 | +0.041 | −0.045 | +0.044 | +0.022 |
| W3(+2 − 1) | 143008+533431 | +0.052 | −0.026 | +0.030 | +0.029 |

Table 19: SLR color offsets of all CFHTLS Wide fields (Cont'd).

| W Cartesian Ident name | CFHTLS Ident Name | $\left[\Delta_{u^*-g}^{SLR_{Wi}} - \Delta_{u^*-g}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{g-r}^{SLR_{Wi}} - \Delta_{g-r}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{r-i}^{SLR_{Wi}} - \Delta_{r-i}^{SLR_{Wi0}}\right]$ | $\left[\Delta_{i-z}^{SLR_{Wi}} - \Delta_{i-z}^{SLR_{Wi0}}\right]$ |
|---|---|---|---|---|---|
| W3(+2 − 0) | 143023+543031 | +0.052 | −0.017 | +0.002 | +0.052 |
| W3(+2 + 1) | 143040+552631 | +0.012 | −0.015 | +0.008 | +0.056 |
| W3(+2 + 2) | 143057+562231 | +0.017 | −0.011 | +0.019 | +0.015 |
| W3(+2 + 3) | 143115+571831 | +0.088 | −0.027 | −0.007 | −0.053 |
| W3(+3 − 3) | 143532+514231 | +0.045 | −0.019 | −0.012 | +0.039 |
| W3(+3 − 2) | 143553+523831 | +0.076 | −0.036 | +0.035 | +0.005 |
| W3(+3 − 1) | 143615+533431 | +0.033 | +0.014 | −0.004 | +0.048 |
| W3(+3 − 0) | 143638+543031 | +0.011 | +0.027 | +0.015 | +0.002 |
| W3(+3 + 1) | 143702+552631 | +0.035 | +0.007 | −0.005 | +0.043 |
| W3(+3 + 2) | 143728+562231 | +0.040 | +0.015 | −0.046 | +0.069 |
| W3(+3 + 3) | 143756+571831 | +0.100 | −0.017 | +0.008 | −0.059 |
| W4(+2 − 2) | 222054−003100 | +0.103 | −0.046 | +0.011 | +0.022 |
| W4(+2 − 1) | 222054+002300 | +0.092 | −0.019 | +0.028 | −0.012 |
| W4(+2 + 0) | 222054+011900 | +0.069 | −0.036 | +0.011 | −0.003 |
| W4(+1 − 2) | 221706−003100 | +0.050 | +0.035 | −0.023 | +0.066 |
| W4(+1 − 1) | 221706+002300 | +0.022 | +0.021 | −0.023 | +0.024 |
| W4(+1 + 0) | 221706+011900 | +0.030 | −0.044 | +0.033 | +0.005 |
| W4(+1 + 1) | 221706+021500 | +0.054 | −0.073 | +0.021 | −0.002 |
| W4(+0 − 2) | 221318−003100 | +0.048 | +0.025 | −0.005 | +0.038 |
| W4(+0 − 1) | 221318+002300 | +0.011 | −0.023 | −0.005 | +0.007 |
| W4(+0 + 0) | 221318+011900 | +0.050 | −0.001 | −0.074 | +0.009 |
| W4(+0 + 1) | 221318+021500 | +0.047 | −0.001 | −0.044 | +0.041 |
| W4(−1 − 2) | 220930−003100 | +0.057 | −0.041 | +0.018 | +0.069 |
| W4(−1 − 1) | 220930+002300 | −0.014 | +0.010 | −0.010 | +0.021 |
| W4(−1 + 0) | 220930+011900 | +0.000 | −0.033 | +0.001 | −0.021 |
| W4(−1 + 1) | 220930+021500 | −0.020 | +0.009 | −0.005 | −0.038 |
| W4(−1 + 2) | 220930+031100 | +0.059 | −0.034 | −0.012 | −0.043 |
| W4(−1 + 3) | 220930+040700 | +0.047 | −0.035 | +0.018 | −0.051 |
| W4(−2 + 0) | 220542+011900 | +0.083 | −0.053 | −0.025 | +0.020 |
| W4(−2 + 1) | 220542+021500 | +0.062 | +0.020 | −0.044 | −0.028 |
| W4(−2 + 2) | 220542+031100 | +0.087 | −0.035 | −0.045 | −0.009 |
| W4(−2 + 3) | 220542+040700 | +0.035 | −0.039 | +0.003 | +0.023 |
| W4(−3 + 0) | 220154+011900 | +0.082 | −0.034 | −0.047 | +0.016 |
| W4(−3 + 1) | 220154+021500 | +0.066 | −0.018 | −0.012 | −0.025 |
| W4(−3 + 2) | 220154+031100 | +0.071 | −0.031 | −0.048 | +0.012 |
| W4(−3 + 3) | 220154+040700 | +0.071 | −0.055 | −0.006 | −0.010 |

Table 20: SLR color offsets of all CFHTLS Wide fields (Cont'd).

We ran the SLR method on the 97 CFHTLS Wide merged catalogues (see Section 5.3), using the MAG_AUTO $u^*, g, r, i/y, z$ magnitudes. The comparisons between the Direct and SLR offsets are shown in Fig. 26. The Direct-SLR correlations closely follow the 1st diagonals, as expected. Fig. 26 shows that the results are very good for all fields. A few variations are observed from field to field. The correlations are excellent for W3, but show larger scatters for W1 and W4 and a small offset in $u^* - g$ for W1.

The excellent agreement between the SLR and the Direct methods demonstrate the offsets determined using the SLR method are reliable, provided they can be secured from direct CFHT-SDSS calibrations of each Wide field independently in order to take into account differences of the stellar populations in each field with respect to the "universal" SDSS model. If so, one can calculate color corrections in all stacks of W1, W3 and W4, even in regions of the sky without overlapping with SDSS.

We applied the technique to all W1, W3 and W4 fields and produced color correction maps. They are shown in Fig. 27.

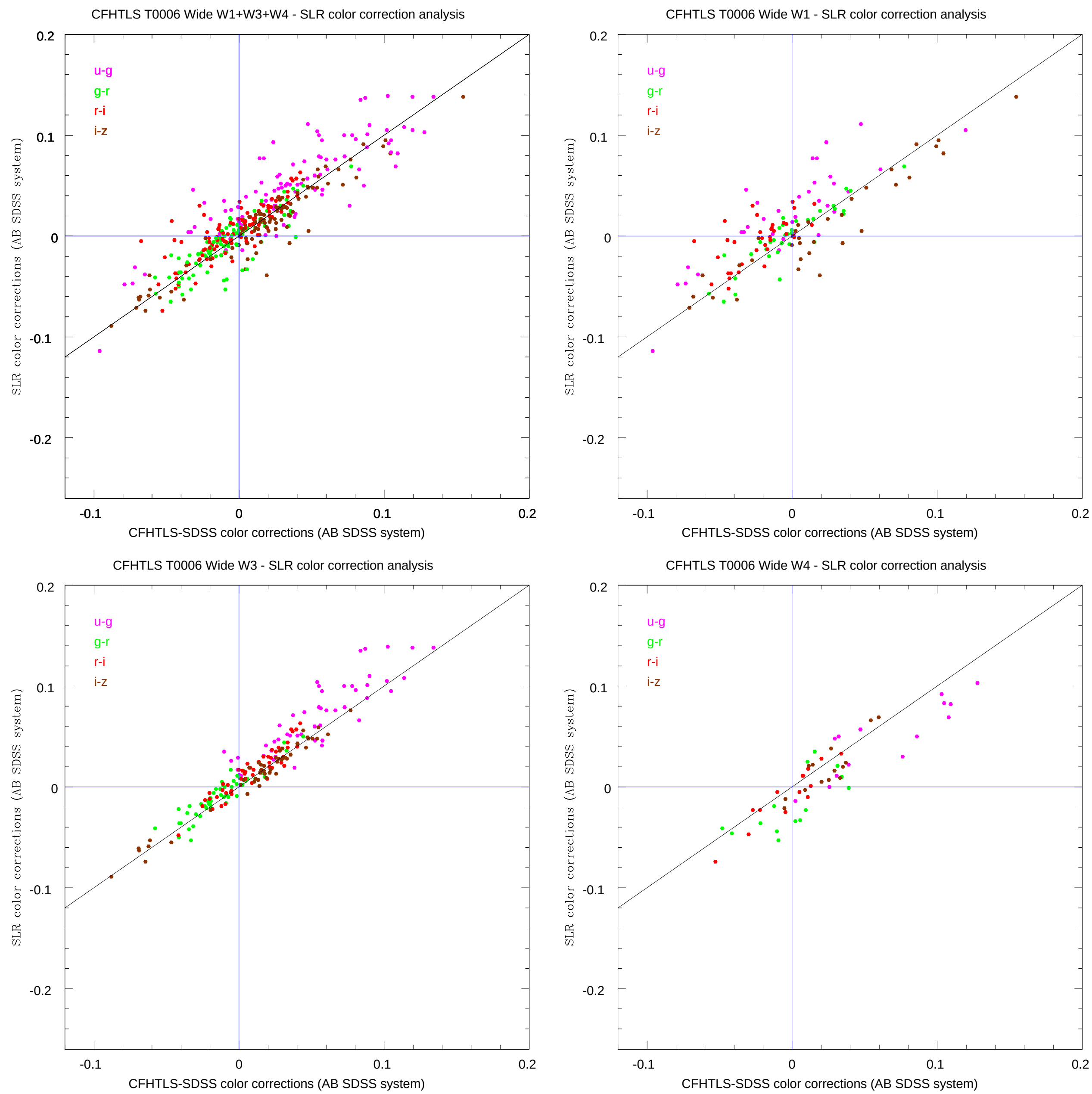



Figure 26: Comparison of the color offsets derived from the Direct, $\Delta_{m-m'}^{CFHTLS-SDSS_{Wi}}$, and the SLR, $\Delta_{m-m'}^{SLR_{Wi}} - \Delta_{m-m'}^{SLR_{Wi0}}$, methods. The top left plot show the full sample. The sample is the 97 stacks of W1, W3 and W4 with common stars with SDSS. Overall, the two methods are in excellent agreement. The three other panels show the results for W1, W3 and W4 separately. The W3 field seems better than the others, but the methods works very well in all Wide fields. There is however a small offset in $u^* - g$ for W1 .

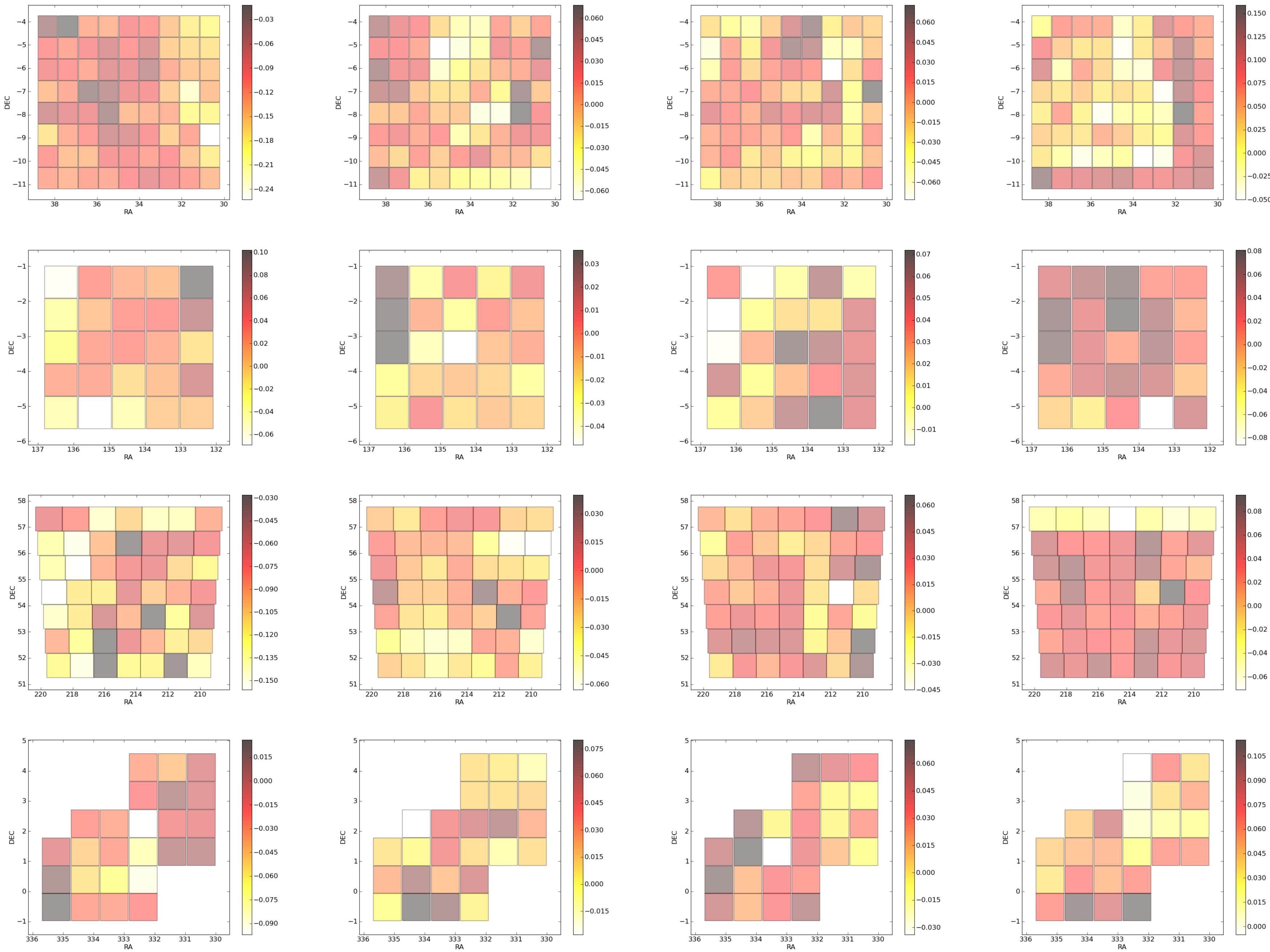


Figure 27: Maps of the SLR color corrections for the W1, W2, W3 and W4 fields. From left to right: $u^* - g$, $g - r$, $r - i$, $i - z$.

### 3.4.7 Production of photometrically corrected source catalogues from SLR

An interesting application of the joint Direct and SLR methods is the derivation of *magnitude corrections* over the whole stacks of W1, W3 and W4. If at least one CFHTLS-SDSS magnitude offsets is sufficiently stable and reliable, the SLR color offsets can then be transformed into SLR magnitude offsets for all sources. For the CFHTLS, the mean offset values of Table 11 and the histograms of Fig. 18 show that the $g$-band may be the best suitable filter. If so, one can derive SLR magnitude corrections for all stacks in W1, W3 and W4, even in fields without SDSS observations.

First the $g$-band data of the T0006 source catalogues, $g_{T0006}$ are corrected using the CFHTLS-SDSS magnitude offset, $\langle\Delta_g\rangle$. Then magnitude corrections can be derived for the filter $m$, using the CFHTLS colors of sources and SLR color offsets $\Delta_{m-g}^{SLR_{Wi}} - \Delta_{m-g}^{SLR_{Wi0}}$. The transformations lead to the following SLR-corrected magnitudes for each Wide $Wi$:

$$\begin{aligned}
g_{cor}^{Wi} &= g_{T0006}^{Wi} + \langle\Delta_g^{Wi}\rangle \\
u_{cor}^{*\,Wi} &= g_{cor}^{Wi} + (u^* - g)^{Wi} - \left(\Delta_{u^*-g}^{SLR_{Wi}} - \Delta_{u^*-g}^{SLR_{Wi0}}\right) \\
r_{cor}^{Wi} &= g_{cor}^{Wi} - (g - r)^{Wi} + \left(\Delta_{g-r}^{SLR_{Wi}} - \Delta_{g-r}^{SLR_{Wi0}}\right) \\
i_{cor}^{Wi} &= g_{cor}^{Wi} - (g - i)^{Wi} + \left[\left(\Delta_{g-r}^{SLR_{Wi}} - \Delta_{g-r}^{SLR_{Wi0}}\right) + \left(\Delta_{r-i}^{SLR_{Wi}} - \Delta_{r-i}^{SLR_{Wi0}}\right)\right] \\
z_{cor}^{Wi} &= g_{cor}^{Wi} - (g - z)^{Wi} + \left[\left(\Delta_{g-r}^{SLR_{Wi}} - \Delta_{g-r}^{SLR_{Wi0}}\right) + \left(\Delta_{r-i}^{SLR_{Wi}} - \Delta_{r-i}^{SLR_{Wi0}}\right)\right. \\
&\quad \left. + \left(\Delta_{i-z}^{SLR_{Wi}} - \Delta_{i-z}^{SLR_{Wi0}}\right)\right]
\end{aligned} \tag{8}$$

All magnitudes of the W1, W3 and W4 TERAPIX T0006 source catalogues can be corrected with these equations.

To check the validity of the corrections, we applied them to W3 stars that are common with the SDSS R6 catalogue. This field is best suited because common SDSS stars cover the whole W3 field, so the photometric corrections can be tested on a large source sample and over $7 \times 7$ deg$^2$. Once corrected, we re-computed the CFHT-SDSS offsets on these stars. If the method work, the offset should be around zero.

We found the following residual offsets:

$$\begin{aligned}
u_{cor}^{*\,W3} - u_{SDSS} &= 0.01 \\
g_{cor}^{W3} - g_{SDSS} &= 0.02 \\
r_{cor}^{W3} - r_{SDSS} &= 0.02 \\
i_{cor}^{W3} - i_{SDSS} &= 0.03 \\
z_{cor}^{W3} - z_{SDSS} &= 0.03\ ,
\end{aligned} \tag{9}$$

that are indeed similar to the photometric internal *rms* errors. This is most obvious in $u^*$-band, where the mean offset droped from $\langle\delta_{u^*}\rangle = 0.067 \pm 0.033$ to 0.01. The residuals are slightly higher in $i$ and $z$ bands, but this is not surprising because we must apply more color corrections to those filters. We can therefore conclude that the second-pass returns an offset of about zero in all bands.

The zero-residuals found in all bands

- confirm *a posteriori* that the CFHTLS-SDSS offsets in $g$-band provide a reliable $g$-reference filter for the corrections of all Wide fields,
- reinforce our assumption that the mean $g$-band offset value averaged over the whole 97 fields common to CFHTLS and SDSS can be used to correct the whole survey, and
- demonstrate that the corrections applied to T0006 catalogues with this method are reliable

In order to leave CFHTLS users free to use their preferred photometry, the native T0006 catalogues released by TERAPIX do not have the corrections applied, and are delivered in the instrumental megacam system. For any interested users the correction table can be provided. It can can be obtained on request to TERAPIX.

These corrections are only verified for W1, W3 and W4. The need for the $\Delta_{m-g}^{SLR_{Wi0}}$ SLR color zero points prevents us to determine reliable corrections for the W2 field with this method.

## 3.5 Astrometric accuracy

The astrometric accuracy is derived in two different ways.

- First, at the end of the global astrometric calibration process, by comparing the astrometric positions of sources in all single CFHTLS images composing the survey with respect to an internal and an external reference catalogue. This *astrometric calibration error* estimate is the critical path that sets the global and upper limits on the accuracy of the survey.
- Second, by comparing the source positions inside each CFHTLS Wide stack with respect to an external reference catalogue. This *astrometric accuracy of CFHTLS stacks* measures the final astrometric accuracy of each stack and their relevant catalogues, independently.

The astrometric calibration of the Wide survey is described in Section 6.2.

### 3.5.1 Astrometric calibration errors

The mean internal astrometric calibration errors are derived using the cross-identifications of sources inside the overlapping regions of adjacent fields (see Fig. 7). All single input MegaCam Wide, Pre-Wide (see Fig. 7) and short photometric exposures images remaining after the TERAPIX selection are included. The cross-identifications and the internal errors are obtained during the `SCAMP` calibration process. The calibrations outputs of the Wide fields W1, W2, W3 and W4 are available at `http://terapix.iap.fr/cplt/table_syn_T0006.html`.

Over the whole survey, the mean internal *rms* error is

$$\sigma_{\mathrm{RA}} = 0.0286'' \pm 0.0044'' \ , \ \text{and} \ , \ \sigma_{\mathrm{DEC}} = 0.0260 \pm 0.0047'' \ , \qquad (10)$$

where the reported errors are not the `SCAMP` internal errors, but the mean absolute difference of the internal errors between the four Wide fields and the mean error values. Since the four

| Field | RA diff. ["] | DEC diff. ["] |
|---|---|---|
| W1 | +0.023 | +0.019 |
| W2 | −0.025 | −0.019 |
| W3 | +0.014 | +0.013 |
| W4 | −0.011 | −0.012 |

Table 21: Mean RA and DEC differences between the external errors in each field and the mean external errors, averaged over the four Wide fields.

fields are calibrated independently, the errors quoted above are just rough estimates; the internal errors for W1, W2, W3 and W4 are given in Table 3.

For each field, the mean *rms* external RA and DEC errors of the astrometric solution are derived during the `SCAMP` calibration process, using the cross-identification of sources inside each single CFHTLS Wide image with the 2MASS catalogue. The mean external calibration errors over the whole survey are $\sigma_{\rm RA} = 0.214$" and $\sigma_{\rm DEC} = 0.210$". They roughly correspond to the internal errors of the 2MASS catalogue.

The mean scatter from one Wide field to another is uncertain, because the CFHTLS is only composed of four independent fields. It can be estimated from the offsets of the mean external errors of each field separately with respect to the mean value over the four fields. The offsets are listed in Table 21. The amplitudes are very close to the internal astrometric calibration errors of the Wide fields, so we conclude there is no significant field to field scatter in the astrometric calibrations of the CFHTLS Wide. These errors values are lower then the astrometric internal errors, so we do not expect significant differences in the astrometric calibrations from field to field.

### 3.5.2 Astrometric accuracy of CFHTLS stacks

The astrometric accuracy inside each stack is measured by comparing the source positions in the final CFHTLS catalogues produced from all stacks with the 2MASS source catalogue. The results are given in the `QualityFITS`-out (QFITS-out) evaluation web pages. The mean external astrometric errors inside each stack are given by the *rms* of the the positions of each source inside a stack with respect to an external reference catalogue (2MASS). The results are listed in Table 22. They are in excellent agreement with the external errors from the internal astrometric calibration.

To control whether systematic offsets of source coordinates are present inside each Wide catalogue, we inspected and averaged over all stacks composing each Wide field the mean offsets $\langle \Delta {\rm RA}_{\rm CFHTLS-2MASS} \rangle$ and $\langle \Delta {\rm DEC}_{\rm CFHTLS-2MASS} \rangle$, between the the CFHTLS and 2MASS positions inside a stack. The significance of the offsets is given by comparing the *rms* of the average of the mean offset value with the *rms* of the mean external errors, averaged over the number of field per Wide tile (72 for W1, 25 for W2, 49 for W3 and 25 for W4). The results are listed in Table 22 and detailed in Fig. 28, 29, 30, and 31, for the 4 Wide patches, globally and as function of filter. All fields with the exception of W1 show small offsets. They are perceptible in both amplitude and direction and in all filters, but vary from a Wide tile to another. The amplitude is however small (about 1/10 of the CFHTLS pixel size) and never larger than the 1-$\sigma$ *rms* offset error, the 1-$\sigma$ *rms* error of the external error or the mean internal astrometric errors of the Wide astrometric calibration. Furthermore, we do not see significant chromatic effects.

Figures 28 to 31 also show few outlier stacks with large astrometric offsets with respect to the 2MASS source positions. The most extreme fields are listed in the next sections. However, the number of outliers with an amplitude of the deviation of more than 3-$\sigma$ deviations in at least one direction is close to Gaussian expectations (9/360 for W1, 1/245 for W3, 0/125 for W2 and W4).

| Wide Field - Filter | Wide-averaged MegaCam-mean astrometric offset with respect to 2MASS | | Wide-averaged MegaCam mean external *rms* astrometric error | |
|---|---|---|---|---|
| | $\langle \Delta RA_{CFHTLS-2MASS} \rangle$ ["] | $\langle \Delta DEC_{CFHTLS-2MASS} \rangle$ ["] | $\sigma_{RA}$ ["] | $\sigma_{DEC}$ ["] |
| W1 - all bands | $+0.006 \pm 0.027$ | $-0.001 \pm 0.030$ | $+0.253 \pm 0.018$ | $+0.242 \pm 0.020$ |
| W1 $u^*$-band | $+0.002 \pm 0.028$ | $-0.014 \pm 0.030$ | $+0.238 \pm 0.019$ | $+0.228 \pm 0.023$ |
| W1 $g$-band | $+0.010 \pm 0.027$ | $-0.003 \pm 0.029$ | $+0.252 \pm 0.016$ | $+0.243 \pm 0.019$ |
| W1 $r$-band | $+0.005 \pm 0.026$ | $+0.004 \pm 0.029$ | $+0.258 \pm 0.013$ | $+0.246 \pm 0.016$ |
| W1 $i$-band | $+0.007 \pm 0.027$ | $+0.005 \pm 0.029$ | $+0.255 \pm 0.016$ | $+0.245 \pm 0.018$ |
| W1 $z$-band | $+0.005 \pm 0.026$ | $+0.003 \pm 0.029$ | $+0.260 \pm 0.017$ | $+0.247 \pm 0.019$ |
| W2 - all bands | $-0.005 \pm 0.019$ | $+0.014 \pm 0.014$ | $+0.204 \pm 0.014$ | $+0.207 \pm 0.013$ |
| W2 $u^*$ - band | $-0.004 \pm 0.018$ | $+0.007 \pm 0.014$ | $+0.184 \pm 0.009$ | $+0.188 \pm 0.011$ |
| W2 $g$ - band | $-0.005 \pm 0.018$ | $+0.015 \pm 0.014$ | $+0.208 \pm 0.009$ | $+0.211 \pm 0.008$ |
| W2 $r$ - band | $-0.005 \pm 0.019$ | $+0.016 \pm 0.013$ | $+0.211 \pm 0.009$ | $+0.213 \pm 0.009$ |
| W2 $i$ - band | $-0.004 \pm 0.019$ | $+0.017 \pm 0.014$ | $+0.208 \pm 0.009$ | $+0.212 \pm 0.008$ |
| W2 $z$ - band | $-0.006 \pm 0.020$ | $+0.013 \pm 0.014$ | $+0.211 \pm 0.008$ | $+0.212 \pm 0.008$ |
| W3 - all bands | $-0.002 \pm 0.018$ | $-0.012 \pm 0.023$ | $+0.250 \pm 0.016$ | $+0.242 \pm 0.016$ |
| W3 $u^*$ - band | $-0.003 \pm 0.018$ | $-0.000 \pm 0.022$ | $+0.236 \pm 0.013$ | $+0.226 \pm 0.014$ |
| W4 $g$ - band | $-0.002 \pm 0.019$ | $-0.010 \pm 0.022$ | $+0.248 \pm 0.015$ | $+0.241 \pm 0.012$ |
| W3 $r$ - band | $-0.003 \pm 0.018$ | $-0.015 \pm 0.022$ | $+0.258 \pm 0.013$ | $+0.249 \pm 0.012$ |
| W3 $i$ - band | $-0.002 \pm 0.018$ | $-0.019 \pm 0.025$ | $+0.250 \pm 0.017$ | $+0.245 \pm 0.016$ |
| W3 $z$ - band | $-0.003 \pm 0.018$ | $-0.014 \pm 0.023$ | $+0.257 \pm 0.012$ | $+0.250 \pm 0.012$ |
| W4 - all bands | $+0.013 \pm 0.019$ | $+0.009 \pm 0.018$ | $+0.213 \pm 0.015$ | $+0.209 \pm 0.017$ |
| W4 $u^*$ - band | $+0.011 \pm 0.020$ | $+0.005 \pm 0.018$ | $+0.194 \pm 0.012$ | $+0.187 \pm 0.015$ |
| W4 $g$ - band | $+0.013 \pm 0.020$ | $+0.010 \pm 0.018$ | $+0.218 \pm 0.011$ | $+0.213 \pm 0.013$ |
| W4 $r$ - band | $+0.016 \pm 0.019$ | $+0.010 \pm 0.019$ | $+0.223 \pm 0.011$ | $+0.217 \pm 0.014$ |
| W4 $i$ - band | $+0.015 \pm 0.019$ | $+0.009 \pm 0.019$ | $+0.218 \pm 0.011$ | $+0.216 \pm 0.013$ |
| W4 $z$ - band | $+0.012 \pm 0.018$ | $+0.011 \pm 0.019$ | $+0.215 \pm 0.012$ | $+0.212 \pm 0.013$ |

Table 22: Mean astrometric position accuracy of each Wide stack. The Wide-averaged statistics is the ensemble average over all stacks of the mean CFHTLS-SDSS astrometric offset values computed for each stack (MegaCam mean), separately

### 3.6 Outliers, stacks with exceptions or anomalies

Several images show unusual properties with respect to the bulk sample of stacks. This is the case for the 30 $y$-band stacks that are expected to have slightly different properties compared to the other 141 $i$-band tiles.

Beside the $y$-band, the most common technical anomaly is an amplifier dysfunction during an observing sequence. Since all CCDs have 2 outputs, several images show missing data from a 1/2 or a full CCD area. Usually, each observing sequence is done only once, so the information on the missing CCD is definitely lost. However, the CCD dysfunctions being temporary failures, the $r$-band observations that are split into two periods do no have signal on missing CCDs.

The CCD problems have been noticed and are taken into account in the new masks files produced for T0006. Note that images with more than one full CCD missing have been rejected during the early TERAPIX selection step.

Other anomalies mainly concern photometric problems. Several W1 and W3 stacks on particular show different magnitude offsets with respect to SDSS than the mean sample.

T0006 stacks with problems found are listed in Tables 23 and 24, with a short description. None of them is critical for the scientific exploitation of the survey, but there are CCD-size regions of the CFHTLS Wide where one or two filters are missing, and several stacks with photometric anomalies that should be handled with caution. TERAPIX is still investigating the source of these anomalies.

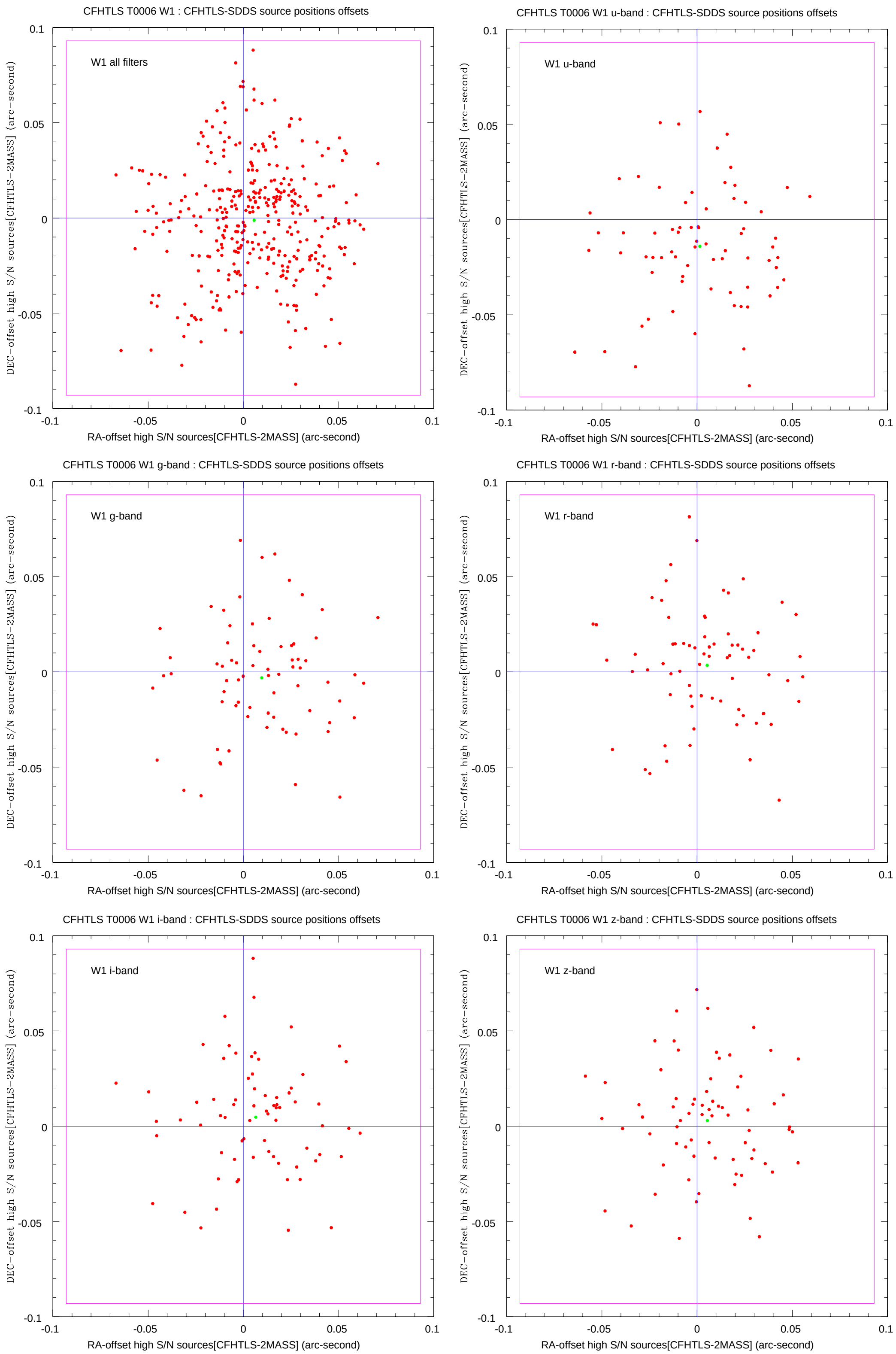



Figure 28: Mean RA-DEC offsets between the CFHTLS W1 and the 2MASS catalogues. The offset is derived from the ensemble average over all Wide W1 stacks of the mean offset inside each W1 stack. The top left plot shows the offset using all filters together (360 stacks). The other plots show the offsets in each filter (72 stacks per filter). The red dots show the mean offset in each stack. The green dot show the ensemble average of all stacks. The square in magenta shows the MegaCam pixel size (0.186”).

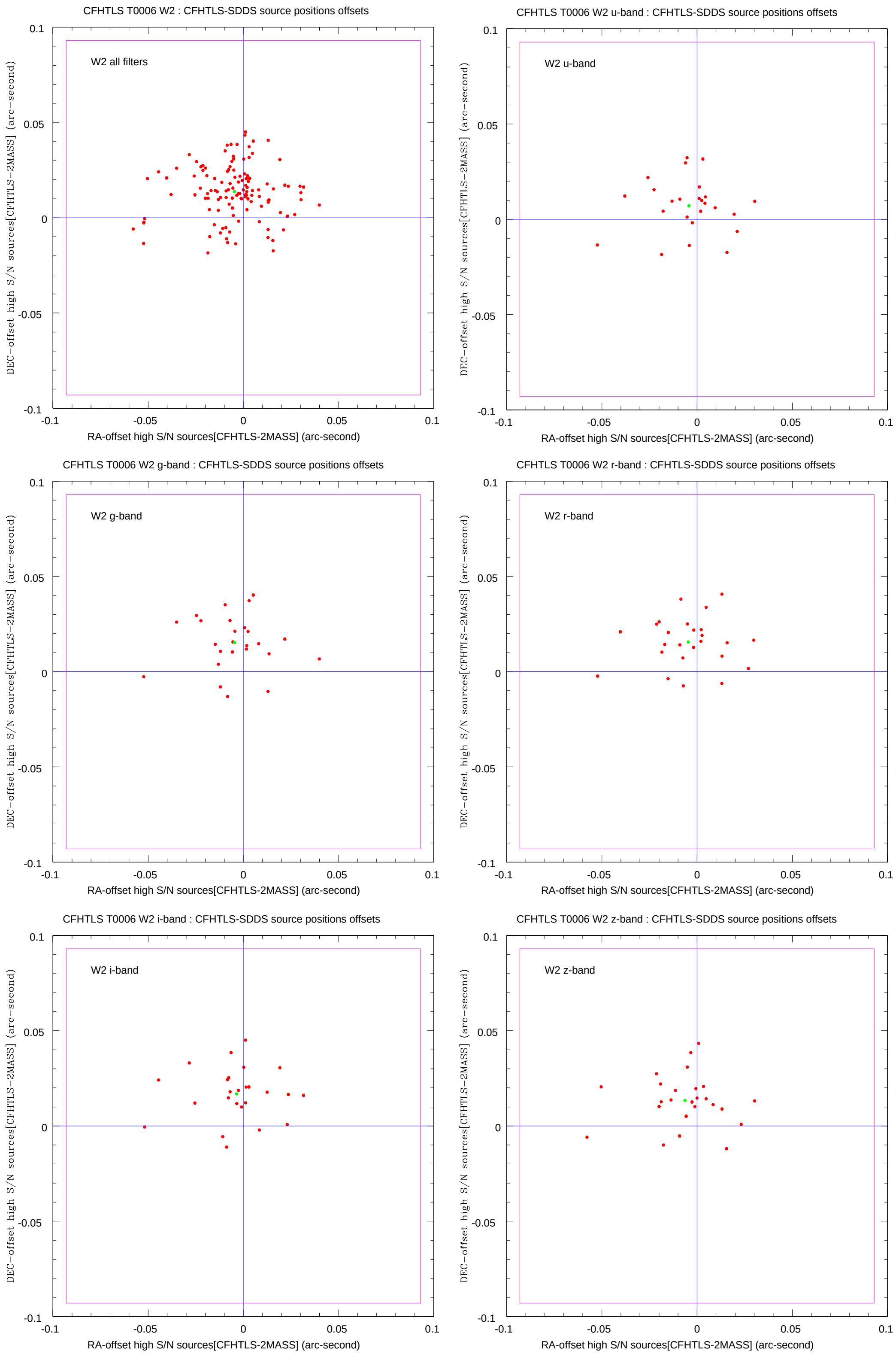



Figure 29: Mean RA-DEC offsets between the CFHTLS W2 and the 2MASS catalogues (see comments on the caption of Fig. 28).

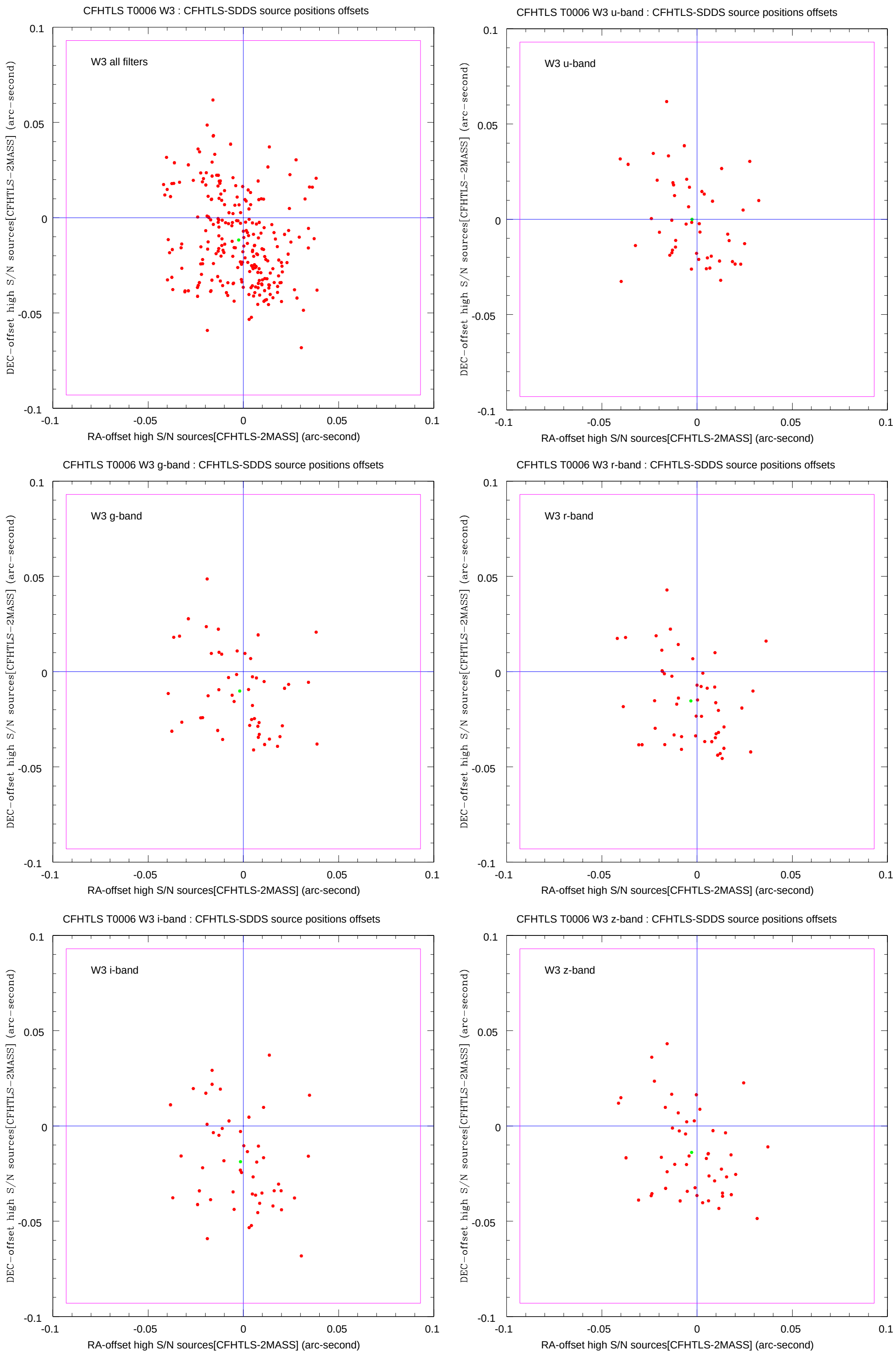



Figure 30: Mean RA-DEC offsets between the CFHTLS W3 and the 2MASS catalogues (see comments on the caption of Fig. 28).

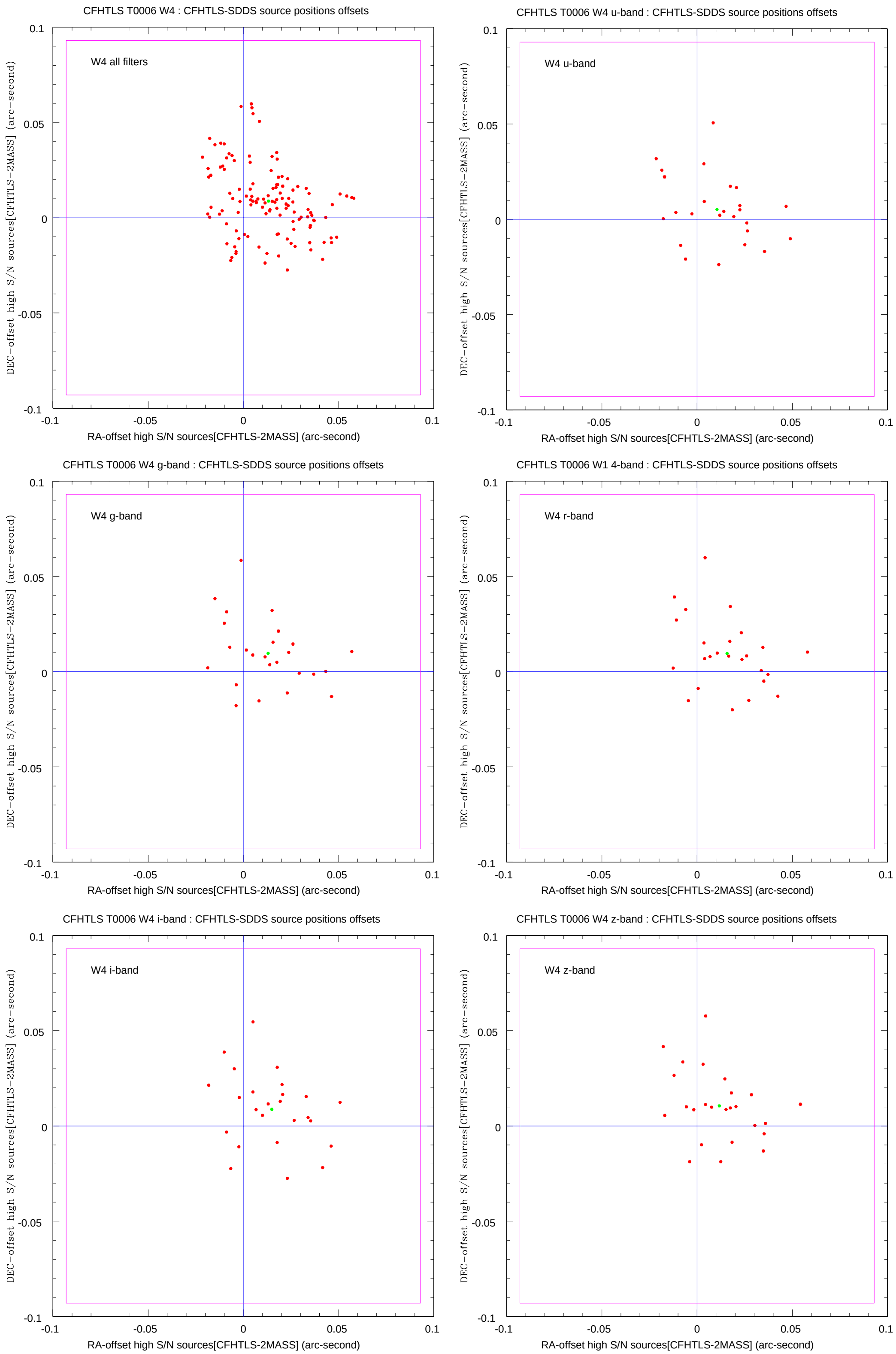



Figure 31: Mean RA-DEC offsets between the CFHTLS W4 and the 2MASS catalogues (see comments on the caption of Fig. 28).

| W Cartesian Ident name | CFHTLS Ident name | Special filter | Comments |
|---|---|---|---|
| W1($-4-1$) | 020241-075600 | | $u^*$-band radial astrometric offset 0.085" |
| | | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W1 |
| W1($-4-2$) | 020241-085200 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W1 |
| W1($-4-3$) | 020241-094800 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W1 |
| W1($-4-4$) | 020241-104400 | $y$-band observations | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W1 |
| | | | $y$-band exp. time is 7380 s. |
| W1($-3-1$) | 020631-075600 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W1 |
| W1($-3-2$) | 020631-085200 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W1 |
| W1($-3-3$) | 020631-094800 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W1 |
| W1($-3-4$) | 020631-104400 | $y$-band observations | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W1 |
| W1($-2-0$) | 021021-070000 | | $r$-band radial astrometric offset 0.080" ; $i$-band radial astrometric offset 0.088" |
| W1($-2-4$) | 021021-104400 | $y$-band observations | |
| W1($+2-0$) | 022539-070000 | | $g$-band: CCD#03 missing |
| W1($+2+1$) | 022539-060400 | | $i$-band: CCD#03 missing |
| W1($+2+2$) | 022539-050800 | | $u^*$-band: 2 1/2 CCD missing (CCD#07 and CCD#11) |
| W1($+2+3$) | 022539-041200 | | $u^*$-band and $z$-band: CCD#03 missing ; $z$-band exp. time is 7200 s. |
| | | | $u^*$-band radial astrometric offset 0.092" |
| W1($-1-1$) | 021410-075600 | | $g$-band radial astrometric offset 0.083" ; $r$-band radial astrometric offset 0.080" |
| W1($-1-2$) | 021410-085200 | | $u^*$-band radial astrometric offset 0.095" |
| W1($-1-4$) | 021410-104400 | $y$-band observations | |
| W1($-0-4$) | 021800-104400 | $y$-band observations | |
| W1($+1-4$) | 022150-104400 | $y$-band observations | |
| W1($+1-1$) | 022150-075600 | $y$-band observations | |
| W1($+1+1$) | 022150-060400 | $y$-band observations | $z$-band exp. time is 7200 s. |
| W1($+1+3$) | 022150-041200 | | $i$-band : 2 1/2 CCD missing (CCD#07 and CCD#11) |
| | | | $u^*$-band radial astrometric offset 0.084" |
| W1($+2-4$) | 022539-104400 | $y$-band observations | |
| W1($+2+2$) | 022539-050800 | $y$-band observations | |
| W1($+3-4$) | 022929-104400 | $y$-band observations | |
| W1($+3-0$) | 022929-070000 | | $g$-band and $i$-band : CCD#03 missing ; $z$-band exp. time is 7200 s. |
| W1($+3+1$) | 022929-060400 | $y$-band observations | $g$-band : CCD#03 missing |
| W1($+3+2$) | 022929-050800 | | $g$-band and $i$-band : CCD#03 missing |
| W1($+3+3$) | 022929-041200 | | $g$-band and $i$-band : CCD#03 missing |
| W1($+4-4$) | 023319-104400 | $y$-band observations | |
| W1($+4-0$) | 023319-070000 | | $g$-band and $i$-band : CCD#03 missing ; $g$-band radial astrometric offset 0.076" |

Table 23: CFHTLS Wide stacks with exceptions or anomalies.

| W Cartesian Ident name | CFHTLS Ident name | Special filter | Comments |
|---|---|---|---|
| W1$(+4+1)$ | 023319-060400 | | $g$-band : CCD#03 missing |
| W1$(+4+2)$ | 023319-050800 | $y$-band observations | $g$-band : CCD#03 missing |
| W1$(+4+3)$ | 023319-041200 | | $i$-band : CCD#03 missing |
| W2$(-1+3)$ | 085011-012700 | | $g$-band : CCD#03 missing |
| W2$(+1+1)$ | 085749-031900 | $y$-band observations | |
| W2$(+3+1)$ | 090526-031900 | | $g$-band : CCD#03 missing |
| W2$(+3+2)$ | 090526-022300 | | $g$-band : CCD#03 missing |
| W2$(+3+3)$ | 090526-012700 | | $g$-band : CCD#03 missing |
| W2$(+2+2)$ | 090137-022300 | $y$-band observations | |
| W3$(-3+3)$ | 135752+571831 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W3 |
| W3$(-3+1)$ | 135846+552631 | $y$-band observations | |
| W3$(-2-0)$ | 140525+543031 | | $u^*, g, r, i, z$ contamination: Messier 101 galaxy on the $4^{th}$ (bottom right) MegaCam quadrant |
| W3$(-2-1)$ | 140540+533431 | $y$-band observations | |
| W3$(-2+1)$ | 140509+552631 | $y$-band observations | |
| W3$(-2+3)$ | 140433+571831 | $y$-band observations | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W3 |
| W3$(-1+3)$ | 141113+571831 | $y$-band observations | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W3 |
| | | | $y$-band radial astrometric offset 0.075” |
| W3$(-0-1)$ | 141754+533431 | | $g$-band seeing anomaly: 1.045” |
| W3$(-0+3)$ | 141754+571831 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W3 |
| W3$(+1+3)$ | 142435+571831 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W3 |
| W3$(+2+3)$ | 143115+571831 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W3 |
| W3$(+3-1)$ | 143615+533431 | $y$-band observations | |
| W3$(+3+2)$ | 143728+562231 | $y$-band observations | |
| W3$(+3+3)$ | 143756+571831 | | Mag. CFHTLS-SDSS offset in $z$-band higher than the average in W3 |
| W4$(+1-1)$ | 221706+002300 | | $i$-band exp. time is 8610 s. |
| W4$(-1-1)$ | 220930+002300 | $y$-band observations | |
| W4$(-1+1)$ | 220930+021500 | $y$-band observations | |
| W4$(-1+2)$ | 220930+031100 | $y$-band observations | |
| W4$(-1+3)$ | 220930+040700 | $y$-band observations | |
| W4$(-2+0)$ | 220542+011900 | | $i$-band exp. time is 7995 s. |
| W4$(-2+2)$ | 220542+031100 | $y$-band observations | |
| W4$(-2+3)$ | 220542+040700 | $y$-band observations | |
| W4$(-3+3)$ | 220154+040700 | $y$-band observations | |

Table 24: CFHTLS Wide stacks with exceptions or anomalies (cont’d).

# 4 Description of the CFHTLS T0006 Deep survey

## 4.1 Overview

The T0006 release of the Deep survey is composed of 4 MegaCam independent pointings split into the D1, D2, D3 and D4 fields (see Table 25), and is completed in the 6 MegaPrime filters for all (instead of 5 per stack for the Wide survey). It is composed of 48 $u^*, g, r, i, y$ and $z$ stacks and 8 chi2 images (that is 112 images including the weight-maps). There are two types of stacks per Deep field; the 85% best seeing images (hereafter the D$k$-85 sample, $k = 1-4$) and the 25% best seeing images (D$k$-25). The two D$k$ series of stacks have exactly the same center positions.

The image selection criteria applied to the 10632 CFHTLS *Validated* images for the production of the CFHTLS Deep survey are the following:

- CFHTLS L01 and L04 Deep observation period: between May 26, 2003 and February 02, 2009;
- COSMOS $u^*$ band observations;
- TERAPIX selection of CFHT *Validated* images, with `QualityFITS` grade A or B (images within the survey specifications);
- exposure time $> 60\ s$;
- airmass $< 1.7$;
- images with more than one complete CCD missing have been removed from the parent sample. In contrast with Wide data, images with missing data over half CCD detectors have also been rejected;
- images of the CFHTLS Wide W1 around D1, as well as all W1 photometric short exposures. They will be included in the set of images used for the `SCAMP` astrometric/photometric calibration process;
- short exposure $i$-band *astrometric* images surrounding and overlapping with the Deep center fields. They are used during the Deep `SCAMP` calibration steps only;
- Images with seeing (FWHM) < 1.4” in $u^*$, and < 1.20” in $g$, $r$, $i$, $y$, and $z$, are selected for the calibration process;
- Images with seeing (FWHM) < 1.3” in $u^*$, and < 0.95” in $g$, $r$, $i$, $y$ and $z$, are selected for the stack production.

Because the supplementary T0006 deep survey images amount to an increase of a few hundred images per filter compared to previous releases, the image selection is simpler than previous releases:

- TERAPIX selected all images already present D$k$-25 (resp. D$k$-85) T0005 samples;
- then we added several sets of ”new” images:
  - all new 07B, 08A, 08B Deep images taken since T0005. release;
  - the D2-$u^*$ COSMOS images;

| CFHTLS field name | Reference center RA [J2000] | DEC [J2000] | Total sky coverage [deg$^2$] | Filters | Comment |
|---|---|---|---|---|---|
| D1 | 02:25:59.00 | −04:29:40 | 1×1 | $u^*, g, r, i, y, z$ | D1-25 and D1-85 positions |
| D2 | 10:00:28.00 | +02:12:30 | 1×1 | $u^*, g, r, i, y, z$ | D2-25 and D2-85 positions<br>COSMOS $u^*$ data included |
| D3 | 14:19:27.00 | +52:40:56 | 1×1 | $u^*, g, r, i, y, z$ | D3-25 and D3-85 positions |
| D4 | 22:15:31.00 | −17:43:56 | 1×1 | $u^*, g, r, i, y, z$ | D4-25 and D4-85 positions |

Table 25: Overview of the CFHTLS Deep fields. The sky coverages are given along the RA and DEC axes.

  - we included in the D$k$-25 (resp. D$k$-85) T0006 stack lists all the "new" images with seeing better than the worse seeing of T0005 D$k$-25 (resp. D$k$-85);

- finally, a set of 19 D2 and 12 D3 $i$-band images that were rejected from T0005 because the flat-fielding process failed. These images are:

  - `912164, 912165, 912166, 912167, 912168, 912169, 912170, 912430, 912431, 912432, 912433, 912434, 912596, 912597, 912598, 912599, 912600, 912601, 912602`, and,
  - `912194, 912195, 912196, 912198, 912199, 912200, 912201, 912462, 912463, 912464, 912465, 912466`.

  They have been re-processed with ELIXIR at CFHT and are included in the new Deep stacks, having passed the `QualityFITS` and seeing-cut selections.

The T0006 parent sample of the CFHTLS Deep survey is composed of 8876 images, of which 1402 images are new. In addition, in order to improve the astrometric calibration of each Deep field, several images of the Wide sample located around and with large overlapping regions with the Deep fields have been added. Eventually, 8504 Deep images are combined into T0006 stacks; 617 $u^*$, 1437 $g$, 1902 $r$, 1979 $i$, 682 $y$ and 1887 $z$.

All stacks have similar angular size and pixel scale and cover exactly 1×1 deg$^2$ (19354×19354 pixels of 0.1860"). For all Deep, but D2-$u^*$, the stacks are only composed of images that are part of a CFHTLS Deep L01 and L03 observing sequence, and that are inside a radius of 3 arcminutes with respect to the CFHTLS Deep center fields. For the D2-$u^*$, we included all $u^*$-COSMOS that passed the selections, without restriction on the radial distance.

The Deep stacks combine sets of images obtained during sequences of short exposures (few hundreds of seconds). Each exposure is followed by a small shift of the telescope in order to better subtract the sky background during the image processing steps and to fill the physical gaps between CCDs. The shifts are within a box of 4 arcminutes in DEC and 3 arcminutes in RA (*i.e.* larger than the Wide). The D2-$u^*$ stacks COSMOS data are shifted by 30' in both RA and DEC directions in order to pave the 1.4×1.4 deg$^2$ of the COSMOS survey. For T0006, TERAPIX combines them all with the early CFHTLS D2-$u^*$ observations, but cut the images to only keep the 1×1 deg$^2$ centered on the CFHTLS D2.

Each Deep D$k$ field is centered at a well-defined center position. The center coordinates are given in Table 25, and are exactly the same for all filters. D1, D2, D3 and D4 are therefore composed of a complete set of $u^*, g, r, i, y$ and $z$ images of 1 deg$^2$ each. The images selected in each Deep stack are not listed in the document, but can be provided by TERAPIX, upon request.

Tables 26 and 27 summarise the properties of Deep stacks. Several quantities quoted in these tables that have been discussed in Section 3 (like the seeing) will not be explained again here. So, we only focus on specific or remarkable points of the Deep survey. In contrast with Table 3 on the Wide summary, Tables 26 and 27 present results without errors because the field-to-field scatter in each Deep field is not relevant.

## 4.2 Depth and completeness limit

The depth is measured the same way as the wide survey, so we refer to Section 3.2 for a description of the method. As the Wide data, the completeness limit and galaxy count plots are available at `http://terapix.iap.fr/cplt/table_syn_T0006.html`.

The depths of D-25 and D-85 are given in Tables 26 and 27 and in the T0006 synoptic table (`http://terapix.iap.fr/cplt/table_syn_T0006.html`). Changes as function of magnitudes and cut offs are more detailed on the completeness and galaxy counts plots (see Fig. 34 to 37). The errors quoted for the completeness limits in Tables 26 and 27 are dominated by the uncertainty of the fitting. For the 80% and 50% values, this is due to the rather sparse sampling of the curve in the magnitude range where the variations of the completeness as function of magnitude are important. The exposure times and depths in $g, r, i$ and $z$ are different for each field. The time integration in these filters was determined by the Supernova time constrained acquisitions of the SNLS, hence total integration varies from field to field due to disparities in fields visibility throughout six years of acquistion.

It is interesting to notice from Fig. 34 to 37 that the 80% completeness limits of stellar sources is a good indicator of the maximum of galaxy counts. Likewise, the 80% completeness limits of extended sources locate rather well the turnover point, where the galaxy counts deviate from the expectations. This interpretation is however not true for the $u^*$-band data, where both depth parameters have similar values, and for the $z$ band, where the completeness limit value is lower than the turnover point and seems a pessimistic estimate of depth. It seems that the completeness limit measurements with simulated sources in the Deep data perform less than for the Wide survey (see Fig. 9), and that the Deep D-25 estimates are better than the D-85. This is probably the results of the increasing crowding, as the exposure time grows. It increases the fraction of blended simulated-real sources and makes the unambiguous detection of simulated sources more and more difficult.

The D2-$u^*$ should be interpreted with caution. As it mixes together CFHTLS and COSMOS images that are shifted by 30 arcminutes, the center of the stacks is deeper and the corners are shallower than the mean depth of the stack (see Fig. 32). The total exposure times and the depths quoted in the tables and on the figures for the D2-25-$u^*$ and D2-85-$u^*$ images are simply mean values and somewhat misleading.

The D2-$u^*$ is the only Deep stack which shows a heterogeneous field. The observing sequences have been split into 5 positions of MegaCam with respect to the Deep D2 center field. We reference them as follows:

- the D2-`cc`-$u^*$ center pointing;
- the D2-`ul`-$u^*$ upper left pointing, located North-East from the center field;

| Field | Parameter | $u^*$ | $g$ | $r$ | $i$ | $y$ | $z$ |
|---|---|---|---|---|---|---|---|
| D1-25 | Nb images | 34 | 115 | 159 | 164 | 69 | 162 |
| | Exp. time [s] | 22443 | 27233 | 50411 | 79052 | 27724 | 58331 |
| | Seeing ["] | 0.74 | 0.68 | 0.64 | 0.63 | 0.58 | 0.58 |
| | 80% Compl. (stellar) | 26.22 ±0.10 | 25.94 ±0.10 | 25.40 ±0.10 | 25.10 ±0.10 | 25.00 ±0.10 | 24.59 ±0.10 |
| | 80% Compl. (extended) | 25.52 ±0.10 | 25.29 ±0.10 | 24.68 ±0.10 | 24.32 ±0.10 | 24.28 ±0.10 | 23.83 ±0.10 |
| | Int. astrom. err. | (0.010",0.009") | (0.011",0.010") | (0.010",0.008") | (0.013",0.010") | (0.012",0.011") | (0.010",0.008") |
| | Ext. astrom. err. | (0.25",0.22") | (0.26",0.24") | (0.26",0.24") | (0.25",0.24") | (0.27",0.25") | (0.26",0.24") |
| | Mag. int. err. [mag.] | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| D2-25 | Nb images | 128 | 137 | 169 | 187 | 127 | 147 |
| | Exp. time [s] | ~25000 | 30834 | 50893 | 89404 | 51008 | 52930 |
| | Seeing ["] | 0.75 | 0.69 | 0.63 | 0.61 | 0.63 | 0.57 |
| | 80% Compl. (stellar) | 26.32 ±0.10 | 26.01 ±0.10 | 25.44 ±0.10 | 25.10 ±0.10 | 25.31 ±0.10 | 24.65 ±0.10 |
| | 80% Compl. (extended) | 25.64 ±0.10 | 25.30 ±0.10 | 24.68 ±0.10 | 24.38 ±0.10 | 24.39 ±0.10 | 23.90 ±0.10 |
| | Int. astrom. err. | (0.061",0.050") | (0.069",0.059") | (0.073",0.052") | (0.097",0.076") | (0.097",0.076") | (0.056",0.047") |
| | Ext. astrom. err. | (0.21",0.21") | (0.23",0.22") | (0.22",0.23") | (0.21",0.22") | (0.23",0.23") | (0.21",0.22") |
| | Mag. int. err. [mag.] | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| | CFHTLS-SDSS $\langle\delta_m\rangle$ [mag.] | +0.052 | +0.024 | +0.017 | +0.026 | +0.020 | +0.023 |
| D3-25 | Nb images | 33 | 104 | 140 | 154 | 69 | 117 |
| | Exp. time [s] | 21787 | 23419 | 42027 | 73870 | 28053 | 42142 |
| | Seeing ["] | 0.76 | 0.68 | 0.65 | 0.63 | 0.64 | 0.54 |
| | 80% Compl. (stellar) | 26.15 ±0.10 | 25.95 ±0.10 | 25.48 ±0.10 | 25.02 ±0.10 | 25.10 ±0.10 | 24.51 ±0.10 |
| | 80% Compl. (extended) | 25.45 ±0.10 | 25.29 ±0.10 | 24.69 ±0.10 | 24.39 ±0.10 | 24.36 ±0.10 | 23.71 ±0.10 |
| | Int. astrom. err. | (0.008",0.007") | (0.037",0.029") | (0.032",0.027") | (0.034",0.026") | (0.028",0.024") | (0.052",0.045") |
| | Ext. astrom. err. | (0.24",0.24") | (0.25",0.25") | (0.25",0.25") | (0.25",0.25") | (0.27",0.26") | (0.25",0.25") |
| | Mag. int. err. [mag.] | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.04 |
| | CFHTLS-SDSS $\langle\delta_m\rangle$ [mag.] | +0.049 | +0.020 | +0.016 | +0.023 | +0.018 | +0.006 |
| D4-25 | Nb images | 35 | 114 | 140 | 157 | 49 | 168 |
| | Exp. time [s] | 23103 | 27862 | 46448 | 73330 | 19883 | 60490 |
| | Seeing ["] | 0.77 | 0.71 | 0.61 | 0.58 | 0.60 | 0.57 |
| | 80% Compl. (stellar) | 25.99 ±0.10 | 25.92 ±0.10 | 25.41 ±0.10 | 25.11 ±0.10 | 24.98 ±0.10 | 24.55 ±0.10 |
| | 80% Compl. (extended) | 25.37 ±0.10 | 25.26 ±0.10 | 24.65 ±0.10 | 24.31 ±0.10 | 24.22 ±0.10 | 23.76 ±0.10 |
| | Int. astrom. err. | (0.046",0.039") | (0.087",0.075") | (0.069",0.070") | (0.083",0.056") | (0.083",0.056") | (0.068",0.068") |
| | Ext. astrom. err. | (0.22",0.21") | (0.23",0.22") | (0.23",0.22") | (0.22",0.21") | (0.24",0.22") | (0.22",0.21") |
| | Mag. int. err. [mag.] | 0.04 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |

Table 26: Quick summary of the D1-25, D2-25, D3-25 and D4-25 stacks parameters. "80% Compl." is the 80% completeness limit. The seeing is the median FWHM. Astrometric errors are given along the two (X,Y)=(NS,EW) axes. The internal astrometric errors are from the SCAMP calibrations, and the external errors are QualityFITS-out outputs, from the comparison of source positions on each stack with the 2MASS astrometric positions. The "Mag. int. err." are the mean internal photometric errors from the mean of the 3 magnitude ranges of Table 29. The "CFHTLS-SDSS $\langle\delta_m\rangle$ mag." denotes the mean magnitude offset between the CFHTLS and the SDSS surveys, averaged over a Deep field. Note that the number of images combined in the D2 $u^*$ does not express the exposure time because most COSMOS images are shifted by 30 arcminutes and only fill one quadrant of the $u^*$-band stacks. The D2-$u^*$ corresponds to the innermost regions of Fig. 33, delimited by the black contours. Table 28 describes each sub-field in more details.

| Field | Parameter | $u^*$ | $g$ | $r$ | $i$ | $y$ | $z$ |
|---|---|---|---|---|---|---|---|
| D1-85 | Nb images | 113 | 384 | 542 | 553 | 144 | 554 |
| | Exp. time [s] | 74590 | 89784 | 176258 | 265844 | 60329 | 199477 |
| | Seeing ["] | 0.88 | 0.83 | 0.77 | 0.74 | 0.70 | 0.71 |
| | 80% Compl. (stellar) | 26.56 ±0.10 | 26.03 ±0.10 | 25.40 ±0.10 | 25.19 ±0.10 | 25.28 ±0.10 | 24.96 ±0.10 |
| | 80% Compl. (extended) | 25.83 ±0.10 | 25.33 ±0.10 | 24.65 ±0.10 | 24.35 ±0.10 | 24.38 ±0.10 | 24.09 ±0.10 |
| | Int. astrom. err. | (0.010",0.009") | (0.011",0.010") | (0.010",0.008") | (0.013",0.010") | (0.012",0.011") | (0.010",0.008") |
| | Ext. astrom. err. | (0.26",0.23") | (0.27",0.25") | (0.26",0.24") | (0.25",0.25") | (0.27",0.25") | (0.26",0.24") |
| | Mag. int. err. [mag.] | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| D2-85 | Nb images | 267 | 324 | 447 | 411 | 224 | 401 |
| | Exp. time [s] | ∼45000 | 72923 | 135275 | 194264 | 95536 | 144388 |
| | Seeing ["] | 0.83 | 0.80 | 0.75 | 0.71 | 0.69 | 0.67 |
| | 80% Compl. (stellar) | 26.53 ±0.10 | 26.05 ±0.10 | 25.46 ±0.10 | 25.15 ±0.10 | 25.32 ±0.10 | 24.90 ±0.10 |
| | 80% Compl. (extended) | 25.82 ±0.10 | 25.33 ±0.10 | 24.66 ±0.10 | 24.36 ±0.10 | 24.43 ±0.10 | 24.05 ±0.10 |
| | Int. astrom. err. | (0.061",0.050") | (0.069",0.059") | (0.073",0.052") | (0.097",0.076") | (0.097",0.076") | (0.056",0.047") |
| | Ext. astrom. err. | (0.22",0.22") | (0.22",0.22") | (0.23",0.23") | (0.22",0.22") | (0.23",0.23") | (0.21",0.22") |
| | Mag. int. err. [mag.] | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| | CFHTLS-SDSS $\langle\delta_m\rangle$ [mag.] | +0.049 | +0.016 | +0.020 | +0.022 | +0.016 | +0.020 |
| D3-85 | Nb images | 116 | 355 | 471 | 528 | 198 | 487 |
| | Exp. time [s] | 76584 | 79626 | 142773 | 249376 | 85238 | 175415 |
| | Seeing ["] | 0.89 | 0.84 | 0.78 | 0.76 | 0.78 | 0.69 |
| | 80% Compl. (stellar) | 26.50 ±0.10 | 26.09 ±0.10 | 25.51 ±0.10 | 25.06 ±0.10 | 25.31 ±0.10 | 24.95 ±0.10 |
| | 80% Compl. (extended) | 25.82 ±0.10 | 25.34 ±0.10 | 24.65 ±0.10 | 24.36 ±0.10 | 24.44 ±0.10 | 24.06 ±0.10 |
| | Int. astrom. err. | (0.008",0.007") | (0.037",0.029") | (0.032",0.027") | (0.034",0.026") | (0.028",0.024") | (0.052",0.045") |
| | Ext. astrom. err. | (0.25",0.25") | (0.26",0.25") | (0.26",0.25") | (0.25",0.25") | (0.27",0.26") | (0.25",0.25") |
| | Mag. int. err. [mag.] | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.04 |
| | CFHTLS-SDSS $\langle\delta_m\rangle$ [mag.] | +0.057 | +0.021 | +0.016 | +0.023 | +0.014 | +0.002 |
| D4-85 | Nb images | 121 | 374 | 442 | 487 | 116 | 455 |
| | Exp. time [s] | 77269 | 87741 | 146547 | 234074 | 45607 | 160227 |
| | Seeing ["] | 0.89 | 0.82 | 0.72 | 0.69 | 0.68 | 0.66 |
| | 80% Compl. (stellar) | 26.47 ±0.10 | 26.05 ±0.10 | 25.53 ±0.10 | 25.11 ±0.10 | 25.09 ±0.10 | 24.90 ±0.10 |
| | 80% Compl. (extended) | 25.70 ±0.10 | 25.33 ±0.10 | 24.63 ±0.10 | 24.34 ±0.10 | 24.34 ±0.10 | 23.97 ±0.10 |
| | Int. astrom. err. | (0.046",0.039") | (0.087",0.075") | (0.069",0.070") | (0.083",0.056") | (0.083",0.056") | (0.068",0.068") |
| | Ext. astrom. err. | (0.22",0.22") | (0.23",0.22") | (0.23",0.22") | (0.22",0.21") | (0.24",0.23") | (0.22",0.21") |
| | Mag. int. err. [mag.] | 0.04 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |

Table 27: Quick summary of the D1-85, D2-85, D3-85 and D4-85 stack parameters. "80% Compl." is the 80% completeness limit. The seeing is the median FWHM. Astrometric errors are given along the two (X,Y)=(NS,EW) axes. The internal photometric errors are from the `SCAMP` calibrations, and the external errors are `QualityFITS`-out outputs, from the comparison of source positions on each stack with the 2MASS astrometric positions. The "Mag. int. err." are the mean internal photometric errors from the mean of the 3 magnitude ranges of Table 29. The "CFHTLS-SDSS $\langle\delta_m\rangle$ mag." denotes the mean magnitude offset between the CFHTLS and the SDSS surveys, averaged over a Deep field. Note that the number of images combined in the D2 $u^*$ does not express the exposure time because most COSMOS images are shifted by 30 arcminutes and only fill one quadrant of the $u^*$-band stacks. The D2-$u^*$ corresponds to the innermost regions of Fig. 33, delimited by the black contours. Table 28 describes each sub-field in more details.

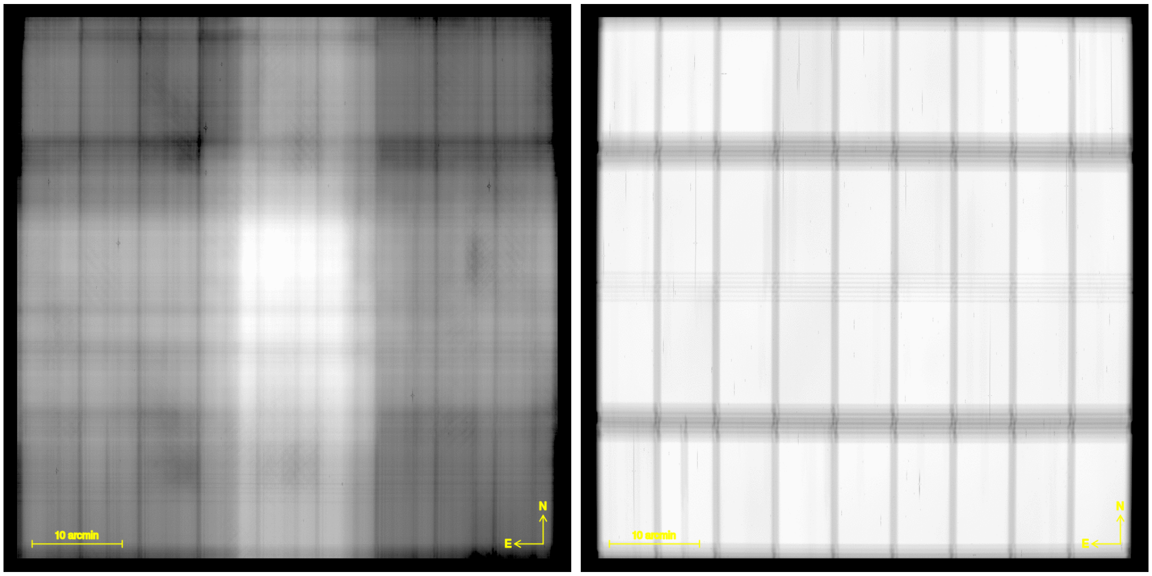



Figure 32: Weightmap images of the D2 CFHTLS_D-85_u_100028+021230_T0006 (left) and CFHTLS_D-85_i_100028+021230_T0006 (right) stacks. The mosaicing of the D2-$u^*$ field by the CFHTLS and the COSMOS data produces a heterogeneous stack, with significant variations of the exposure times and depths over the field. The contrast with the $i$-band (and other filters) is striking. The innermost bright region of the D2-$u^*$ weight-map corresponds to the central squares inside the bold contours drawn on Fig. 33, and the numbers quoted on Tables 26 and 27 for the D2-$u^*$ stacks are only relevant for the regions inside the black contours.

- the D2-ur-$u^*$ upper right pointing, located North-West;
- the D2-ll-$u^*$ lower left pointing, located South-East; and
- the D2-lr-$u^*$ lower right pointing, located South-West.

The relative positions of D2-cc, D2-ul, D2-ur, D2-ll and D2-lr are shown on Fig. 33. The black contours draw the shape of the D2-$u^*$ stacks. All colored areas located inside are combined to produce the D-25-$u^*$ and D-85$u^*$, which explains the complex weight-map shown on the left panel of Fig. 32.

The local dithering, the complex mosaicing of the fields and the split of observations in several observing runs produce non-uniform D2-$u^*$ stacks. The exposure time, the depth and the seeing can only be defined locally over the D2-$u^*$ MegaCam field. Table 28 describes the observations in sub-quadrants drawn on Fig. 33. Each quadrant of D-25-$u^*$ and D-85-$u^*$ combines the D2-cc images with either D2-ul, or D2-ur, or D2-ll, or D2-lr, while the central part combines them all. The precise measurement of an exposure time and a depth for D2-$u^*$ is clearly impossible. Note that the exposure times inside the bold contours of Fig. 33 are 65600 $s$. and 134700 $s$., for the D2-$u^*$-25 and D2-$u^*$-85 stacks, respectively.

In contrast, the seeing looks more uniform. The last column of Table 28 provides the mean seeing, as derived from the median seeing value of the single MegaCam exposures composing D2-cc, D2-ul, D2-ur, D2-ll and D2-lr. The errors are the $rms$ of the mean. All mean seeings keep compatible with a similar value within 1-$\sigma$, so there is no significant difference between the 5 regions.

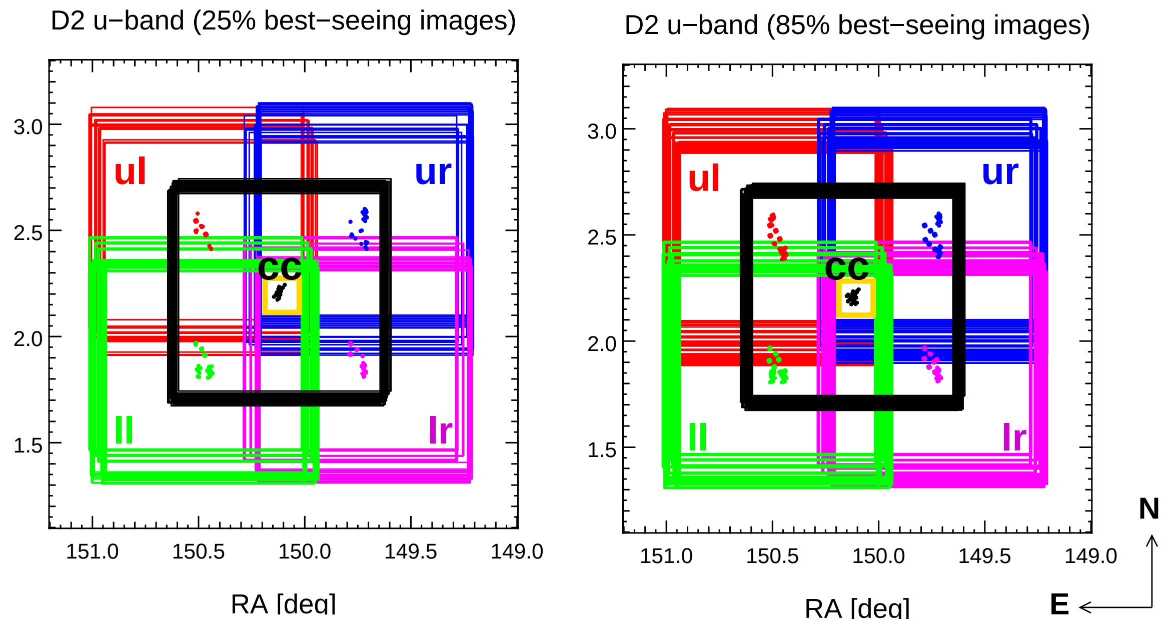



Figure 33: Locations of $u^*$-band pointings used to produced the D2-$u^*$ stack. The colored squares represent the different MegaCam fields, and the colored points are the center positions of each single CFHTLS and COSMOS images that are combined to produce D-25-$u^*$ and D-85-$u^*$. The dark squares are located at the D2 center position and draw the contour of the final D2-$u^*$. The D2-$u^*$ properties quoted in Tables 26 and 27 only refer to the central regions delimited by the black squares. The bold squares show the very central part that combines all exposures. The stacks inside this narrow field are extremely deep: 65600 $s$. for D2-$u^*$-25 , and 134700 $s$. for D2-$u^*$-85.

## 4.3 Photometric accuracy

### 4.3.1 Systematic offsets between CFHTLS and SDSS and between Deep fields

Whenever possible, the systematics offsets between CFHTLS and SDSS common stars have been measured. They are derived with the minimisation method described in Section 3.4.3 for the Wide fields. The SDSS magnitudes are first converted into the CFHTLS system, using the MegaCam-SDSS color transformation equations of Regnault et al 2009.

The offsets are quoted in Tables 26 and 27 as well as in the T0006 synoptic table (`http://terapix.iap.fr/cplt/ta` Only D2 and D3 show common sources with SDSS, so the interpretation of these data in terms of systematic offsets between the two surveys should be done with caution. Nevertheless, the offsets are indeed similar to the means $\langle\Delta_{m=u^*,g,r,i/y,z}\rangle$ (Table 11) or $\langle\delta_{m=u^*,g,r,i/y,z}\rangle$ (Table 3) found for the Wide fields. In both Deep and Wide fields, the CFHTLS-SDSS comparisons are carried out with the same stellar population, all stars being within the magnitude range $17 < i < 21$ . The signal-to-noise ratio of all common stars on the Deep fields is much higher than on the Wide, so it is interesting to find that the offsets still keep similar values, in all filters. The consistency between the Deep and Wide offsets is an indication there is a small systematic residual in the photometric calibration. CFHT and TERAPIX are working on this issue.

| CFHTLS+COSMOS D2-$u^*$ field name | Reference center RA ; DEC [J2000] | Number of Exposures | Total Exp. time [s] | Mean Seeing ± $rms$ ["] |
|---|---|---|---|---|
| D2-cc-25 | 10:00:28.00 ; +02:12:30 | 24 | 13446 | 0.735 ± 0.053 |
| D2-cc-85 | | 33 | 17471 | 0.792 ± 0.108 |
| D2-ul-25 | 10:01:48.00 ; +02:24:44 | 18 | 7474 | 0.800 ± 0.016 |
| D2-ul-85 | | 56 | 28244 | 0.887 ± 0.078 |
| D2-ur-25 | 09:58:50.00 ; +02:24:44 | 24 | 12482 | 0.763 ± 0.064 |
| D2-ur-85 | | 56 | 27892 | 0.841 ± 0.090 |
| D2-ll-25 | 10:01:48.00 ; +01:49:47 | 36 | 19299 | 0.757 ± 0.043 |
| D2-ll-85 | | 64 | 32805 | 0.830 ± 0.096 |
| D2-lr-25 | 09:58:50.00 ; +01:49:47 | 26 | 12866 | 0.733 ± 0.072 |
| D2-lr-85 | | 58 | 28325 | 0.845 ± 0.120 |

Table 28: Overview of the mosaicing of $u^*$-band observations over the 5 pointings that are used to produce D-25-$u^*$ and D-85-$u^*$. The total field of view covered by the 5 pointings is 1.4×1.4 deg$^2$, but we only keep the 1.×1. deg$^2$ field at the D2 T0006 reference position. Only the very central region of stacks combines all data and corresponds to the D2-$u^*$ properties quoted in Tables 26 and 27. This region is roughly comprised inside the bold squares of Fig. 33. The seeings are not the same, but the scatter is large and all stacks agree with the same mean seeing, within 1-$\sigma$.

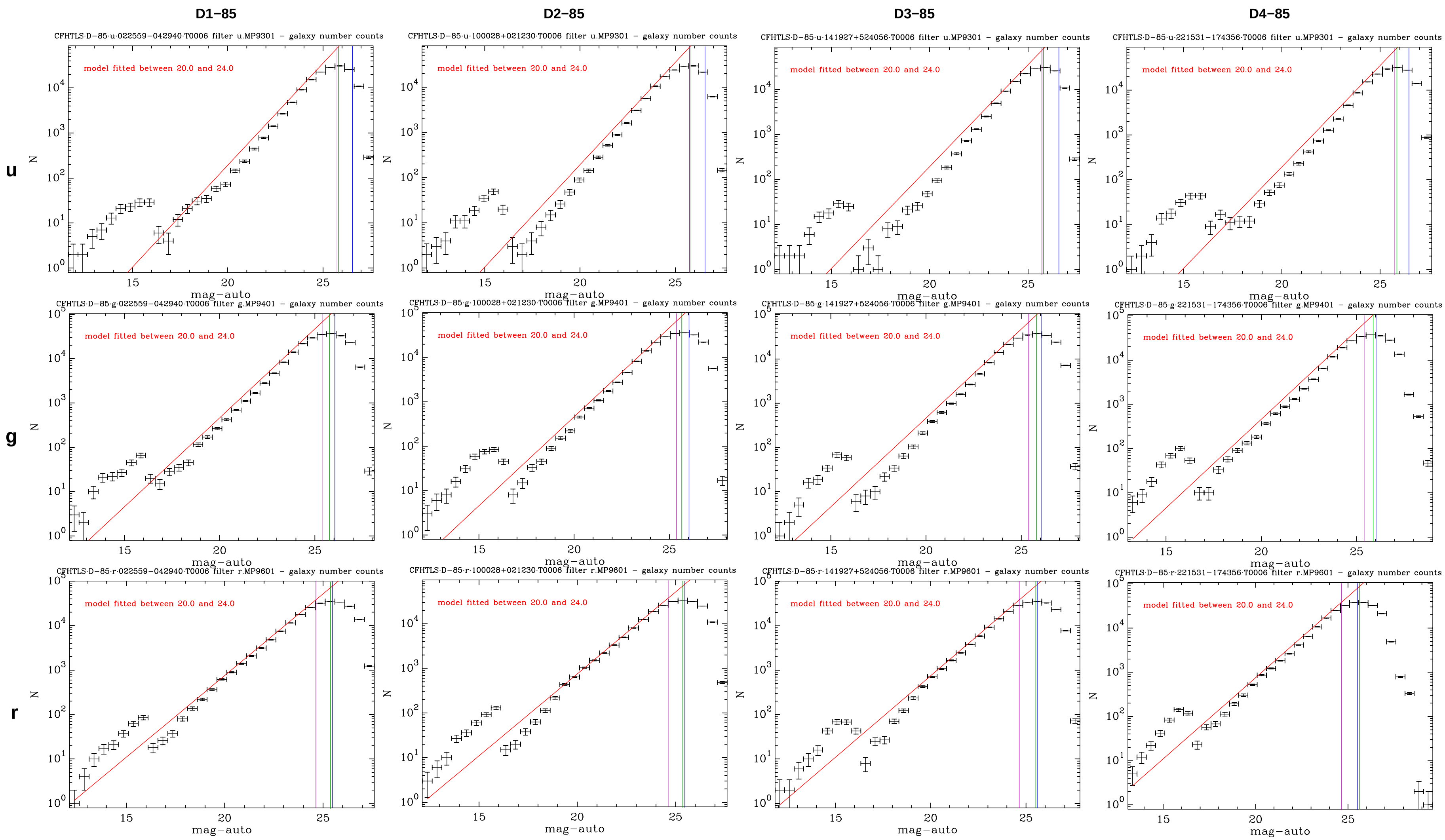


Figure 34: D-85 *ugr* galaxy counts in the 4 Deep fields. The counts are derived by `QualityFITS`-out, immediately after the production of stacks, so they do not use the chi2 image. In principle the final merged catalogues based on the `Sextractor` DUAL-image mode exploration of images should be deeper than the limits shown on these plots. The red lines draw the expectations for the $u$, $g$ and $r$ MegaCam filters (the next plots also show the $i$, $y$ and $z$ filters). The vertical green lines locate the maxima; the magenta lines locate the 80% completeness limits for extended sources and the blue lines locate the 80% completeness limits for stellar sources. The bump observed on each plot at bright magnitude is due to wrong detections and wrong magnitude estimates of saturated sources in the fields.

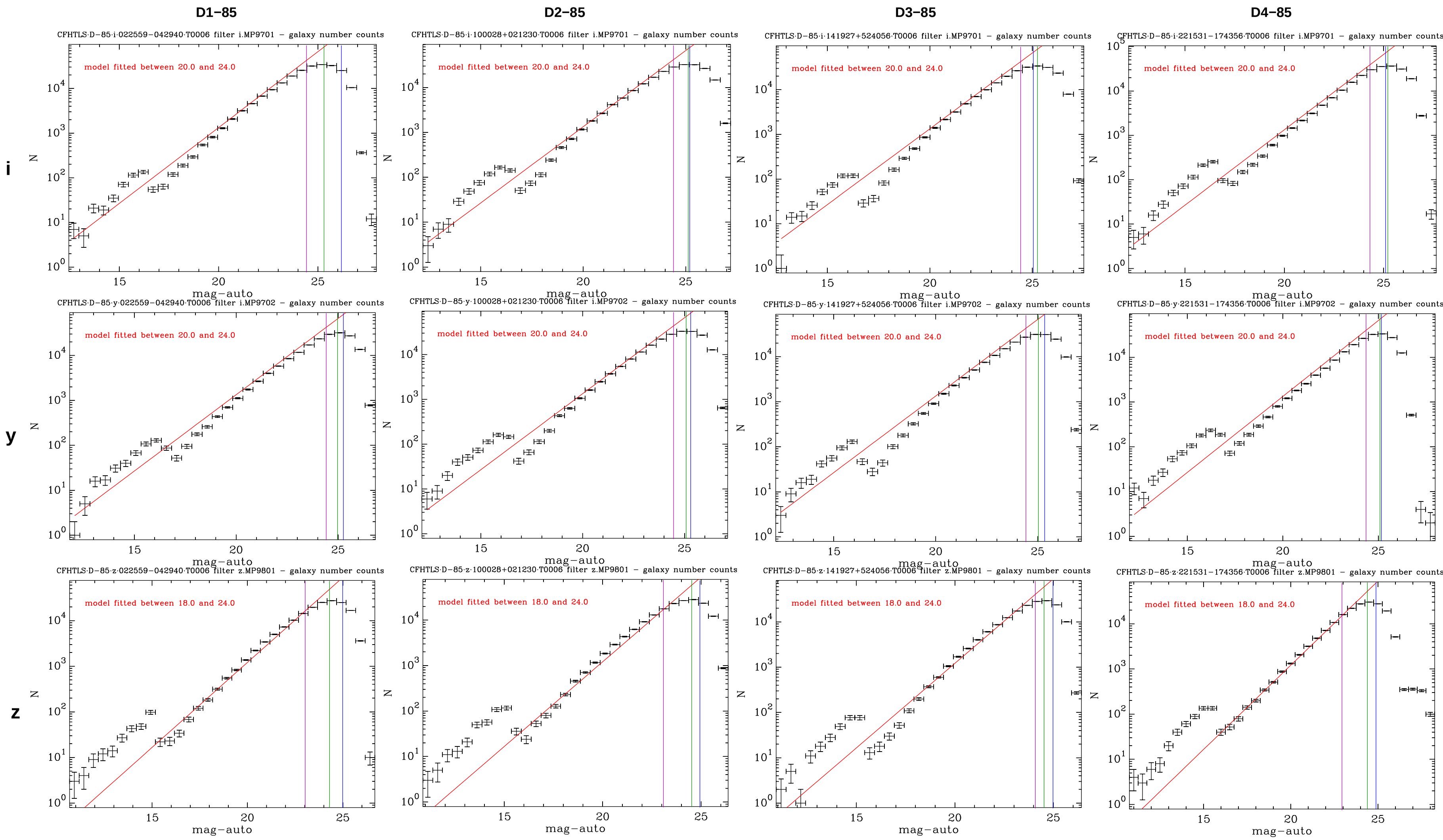



Figure 35: D-85 *iyz* galaxy counts in the 4 Deep fields (galaxy counts cont'd; see caption on Fig. 34).

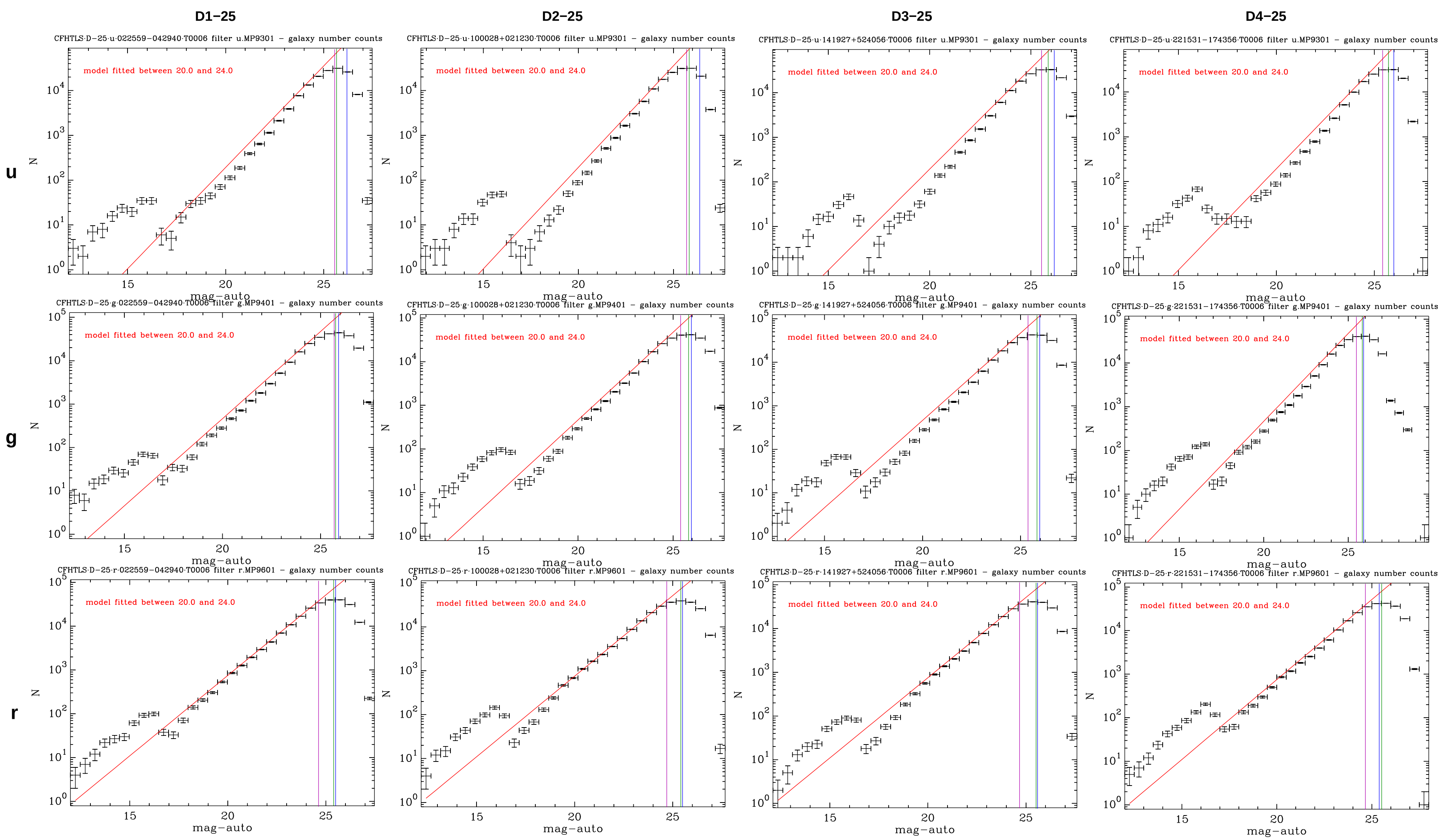



Figure 36: D-25 *ugr* galaxy counts in the 4 Deep fields (galaxy counts cont'd; see caption on Fig. 34).

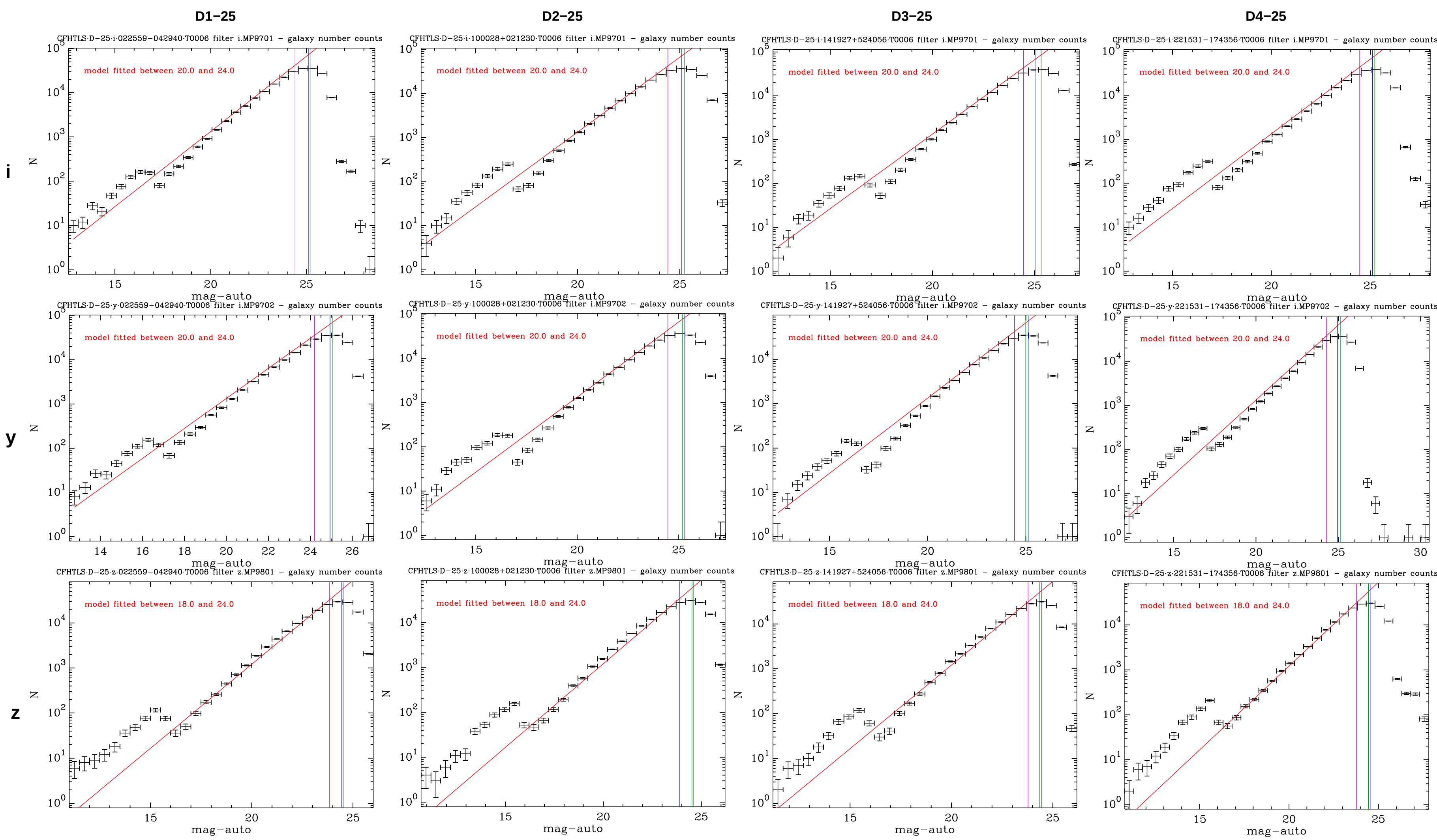



Figure 37: D-25 *iyz* galaxy counts in the 4 Deep fields (galaxy counts cont'd; see caption on Fig. 34).

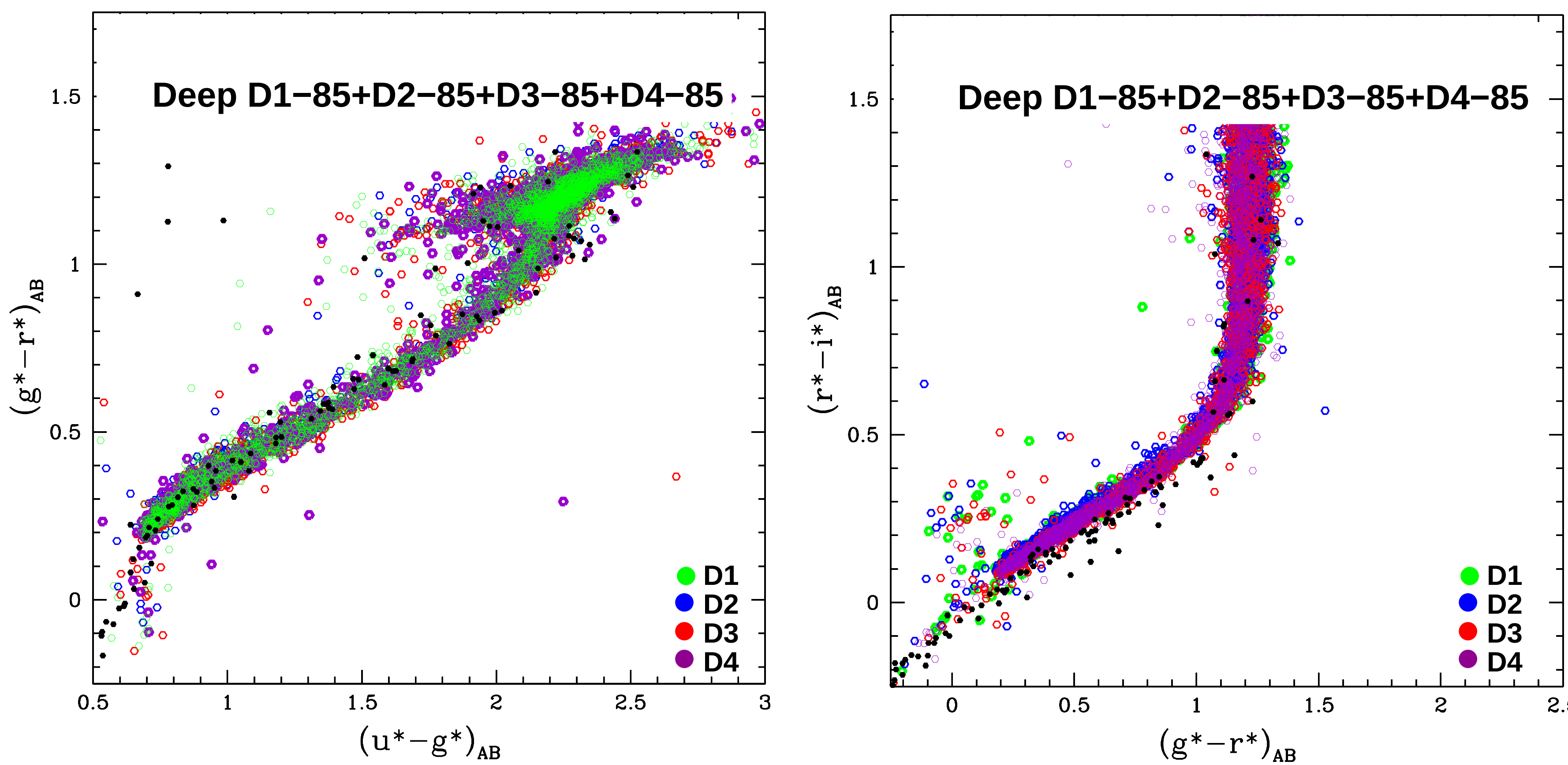



Figure 38: Comparison of the $(u^*-g)/(g-r)$ (left) and $(g-r)/(r-i)$ (right) stellar color-color tracks of the 4 Deep D$k$-85 fields. The tracks are superimposed with different colors in order to see translations or dilutions between D1, D2, D3 and D4. The green points are D1-85, the blue are D2-85, the red are D3-85 and the magenta are D4-85. The agreement is excellent. All points overlap and the distinction between the color-color tracks is difficult. The left panel show D4-D3-D2-D1 over-plotted, in that order, so D4 (magenta) is background, and D1 (green) is foreground. The right panel is the opposite.

Note that the small offset found in the Deep D-25 and D-85 $z$-band stacks confirm it is likely close to zero, as pointed out in Section 3.4.3 from the inspection of the Wide fields.

The stellar color-color tracks of the four fields are remarkably similar. No color offsets can be measured between D1, D2, D3 and D4. This is illustrated on Fig. 38. It shows a superimposition of the $(u^* - g)/(g - r)$ and $(g - r)/(r - i)$ color-color plots for the four D-85 stacks together.

### 4.3.2 Photometric errors

The internal errors have been measured by comparing the photometry of common sources in the D-25 and D-85 stacks. The D-25 and D-85 parent samples comprise all source pairs listed in the TERAPIX T0006 merged catalogues of the 4 Deep fields. The selected sources must have magnitude measured in all filters (no objects with magnitude/mag_err = 99.0 in any $u^*$, $g$, $r$, $i$, $y$ and $z$ filters, for both the D-25 and D-85 catalogues), with a `SExtractor` extraction flag FLAGS=0 (objects with good photometry) and a TERAPIX object flag=1 or 0 (i.e. stellar or extended sources, only non-saturated objects in non-masked regions). Only sources fainter than $u^*, g$=20.5 and $r, i, y, z$=19.5, and brighter than the D-25 80% completeness limit of extended sources are selected. This cut secures the homogeneity and completeness of the D-25 and D-85 populations.

The internal photometric errors are derived from the distributions of magnitude differences of source pairs between the D-25 and D-85 catalogues, D25–D85, as function of D-25 magnitudes. The analyses are carried out 3 magnitude ranges, for all filters, and after a 3-$\sigma$ clipping over the distributions of magnitude differences. The statistics use the MAG_AUTO magnitudes to derive first the median and mean systematic magnitude offsets between D-25 and D-85, then the mean scatter, based on the *rms*. We verified that the median systematic offset is randomly distributed around zero and never exceeds 0.013 mag., for all sub-samples.

The distributions are then fitted by a Gaussian, which returns the FWHM of the mean magnitude difference of cross-identified sources in D-25 and D-85. The mean internal photometric error is then defined as $\sigma_{\rm D25-D85}$ =FWHM/2.35. We checked that the error estimate based on the Gaussian fitting is very close the *rms* errors. The results are summarised in Table 29. Overall, they look very similar to the Wide survey, when sources with same signal-to-noise ratio are compared.

We use the results quoted in Table 29 to compute the photometric errors listed in the summary Tables 26 and 27. The internal photometric errors are the mean values of the 3 magnitude ranges. This is a reasonable but likely optimistic estimate because it does not take into account there are much more faint than bright objects. Note that these results are valid for both stellar and extended sources.

In contrast with the Wide survey, we do not have much sources common to CFHTLS and SDSS in D2 and D3 to estimate with high degree of confidence the external errors. In addition, we do not have any common sources at all for D1 and D4. However taking into account the statistics for the internal errors and the remarkable consistency of the results with the Wide survey, similar conclusions as for the TERAPIX T0006 Wide data can be drawn. Therefore, TERAPIX considers the following errors are reasonably good and conservative estimates of the *rms* photometric errors over a rather broad magnitude range of the CFHTLS Deep survey (details in Table 29):

- 5% in $u^*$;   3% in $g, r$ and $i/y$,   4% in $z$ .

For faint sources photometric errors rise by a factor of $\sim 2$ in all bands with respect to the magnitude range quoted above and in Tables 26 and 27.

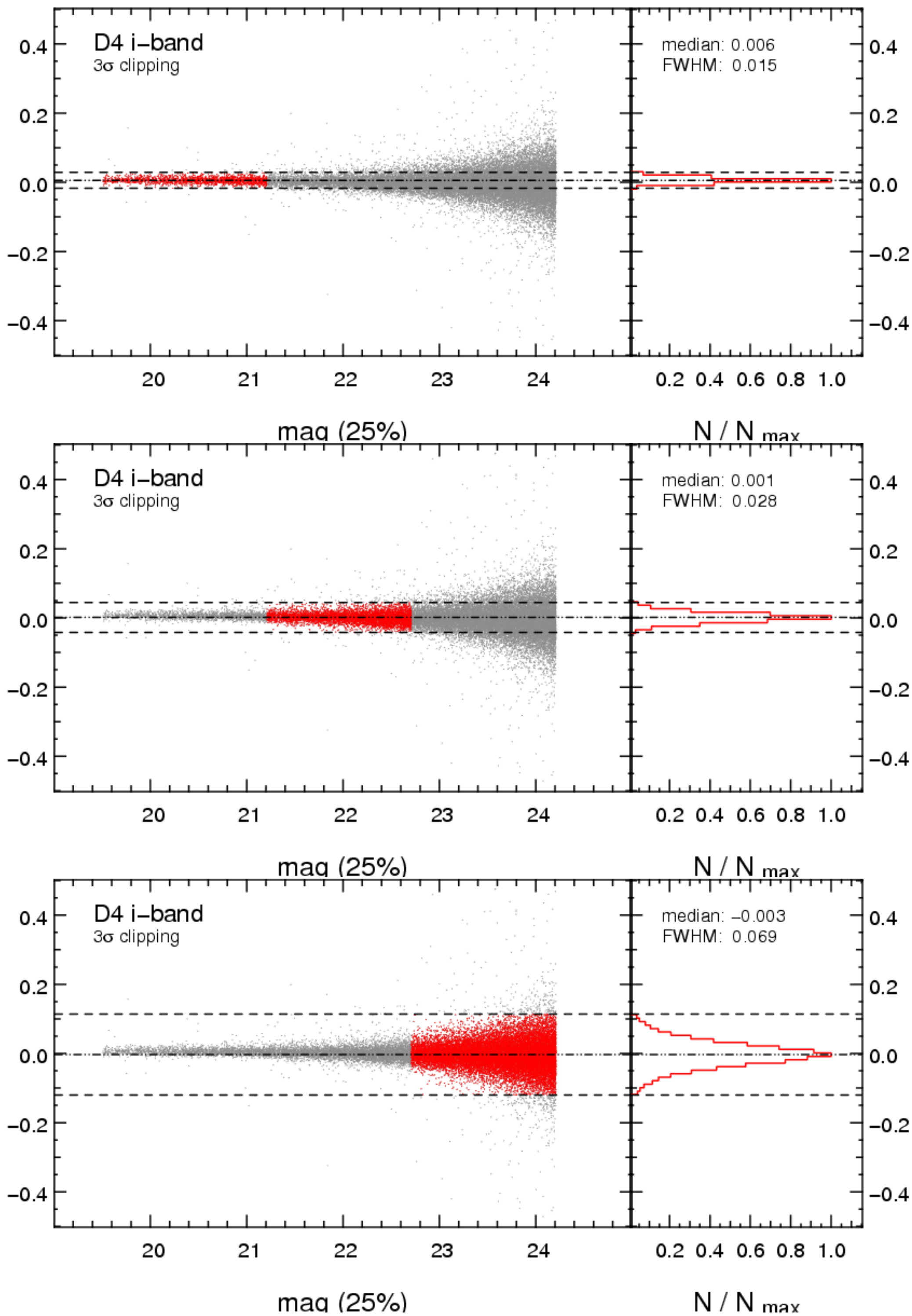



Figure 39: Estimation of the internal photometric accuracy in Deep stacks by comparing the the MAG_AUTO magnitudes of sources in D4-25-$i$ and D-85-$i$. The sample comprises all (stars and galaxies) common sources down to the 80% completeness limits for extended sources of the D-25 stack (sharp cuts on the left panels). The catalogue is then split into 3 magnitude bins (from top to bottom, the red dots: $19.5 < i < 21.21$, $21.21 < i < 22.71$, $22.71 < i < 24.21$), and for each bin we analyse the $i$-band magnitude differences D25–D85 as function of magnitude (left panels). The right panels show the distribution of magnitude differences. The histograms are first sigma-clipped and then fitted by a Gaussian that returns the FWHM of the distribution. The mean internal photometric error is then defined as $\sigma_{\rm D25-D85}$ =FWHM/2.35.

| Filter | CFHTLS T0006 Deep data | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | D1 | | D2 | | D3 | | D4 | |
| | mag. range [AB MegaCam] | $\sigma_{D25-D85}$ [mag.] | mag. range [AB MegaCam] | $\sigma_{D25-D85}$ [mag.] | mag. range [AB MegaCam] | $\sigma_{D25-D85}$ [mag.] | mag. range [AB MegaCam] | $\sigma_{D25-D85}$ [mag.] |
| $u^*$ | 20.50 - 22.42 | 0.011 | 20.50 - 22.54 | 0.011 | 20.50 - 22.35 | 0.013 | 20.50 - 22.27 | 0.014 |
| | 22.42 - 23.92 | 0.023 | 22.54 - 24.04 | 0.021 | 22.35 - 23.85 | 0.025 | 22.27 - 23.77 | 0.026 |
| | 23.92 - 25.42 | 0.062 | 24.04 - 25.54 | 0.053 | 23.85 - 25.35 | 0.060 | 23.77 - 25.27 | 0.068 |
| $g$ | 20.50 - 22.19 | 0.008 | 20.50 - 22.20 | 0.006 | 20.50 - 22.19 | 0.007 | 20.50 - 22.16 | 0.007 |
| | 22.19 - 23.69 | 0.014 | 22.20 - 23.70 | 0.012 | 22.19 - 23.69 | 0.015 | 22.16 - 23.66 | 0.014 |
| | 23.69 - 25.19 | 0.035 | 23.70 - 25.20 | 0.030 | 23.69 - 25.19 | 0.037 | 23.66 - 25.16 | 0.037 |
| $r$ | 19.50 - 21.58 | 0.007 | 19.50 - 21.58 | 0.006 | 19.50 - 21.59 | 0.006 | 19.50 - 21.55 | 0.007 |
| | 21.58 - 23.08 | 0.012 | 21.58 - 23.08 | 0.010 | 21.59 - 23.09 | 0.011 | 21.55 - 23.05 | 0.012 |
| | 23.08 - 24.58 | 0.030 | 23.08 - 24.58 | 0.026 | 23.09 - 24.59 | 0.029 | 23.05 - 24.55 | 0.031 |
| $i$ | 19.50 - 21.22 | 0.008 | 19.50 - 21.28 | 0.007 | 19.50 - 21.29 | 0.007 | 19.50 - 21.21 | 0.008 |
| | 21.22 - 22.72 | 0.016 | 21.28 - 22.78 | 0.011 | 21.29 - 22.79 | 0.014 | 21.21 - 22.71 | 0.014 |
| | 22.72 - 24.22 | 0.040 | 22.78 - 24.28 | 0.027 | 22.79 - 24.29 | 0.034 | 22.71 - 24.21 | 0.034 |
| $y$ | 19.50 - 21.18 | 0.012 | 19.50 - 21.29 | 0.010 | 19.50 - 21.26 | 0.007 | 19.50 - 21.12 | 0.007 |
| | 21.18 - 22.68 | 0.019 | 21.29 - 22.79 | 0.012 | 21.26 - 22.76 | 0.015 | 21.12 - 22.62 | 0.016 |
| | 22.68 - 24.18 | 0.040 | 22.79 - 24.29 | 0.028 | 22.76 - 24.26 | 0.037 | 22.62 - 24.12 | 0.042 |
| $z$ | 19.50 - 20.73 | 0.010 | 19.50 - 20.80 | 0.008 | 19.50 - 20.61 | 0.011 | 19.50 - 20.66 | 0.009 |
| | 20.73 - 22.23 | 0.023 | 20.80 - 22.30 | 0.020 | 20.61 - 22.11 | 0.026 | 20.66 - 22.16 | 0.020 |
| | 22.23 - 23.73 | 0.061 | 22.30 - 23.80 | 0.050 | 22.11 - 23.61 | 0.071 | 22.16 - 23.66 | 0.059 |

Table 29: Analysis of the internal photometric errors in the CFHTLS T0006 Deep data from the comparison of source pairs in D-25 and D-85. For each Deep field, the internal error is estimated from the mean MAG_AUTO magnitude differences of common sources in D-25 and D-85. The statistics are based on a 3-$\sigma$ clipping and a Gaussian fitting of the distribution of magnitude differences. The best fit returns the FWHM of the distribution. The mean internal photometric error is then defined as $\sigma_{D25-D85}$ =FWHM/2.35. Each sample is split into 3 magnitude ranges, but does not use any filters based on the morphology, so the internal errors quoted in this table are valid for any sources. The bright cuts are AB=20.5 for $u^*$ and $g$ and or AB=19.5 for $r, i, y$ and $z$, while for the faint sources, the cut is set by the 80% completeness limits of extended sources in the D-25 stacks, so both D-85 and D-25 are complete up to the depth of the analyses.

### 4.4 Astrometric accuracy

The astrometric accuracy is derived in the same way as for the Wide survey. We refer to the top of Section 3.5 for a description of the method. The Deep analysis is however simpler than the Wide because there is only one single position per field. The astrometric calibration of the Deep fields is detailed in Section 6.2, so we only focus on the accuracy in this section.

The results of the internal and external error analyses are given in Tables 26 and 27. The internal errors have been measured by `SCAMP`, from the astrometric solutions of each Deep field, for each filter separately. In contrast, the external errors quoted in Tables 26 and 27 are not the values derived from the astrometric solutions. They are computed separately as well, but after the production of the Deep images, in order to get the true astrometric errors of sources in each stack. The reference external catalogue is 2MASS, and the external errors found are very similar to the Wide survey.

On the average, the mean internal astrometric *rms* errors in the Deep fields are

$$\sigma_{\rm RA} = 0.048\text{"} \pm 0.031\text{"} \ , \ \text{and} \ , \ \sigma_{\rm DEC} = 0.039 \pm 0.025\text{"} \ , \tag{11}$$

and the mean external errors

$$\sigma_{\rm RA} = 0.239\text{"} \pm 0.019\text{"} \ , \ \text{and} \ , \ \sigma_{\rm DEC} = 0.231 \pm 0.016\text{"} \ , \tag{12}$$

where, the dispersions are the *rms* errors. Since the 4 fields are calibrated independently, the values quoted above are just rough estimates; the errors for D1, D2, D3 and D4 are given in Tables 26 and 27. The rather large scatter in the internal errors is due to the different ways each Deep field has been calibrated (either using an internal catalogue based on the $i$ band data, or using the external 2MASS catalogue, see Section 6.2). The external astrometric errors are similar to the Wide survey and correspond to the expectations, considering the astrometric errors in the 2MASS reference catalogue.

# 5 Data products

## 5.1 Public and non-public data sets

The T0006 data are split into two samples: those delivered to CADC and those that are archived at TERAPIX. The data archived and distributed by CADC have a 1-year proprietary period before being released worldwide. The data of release is October XX, 2009. Only CFHTLS registered users have access to these data until October XX, 2010. The data archived at TERAPIX are immediately public. The T0006 synoptic table (`http://terapix.iap.fr/cplt/table_syn_T0006.html`) is an easy way to access to public and non-public data.

The non-public data are the images and the catalogues and form the core of the T0006 release. These data are:

- the complete set of individual weight-map images corresponding to the 6043 and 8876 single images used during the production of the CFHTLS Wide and Deep releases. The TERAPIX weight-map images are Multi-Extention FITS (MEF), like the native CFHT image. This CFHTLS input image sample splits into four
  - the short exposure, photometric images. They are used during the `SCAMP` calibration steps only;
  - the short exposure $r$-band Pre-Wide survey images that have large overlaps with the nearest science images (see Fig. 7). They are used during the Wide `SCAMP` calibration steps only;
  - the supplemental short exposure $i$-band *astrometric* images surrounding and overlapping with the Deep center fields. They are used during the Deep `SCAMP` calibration steps only;
  - the CFHTLS Science image (CFHTLS Wide or CFHTLS Deep) that are used during the `SCAMP` calibration steps and will be combined to produce the stacks.
- the stack images with their weight-maps (single extension FITS image files).
  - There are
    - 855 Wide stacks, corresponding to $u^*$, $g$, $r$, $i$ or $y$ and $z$ bands:
      - 360 for W1,
      - 125 for W2,
      - 245 for W3 and
      - 125 for W4;
    - 48 Deep stacks corresponding to $u^*$, $g$, $r$, $i$, $y$ and $z$ bands :
      - 12 for D1 (6 D-25, 6 D-85),
      - 12 for D2,
      - 12 for D3 and
      - 12 for D4;
  - each stack corresponds to a tile of 1 deg.×1 deg. field (19354×19354 pixels of 0.1860”), centered at the positions listed in Tables 4 to 8 (Wide), and in 25 (Deep);
  - the Equatorial coordinate system is J2000 (ICRS) and the projection type is the distorted tangential `TAN`. Stacks are produced using a median filter, are weighted accordingly using the weight-map images, and combined using a `Lanczos3` interpolation kernel.

- the mesh size used to derive the sky background is 32 pixels for all Wide stacks, and 128 pixels for all Deep stacks;

- the chi2 ($g$-$r$-$i/y$ for the Wide and $g$-$r$-$i$ for the Deep data) images with their weight-map (FITS image).
  - the chi2 image only combines $g$, $r$ and $i/y$[15] (Wide) or $g$, $r$ and $i$ (Deep) images;
  - the chi2 image is generated using the `swarp.conf` of the co-added images, but with the 'COMBINE_TYPE CHI2' option;
  - each has the same size, pixel scale and projection type as the native stacks;
  - the pixel values are actually $\sqrt{(\text{chi2})}$ , not chi2
  - there is one chi2 image per Wide tile and Deep field. Since T0006 is complete, there are 171 chi2 images for the Wide and 8 chi2 images for the Deep.

    All together, the T0006 release is therefore composed of 2052 Wide and 112 Deep MegaCam-size science, chi2 or weight-map images;

- the early catalogues of sources extracted from each stack, prior to produce catalogues from the chi2 reference image (855 `.ldac` Wide and 48 `.ldac` Deep FITS table);

- the single filter catalogues, one per stack. They are built by running `SExtractor` in dual-image mode using the chi2 image as the reference source detection image and the $u^*, g, r, i, y$ or a $z$-stack as a photometry image (`*u/g/r/i/z*.cat` ASCII tables). The T0006 single filter catalogues contain all parameters listed in Tables 34, 35 and 36. There is one source catalogue per chi2 source detection and per filter, that is 855 Wide and 48 Deep catalogues. So, for each MegaCam stack position, the Wide ($u^*$, $g$, $r$, $i/y$, $z$) and the Deep ($u^*$, $g$, $r$, $i$, $y$, $z$) catalogues have the same number of sources;

- ASCII merged source catalogues (M-SC) are also provided:
  - 171 Wide merged 5-filters $u^*gr[i/y], z$ catalogues (either $i$ or $y$ band data inside), and
  - 8 Deep merged 6-filters $u^*griyz$ catalogues (both $i$ and $y$ band inside),

  in ASCII table format. The Wide catalogues are named `*urgiz*.cat` or `*urgyz*.cat`; the Deep are all named `*ugriyz*.cat`, and do contain $i$ and $y$ data. They contain all objects with a limited list of parameters from the parent single filter catalogues, but include a $e(b-v)$ value for each objects. They are estimated at each source position from interpolation of the Schlegel et al maps;

- the DS9 compliant masks (`.reg` ASCII file), *one for each stack*. The masks are produced automatically. The masking uses the USNO source catalogues to locate bright stars in CFHTLS stacks and draw a polygon that delimits a polluted region. The size of the polygon depends on the magnitude of the stars. After the stellar source masking, polygons are added automatically to all mask, to exclude the edges of fields. Masks are then tuned manually with extra-polygons that exclude regions with missing CCDs.

  *It is important to notice that the mask needs depend on the science goals. The T0006 masks may therefore be tuned accordingly. We recommend to CFHTLS users to overlay the masks on a DS9 view of each stack image and have a first look prior to use them.*

  The mask format is identical to previous releases, but in contrast with T0005 that released only one mask per stack, valid for all filters, T0006 provides 855 Wide and 6 Deep mask files, one per filter. Special features, like missing CCDs or giant galaxies in a field, can then be better taken into account, for each filter separately.

[15] We remind that $i/y$ means either $i$ or (exclusive) $y$ data.

All quality control files produced during the TERAPIX processing are public. The supplementary data available at TERAPIX are:

- a set of 855 Wide and 48 Deep binary masks images (FITS), one per filter, based on the ASCII `.reg` masks;
- the 6043 Wide and 8876 Deep individual `QualityFITS` evaluation files attached to each input image (`QFITS-in`). Only `QFITS-in` data of images that were selected for stacks in T0006 are available;
- the astrometric and photometric rescaling calibration files attached to each image during the `SCAMP` calibration step. There are 855 Wide , and 48 Deep `.head` and `.ahead` (ASCII) files;
- the complete list of MegaCam images contained in each stack (upon request to TERAPIX);
- the 855 Wide and 48 Deep individual `QualityFITS` evaluation files attached to all stacks (`QFITS-out`);
- a series of quality assessment files: tables, images, plots and statistics on any image are available from the T0006 synoptic table `http://terapix.iap.fr/cplt/table_syn_T0006.html`. They include:
  - all stellar color-color plots. They are used to check if stars in the magnitude range $17.5 < AB < 21.5$ have color-color tracks that follow expectations. There are 3 color-color plots per Wide stack, and 5 color-color plots per Deep stack. There are more Deep because there are both $i$ and $y$ stacks available;
  - all 3-filter colored (`.jpg`) images. These images may be used for posters, but are primarily produced to verify that no astrometric shifts exist between filters. There are 3 color images per stack that combines the 5 filters in different ways;
  - all completeness limit (`.png`) plots, one per stack. The ASCII `.dat` data tables used to make these plots are also available, upon request to TERAPIX;
  - all galaxy count (`.ps`) plots, one per stack;
  - the complete `QualityFITS` QFITS-out quality control files (`.html` page); one per stack;
  - the complete set of `SCAMP` output and quality control files (`.html` page); between one (all image together) and six (one per filter) per field;

## 5.2 Data type and file naming convention

All files of the T0006 release are listed and shortly described in Tables 30 to 33. The CFHT input image names are the native CFHT odometer numbers. TERAPIX preserves this naming convention for all relevant files attached to single images (like the weight-maps, the early `QualityFITS .ldac` catalogues, or the astrometric calibration files).

| File name | Content | Data type | Size | Number of files | Access |
|---|---|---|---|---|---|
| #[CFHT-odometer]p.fits | Single CFHTLS images | MEF-FITS binary 16 | 0.7 GB | 6043 Wide<br>8876 Deep | CADC |
| #[CFHT-odometer]p_weight.fits | Single CFHTLS weight-map images | MEF-FITS binary -32 | 1.4 GB | 6043 Wide<br>8876 Deep | CADC |
| #[CFHT-odometer]p.ldac | Single CFHTLS early catalogue | ASCII | 11 MB | 6043 Wide<br>8876 Deep | TERAPIX |
| #[CFHT-odometer]p.head | Single CFHTLS astrometric calibration file | ASCII | 100 kB | 6043 Wide<br>8876 Deep | TERAPIX |
| #[CFHT-odometer]p.ahead | Single CFHTLS photometric calibration file | ASCII | 1.5 kB | 6043 Wide<br>8876 Deep | TERAPIX |
| #[CFHT-odometer]p/ | QA: QFITS-in directory | QA files, various type | 350 MB | 6043 Wide<br>8876 Deep | TERAPIX |
| CFHTLS_W_[f]_RA-DEC_T0006.fits | Wide stack science image $f$-band | FITS binary -32 | 1.4 GB | 855 | CADC |
| CFHTLS_W_[f]_RA-DEC_T0006_weight.fits | Wide stack weight maps $f$-band | FITS binary -32 | 1.4 GB | 855 | CADC |
| CFHTLS_W_gri_RA-DEC_T0006.fits | Wide chi2 image for $i$ stacks, chi2-$gri$ combined | FITS binary -32 | 1.4 GB | 141 | CADC |
| CFHTLS_W_gri_RA-DEC_T0006_weight.fits | Wide chi2 weight map for $i$ stacks,chi2-$gri$ combined | FITS binary -32 | 1.4 GB | 141 | CADC |
| CFHTLS_W_gry_RA-DEC_T0006.fits | Wide chi2 image for $y$ stacks, chi2-$gri$ combined | FITS binary -32 | 1.4 GB | 30 | CADC |
| CFHTLS_W_gry_RA-DEC_T0006_weight.fits | Wide chi2 weight map for $y$ stacks, chi2-$gry$ combined | FITS binary -32 | 1.4 GB | 30 | CADC |
| CFHTLS_W_[f]_RA-DEC_T0006.ldac | Wide stack early catalogue $f$-band | FITS binary-table 8 | 50 MB | 855 | CADC |
| CFHTLS_W_[f]_RA-DEC_T0006.cat | Wide stack chi2 catalogue $f$-band | ASCII 177 columns | 450 MB | 855 | CADC |
| CFHTLS_W_ugriz_RA-DEC_T0006.cat | Wide chi2 catalogue merged band | ASCII 23 colums; e(b-v) | 35 MB | 171 | CADC |
| CFHTLS_W_ugriz_RA-DEC_T0006.ape | Wide chi2 26 aperture photometry catalogue merged band | ASCII 516 columns | 1.1 GB | 171 | TERAPIX |

Table 30: CFHTLS files, distribution and naming conventions. The first line of the table quotes the input images from CFHT; they are not produced at TERAPIX. The other lines of this table and the next refer to TERAPIX data products of T0006. Access to CADC (restricted) and TERAPIX data sets, or to all public figures and plots are possible from the T0006 synoptic table : `http://terapix.iap.fr/cplt/table_syn_T0006.html` . The number of files for QFITS-in/out means number of directories ($\sim$ 100 files per dir.).

| File name | Content | Data type | Size | Number of files | Access |
|---|---|---|---|---|---|
| CFHTLS_W_[f]_RA-DEC_T0006.reg | Wide DS9 compliant mask $f$-band | ASCII | 100 kB | 855 | CADC |
| CFHTLS_W_[f]_RA-DEC_T0006_binmask.fits | Wide binary mask image $f$-band | FITS binary -32 (2.3 MB .gz) | 1.4 GB | 855 | TERAPIX |
| CFHTLS_W_[f]_RA-DEC_T0006/ | Wide $f$-band stack QA: QFITS-out directory | QA files, various type | 75 MB | 855 | TERAPIX |
| CFHTLS_W_[fff]_RA-DEC_T0006.jpg | Wide $[(u^*gr);(gri/y);(ri/yz)]$ 3-color image of stacks | JPEG | 50 MB | 513 | TERAPIX |
| CFHTLS_W_ugriz_RA-DEC_T0006_combined.png | Wide stellar combined 3-color-color plots $(u^*\text{-}g)/(g\text{-}r);(g\text{-}r)/(r\text{-}i);(r\text{-}i)/(i\text{-}z)$ | PNG | 200 kB | 141 | TERAPIX |
| CFHTLS_W_ugryz_RA-DEC_T0006_combined.png | Wide stellar combined 3-color-color plots $(u^*\text{-}g)/(g\text{-}r);(g\text{-}r)/(r\text{-}y);(r\text{-}y)/(y\text{-}z)$ | PNG | 200 kB | 30 | TERAPIX |
| CFHTLS_W_[f]_RA-DEC_T0006_subimage_comp_all.png | Wide stacks completeness limit plots $f$-band | PNG | 60 kB | 855 | TERAPIX |
| CFHTLS_W_[f]_RA-DEC_T0006_subimage_comp_all.dat | Wide stacks completeness data points $f$-band | ASCII | 0 kB | 855 | TERAPIX |
| CFHTLS_W_[f]_RA-DEC_T0006_gal_histo.ps | Wide stacks galaxy counts $f$-band | PS | 50 kB | 855 | TERAPIX |
| CFHTLS_D-25_[f]_RA-DEC_T0006.fits | Deep 25% best seeing stack science image $f$-band | FITS binary -32 | 1.4 GB | 24 | CADC |
| CFHTLS_D-25_[f]_RA-DEC_T0006_weight.fits | Deep 25% best seeing stack weight maps $f$-band | FITS binary -32 | 1.4 GB | 24 | CADC |
| CFHTLS_D-25_gri_RA-DEC_T0006.fits | Deep 25% best seeing chi2 image for $i$ stacks, chi2-$gri$ combined | FITS binary -32 | 1.4 GB | 4 | CADC |
| CFHTLS_D-25_gri_RA-DEC_T0006_weight.fits | Deep 25% best seeing chi2 weight map for $i$ stacks,chi2-$gri$ combined | FITS binary -32 | 1.4 GB | 4 | CADC |
| CFHTLS_D-25_[f]_RA-DEC_T0006.ldac | Deep 25% best seeing stack early catalogue $f$-band | FITS binary-table 8 | 50 MB | 24 | CADC |
| CFHTLS_D-25_[f]_RA-DEC_T0006.cat | Deep 25% best seeing stack chi2 catalogue $f$-band | ASCII 177 columns | 450 MB | 24 | CADC |

Table 31: CFHTLS files, distribution and naming conventions (cont'd).

| File name | Content | Data type | Size | Number of files | Access |
|---|---|---|---|---|---|
| CFHTLS_D-25_ugriyz_RA-DEC_T0006.cat | Deep 25% best seeing chi2 catalogue merged band | ASCII 26 columns; e(b-v) | 100 MB | 4 | CADC |
| CFHTLS_D-25_ugriyz_RA-DEC_T0006.ape | Deep 25% best seeing chi2 26 aperture photometry catalogue merged band | ASCII 618 columns | 3.1 GB | 4 | TERAPIX |
| CFHTLS_D-25_[f]_RA-DEC_T0006.reg | Deep 25% best seeing DS9 compliant mask $f$-band | ASCII | 100 kB | 24 | CADC |
| CFHTLS_D-25_[f]_RA-DEC_T0006_binmask.fits | Deep 25% best seeing binary mask image $f$-band | FITS binary -32 (2.3 MB .gz) | 1.4 GB | 24 | TERAPIX |
| CFHTLS_D-25_[f]_RA-DEC_T0006/ | Deep 25% best seeing $f$-band stack QA: QFITS-out directory | QA files, various type | 75 MB | 24 | TERAPIX |
| CFHTLS_D-25_[fff]_RA-DEC_T0006.jpg | Deep 25% best seeing [$(u^*gr)$;$(gri/y)$;$(ri/yz)$] 3-color image of stacks | JPEG | 50 MB | 12 | TERAPIX |
| CFHTLS_D-25_ugriz_RA-DEC_T0006_combined.png | Deep 25% best seeing stellar combined 3-color-color plots $(u^*\text{-}g)/(g\text{-}r)$;$(g\text{-}r)/(r\text{-}i)$;$(r\text{-}i)/(i\text{-}z)$ ;$(g\text{-}r)/(r\text{-}y)$;$(r\text{-}y)/(y\text{-}z)$ | PNG | 200 kB | 4 | TERAPIX |
| CFHTLS_D-25_[f]_RA-DEC_T0006_subimage_comp_all.png | Deep 25% best seeing stacks completeness limit plots $f$-band | PNG | 60 kB | 24 | TERAPIX |
| CFHTLS_D-25_[f]_RA-DEC_T0006_subimage_comp_all.dat | Deep 25% best seeing stacks completeness data points $f$-band | ASCII | 0 kB | 24 | TERAPIX |
| CFHTLS_D-25_[f]_RA-DEC_T0006_gal_histo.ps | Deep stacks galaxy counts $f$-band | PS | 50 kB | 24 | TERAPIX |
| CFHTLS_D-85_[f]_RA-DEC_T0006.fits | Deep 85% best seeing stack science image $f$-band | FITS binary -32 | 1.4 GB | 24 | CADC |
| CFHTLS_D-85_[f]_RA-DEC_T0006_weight.fits | Deep 85% best seeing stack weight maps $f$-band | FITS binary -32 | 1.4 GB | 24 | CADC |
| CFHTLS_D-85_gri_RA-DEC_T0006.fits | Deep 85% best seeing chi2 image for $i$ stacks, chi2-$gri$ combined | FITS binary -32 | 1.4 GB | 4 | CADC |

Table 32: CFHTLS files, distribution and naming conventions (cont'd).

| File name | Content | Data type | Size | Number of files | Access |
|---|---|---|---|---|---|
| CFHTLS_D-85_gri_RA-DEC_T0006_weight.fits | Deep 85% best seeing chi2 weight map for $i$ stacks,chi2-$gri$ combined | FITS binary -32 | 1.4 GB | 4 | CADC |
| CFHTLS_D-85_[f]_RA-DEC_T0006.ldac | Deep 85% best seeing stack early catalogue $f$-band | FITS binary-table 8 | 50 MB | 24 | CADC |
| CFHTLS_D-85_[f]_RA-DEC_T0006.cat | Deep 85% best seeing stack chi2 catalogue $f$-band | ASCII 177 columns | 450 MB | 24 | CADC |
| CFHTLS_D-85_ugriyz_RA-DEC_T0006.cat | Deep 85% best seeing chi2 catalogue merged band | ASCII 26 columns; e(b-v) | 100 MB | 4 | CADC |
| CFHTLS_D-85_ugriyz_RA-DEC_T0006.ape | Deep 85% best seeing chi2 26 aperture photometry catalogue merged band | ASCII 618 columns | 3.1 GB | 4 | TERAPIX |
| CFHTLS_D-85_[f]_RA-DEC_T0006.reg | Deep 85% best seeing DS9 compliant mask $f$-band | ASCII | 100 kB | 24 | CADC |
| CFHTLS_D-85_[f]_RA-DEC_T0006_binmask.fits | Deep 85% best seeing binary mask image $f$-band | FITS binary -32 (2.3 MB .gz) | 1.4 GB | 24 | TERAPIX |
| CFHTLS_D-85_[f]_RA-DEC_T0006/ | Deep 85% best seeing $f$-band stack QA: QFITS-out directory | QA files, various type | 75 MB | 24 | TERAPIX |
| CFHTLS_D-85_[fff]_RA-DEC_T0006.jpg | Deep 85% best seeing [$(u^*gr)$;$(gri/y)$;$(ri/yz)$] 3-color image of stacks | JPEG | 50 MB | 12 | TERAPIX |
| CFHTLS_D-85_ugriz_RA-DEC_T0006_combined.png | Deep 85% best seeing stellar combined 3-color-color plots $(u^*\text{-}g)/(g\text{-}r)$;$(g\text{-}r)/(r\text{-}i)$;$(r\text{-}i)/(i\text{-}z)$ ;$(g\text{-}r)/(r\text{-}y)$;$(r\text{-}y)/(y\text{-}z)$ | PNG | 200 kB | 4 | TERAPIX |
| CFHTLS_D-85_[f]_RA-DEC_T0006_subimage_comp_all.png | Deep 85% best seeing stacks completeness limit plots $f$-band | PNG | 60 kB | 24 | TERAPIX |
| CFHTLS_D-85_[f]_RA-DEC_T0006_subimage_comp_all.dat | Deep 85% best seeing stacks completeness data points $f$-band | ASCII | 0 kB | 24 | TERAPIX |
| CFHTLS_D-85_[f]_RA-DEC_T0006_gal_histo.ps | Deep stacks galaxy counts $f$-band | PS | 50 kB | 24 | TERAPIX |

Table 33: CFHTLS files, distribution and naming conventions (cont'd).

### 5.3 Content of CFHTLS source catalogues

TERAPIX releases 5 types of source catalogues:

- the "early" FITS-table input-ldac source catalogues of individual images, prior to combine them into stacks. There is one `.ldac` catalogue per CFHT input image that will be used later in several steps of the TERAPIX processing. For T0006, 6043 `.ldac` Wide and 8876 `.ldac` Deep are produced;
- the "early" FITS-table output-ldac source catalogues of each individual stack, produced immediately after that the images have been combined into a stack. There is one catalogue per tile and per filter. So 855 `.ldac`-Wide (171 tiles, 5 filters per tiles) and 48 `.ldac`-Deep (4 fields, 6 filters per field, D-25 and D-85 seeing selections) source catalogues are produced;
- the ASCII-table chi2-image reference source catalogues (chi2-RSC), produced from the aperture-matched detections in the 5 Wide ($u^*$-$g$-$r$-$i/y$-$z$) or 6 Deep ($u^*$-$g$-$r$-$i$-$y$-$z$) stacked images of each tile. There is one catalogue per tile and per filter, but each filter has the same number of sources, located at the same positions, as measured in the chi2 image. These catalogues are not corrected for galactic extinction. 855 Wide and 48 Deep `*[f]*.cat` catalogues are produced, where `[f]` denotes the filter, and they all contain the `Sextractor` parameters listed in Tables 34, 35 and 36;
- the ASCII merged source catalogues (M-SC), produced by merging the chi2-RSC done for each filter into one single catalogue ($u^*griz$, or ($u^*gryz$), or ($u^*griyz$). The Wide `*ugriz*.cat`, `*ugryz*.cat` and Deep `*ugriyz*.cat` catalogues are more concise, but may be more convenient for most CFHTLS users. Note that the Wide and Deep catalogues do not have the same number of columns.
  - The Wide merged catalogues contain the following parameters, extracted from the either the chi2-RSC $u$,$g$,$r$,$i$,$z$ or the $u$,$g$,$r$,$y$,$z$ catalogues (`id,x,y,ra,dec,r2,flag,` $u^*$, `g`, `r,i/y,z,`$u^*_{err}$,$g_{err}$, $r_{err}$, $(i/y)_{err}$, $z_{err}$, `e(b-v)`, $u^*_{\mathrm{SEx-flag}}$, $g_{\mathrm{SEx-flag}}$, $r_{\mathrm{SEx-flag}}$, $(i/y)_{\mathrm{SEx-flag}}$, $z_{\mathrm{SEx-flag}}$ ), where
    - `id` : `SExtractor` object ID. This corresponds to the object ID which appears in the chi2 catalogue;
    - `x,y` (pixels) : object pixel coordinates. The pixel scale is 0.186";
    - `ra,dec` : right ascension and declination in J2000 coordinates;
    - `r2` (pixels) : radius enclosing half the light;
    - `flag` : TERAPIX object flag, derived from the `Sextractor r2` parameter . Objects with flag 0 and 1 are galaxies or (non-saturated) stars, respectively, outside the masked zones. Objects inside a mask is flagged `0+4` or `1+4` . *Note that star-galaxy separation is only carried out on the $i$ image to a limit of $i = 21.0$; fainter than this limit, all objects are identified as galaxies.*
    - $u^*$`,g,r,i/y,z` : object MAG_AUTO magnitudes in the MegaCam instrumental reference frame. When MAG_AUTO and its error are missing, these values are set to 99. Note that the $i$ or $y$ magnitudes are both listed in a column labelled $i$ on the top header of each catalog.
    - $u^*_{err}$,$g_{err}$,$r_{err}$,$(i/y)_{err}$,$z_{err}$ : Object magnitude errors; item `e(b-v)`: the values of the galactic extinction are calculated using the Schlegel et al (1998, ApJ 500, 525) dust map at the object's position. The extinction, e(b-v), is derived at each source position using a linearly interpolated value dust data from the 4 nearest

pixels. The interpolated e(b-v) is then added in the last column of the merged catalogue;

  * $u^*_{\mathrm{SEx-flag}}$, $g_{\mathrm{SEx-flag}}$, $r_{\mathrm{SEx-flag}}$, $(i/y)_{\mathrm{SEx-flag}}$, $z_{\mathrm{SEx-flag}}$ : SExtractor extraction flags, for each filter. Each flag is set to zero when no source extraction problem is encountered, or follows the sum of power of 2 rule defined in http://astromatic.iap.fr/sof

- The Deep merged catalogues also contain the parameters extracted from the chi2-RSC, but for 6 filters instead of 5, as for the Wide. All catalogues have $u$,$g$,$r$,$i$, $y$ and $z$ data, for all sources.

171 Wide merged catalogues are produced, one per tile, and 8 Deep merged catalogues are produced, two per field (D-25 and D-85);

- the ASCII multi-aperture merged source catalogues (MAM-SC), produced like the (M-SC), but the catalogues only include the data from the 26 apertures and aperture magnitudes of each sources of the chi2-RSC catalogue. The aperture sizes range from 10 to 60 pixels. As the M-SC, 171 Wide catalogues and 8 Deep catalogues are produced. These catalogues are indeed very big (1-3 GB). They have 516 columns per source for the Wide and 618 for the Deep.

All catalogues have a header on top that describes the meaning of each column.

All data of the two last catalogues, but the e(b-v) of the M-SC, are extracted from the big chi2-RSCs. They are produced only for convenience. All of them have been produced using `SExtractor`, but with different configuration files and output parameter lists. Most $i$ stacks are done with the first $i$-(i.MP9702) filter. However, there are 14 W1, 2 W2, 7 W3 and 14 W4 stacks done with the $y$-(i.MP9702) filter. The $y$ stacks are listed in Tables 4 to 8 and quoted in Tables 23 and 24. All Deep fields comprise both $i$ and $y$-band stacks, but the $i$ stacks contain much more images and are much deeper.

The two "early" input-ldac and output-ldac catalogues as well as the chi2-RSC catalogue contain the 75 parameters described in Table 34 to 36. However, they do not have the same input nor the same of output parameter values. Some of them are vectors, so the number of entries are also not the same and can be much higher than 75. In particular, they do not have the same detection threshold, or the same number of MAG_APER aperture magnitudes. Columns of catalogues with both the '`.cat`' or the '`.ldac`' extensions are defined in the '.param' files. For the Wide survey, there are 81 columns in the `.ldac` catalogues, 177 columns in the chi2-RSC, 23 in the merged M-SC catalogues and 516 in the merged MAM-SC catalogues.

All catalogues have a new magnitude ZP set to 30. The magnitude system in the instrumental $AB$. The magnitudes of objects in the final stacks are computed as follows:

$$m = 30 - 2.5 \log(counts) \ . \qquad (13)$$

The RA-DEC positions are given in J2000.

It is important to notice that the `.cat` catalogues are produced using specific selection criteria or filters set by TERAPIX from its past experience and after discussions with experienced users and the CFHTLS Steering Group. They are certainly not suitable for all scientific goals. Please have a look at the configuration and parameter list files and check they meet your needs. In case different selections or configuration parameters are needed, it may be better to produce a new and more suitable `.cat` catalogue, or to produce a new chi2 image. TERAPIX can provide specific helps upon request or can advice users who want to produce their own images or catalogues.

| Id | Parameter | Description | Units | Comments |
|---|---|---|---|---|
| 1 | NUMBER | Running object number | - | |
| 2 | X_IMAGE | Object position along x | [pixel] | |
| 3 | X_IMAGE | Object position along y | [pixel] | |
| 4 | ERRA_IMAGE | RMS position error along major axis | [pixel] | Error-ellipse shape parameter. Generic SExtractor parameter naming construction: ERR[-] refers to error-ellipse properties, while [-]ERR refers to error on SExtractor object parameters. |
| 5 | ERRB_IMAGE | RMS position error along minor axis | [pixel] | |
| 6 | ERRTHETA_IMAGE | Error ellipse position angle (CCW/x) | [deg] | |
| 7 | A_IMAGE | Profile RMS along major axis | [pixel] | |
| 8 | B_IMAGE | Profile RMS along minor axis | [pixel] | |
| 9 | POLAR_IMAGE | $(\text{A\_IMAGE}^2 - \text{B\_IMAGE}^2)/(\text{A\_IMAGE}^2 + \text{B\_IMAGE}^2)$ | | |
| 10 | THETA_IMAGE | Position angle (CCW/x) | [deg] | |
| 11 | X_WORLD | Barycenter position along world x axis | [deg] | |
| 12 | Y_WORLD | Barycenter position along world y axis | [deg] | |
| 13 | ERRA_WORLD | World RMS position error along major axis | [deg] | |
| 14 | ERRB_WORLD | World RMS position error along minor axis | [deg] | |
| 15 | ERRTHETA_WORLD | Error ellipse pos. angle (CCW/world-x) | [deg] | |
| 16 | A_WORLD | Profile RMS along major axis (world units) | [deg] | |
| 17 | B_WORLD | Profile RMS along minor axis (world units) | [deg] | |
| 18 | POLAR_WORLD | $(\text{A\_WORLD}^2 - \text{A\_WORLD}^2)/(\text{A\_WORLD}^2 + \text{B\_WORLD}^2)$ | | |
| 19 | THETA_WORLD | Position angle (CCW/world-x) | [deg] | |
| 20 | ALPHA_J2000 | Right ascension of barycenter (J2000) | [deg] | |
| 21 | DELTA_J2000 | Declination of barycenter (J2000) | [deg] | |
| 22 | ERRTHETA_J2000 | J2000 error ellipse pos. angle (east of north) | [deg] | |
| 23 | THETA_J2000 | Position angle (east of north) (J2000) | [deg] | |
| 24 | XWIN_IMAGE | Windowed position estimate along x | [pixel] | |
| 25 | YWIN_IMAGE | Windowed position estimate along y | [pixel] | |
| 26 | ERRAWIN_IMAGE | RMS windowed pos error along major axis | [pixel] | |
| 27 | ERRBWIN_IMAGE | RMS windowed pos error along minor axis | [pixel] | |
| 28 | ERRTHETAWIN_IMAGE | Windowed error ellipse pos angle (CCW/x) | [deg] | |

Table 34: Description of parameters listed in T0006 catalogues.

| Id | Parameter | Description | Units | Comments |
|---|---|---|---|---|
| 29 | AWIN_IMAGE | Windowed profile RMS along major axis | [pixel] | |
| 30 | BWIN_IMAGE | Windowed profile RMS along minor axis | [pixel] | |
| 31 | POLARWIN_IMAGE | $(\text{AWIN}^2 - \text{BWIN}^2)/(\text{AWIN}^2 + \text{BWIN}^2)$ | | |
| 32 | THETAWIN_IMAGE | Windowed position angle (CCW/x) | [deg] | |
| 33 | XWIN_WORLD | Windowed position along world x axis | [deg] | |
| 34 | YWIN_WORLD | Windowed position along world y axis | [deg] | |
| 35 | ERRAWIN_WORLD | World RMS windowed pos error along major axis | [deg] | |
| 36 | ERRBWIN_WORLD | World RMS windowed pos error along minor axis | [deg] | |
| 37 | ERRTHETAWIN_WORLD | Windowed error ellipse pos. angle (CCW/world-x) | [deg] | |
| 38 | AWIN_WORLD | Windowed profile RMS along major axis (world units) | [deg] | |
| 39 | BWIN_WORLD | Windowed profile RMS along minor axis (world units) | [deg] | |
| 40 | POLARWIN_WORLD | $(\text{AWIN}^2 - \text{BWIN}^2)/(\text{AWIN}^2 + \text{BWIN}^2)$ | | |
| 41 | THETAWIN_WORLD | Windowed position angle (CCW/world-x) | [deg] | |
| 42 | ALPHAWIN_J2000 | Windowed right ascension (J2000) | [deg] | |
| 43 | DELTAWIN_J2000 | windowed declination (J2000) | [deg] | |
| 44 | ERRTHETAWIN_J2000 | J2000 windowed error ellipse pos. angle (east of north) | [deg] | |
| 45 | THETAWIN_J2000 | Windowed position angle (east of north) (J2000) | [deg] | |
| 46 | FLUX_ISO | Isophotal flux | [count] | |
| 47 | FLUXERR_ISO | RMS error for isophotal flux | [count] | |
| 48 | MAG_ISO | Isophotal magnitude | [mag] | |
| 49 | MAGERR_ISO | RMS error for isophotal magnitude | [mag] | |
| 50 | FLUX_APER | Flux vector within fixed circular aperture(s) | [count] | - ldac catalogues: apertures are 16 (3”) and 25 (4.7”) pixels diameter.<br>- cat chi2-RSC catalogues: apertures are 10 (1.86”),12,14, 16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52, 54,56,58,60 (11.16”) pixels diameter. |
| 51 | FLUXERR_APER | RMS error vector for aperture flux(es) | [count] | |
| 52 | MAG_APER | Fixed aperture magnitude vector | [mag] | Given for apertures defined by FLUX_APER |
| 53 | MAGERR_APER | RMS error vector for fixed aperture mag. | [mag] | |
| 54 | FLUX_AUTO | Flux within a Kron-like elliptical aperture | [count] | |

Table 35: Description of parameters listed in T0006 catalogues (cond’t).

| Id | Parameter | Description | Units | Comments |
|---|---|---|---|---|
| 55 | FLUXERR_AUTO | RMS error for AUTO flux | [count] | |
| 56 | MAG_AUTO | Kron-like elliptical aperture magnitude | [mag] | |
| 57 | MAGERR_AUTO | RMS error for AUTO magnitude | [mag] | |
| 58 | FLUX_PETRO | Flux within a Petrosian-like elliptical aperture | [count] | |
| 59 | FLUXERR_PETRO | RMS error for Petrosian flux | [count] | |
| 60 | MAG_PETRO | Petrosian-like elliptical aperture magnitude | [mag] | |
| 61 | MAGERR_PETRO | RMS error for PETROsian magnitude | [mag] | |
| 62 | FLUX_RADIUS | Fraction-of-light radii | [pixel] | Radii that contain 20%. 50% and 80% of the total flux. |
| 63 | KRON_RADIUS | Kron apertures in units of A or B | | |
| 64 | PETRO_RADIUS | Petrosian apertures in units of A or B | | |
| 65 | BACKGROUND | Background at centroid position | [count] | |
| 66 | THRESHOLD | Detection threshold above background | [count] | |
| 67 | MU_THRESHOLD | Detection threshold above background | [mag/arcsec$^2$] | |
| 68 | FLUX_MAX | Peak flux above background | [count] | |
| 69 | MU_MAX | Peak surface brightness above background | [mag/arcsec$^2$] | |
| 70 | ISOAREA_IMAGE | Isophotal area above Analysis threshold | [pixel$^2$] | |
| 71 | ISOAREAF_IMAGE | Isophotal area (filtered) above Detection threshold | [pixel$^2$] | |
| 72 | ISOAREA_WORLD | Isophotal area above Analysis threshold | [deg$^2$] | |
| 73 | ISOAREAF_WORLD | Isophotal area (filtered) above Detection threshold | [deg$^2$] | |
| 74 | FLAGS | Extraction flags | | |
| 75 | CLASS_STAR | S/G classifier output | | |

Table 36: Description of parameters listed in T0006 catalogues (cont'd).

## 5.4 The QualityFITS in/out products

QualityFITS is a TERAPIX quality assessement (QA) tool of FITS images. In the CFHTLS T0006 production, it is used to assess whether individual CFHT input images and the CFHTLS output stacks have properties that meet the survey specifications. QualityFITS also produces the input weight-map images as well as the input early .ldac catalogues. As a general rule any CFHT images entering or leaving the TERAPIX center should be evaluated be QualityFITS-in or QualityFITS-out. In the case of CFHTLS data, the 17042 CFHTLS input images and the 2108 T0006 output images were evaluated that way.

The quality assessments are eventually done by visual inspection of QualityFITS outputs, from a series of statistics, tables and plots. An overview and a quick-look of the quality of images can be done using the QualityFITS web page. This "ID-card" of each image is produced automatically and is used by TERAPIX to grade all images through the Youpi user interface[16].

The information returned by QualityFITS depends on the type of images (MEF or single extension FITS, mosaic of CCD) the type of detectors (single CCD, mosaic of CCDs) and the origin of images (non-TERAPIX input or TERAPIX output images). Depending on the steps of the processing (evaluation of input images or of final stacks), they are referenced as QualityFITS-in (or QFITS-in) or QualityFITS-out (or QFITS-out) products.

The QualityFITS data products are images, tables and plots:

- the FITS weight-map image, using Weigthwatcher[17], in a multiple or single extension FITS format, like the input image;
- the .ldac catalogue, using SExtractor;
- an analysis of the smearing and the shape of the PSF using PSFEX, sampled over the whole field (QualityFITS-out), or CCD by CCD for a mosaic (as for QualityFITS-in in the case of MegaCam input images);
- an analysis of the sky background over the whole field of CCD by CCD for a mosaic;
- an analysis of galaxy and stellar counts, based on an in-house automatic blind star-galaxy separation from a $r_h$[18]-magnitude diagram. The counts are shown on separate plots and compared to expectations: for the galaxies, they are compared to published results of CFHTLS Deep galaxy counts with the MegaCam filters; for stars, the counts are compared to Bahcall-Soneira models (1981, ApJS 47, 357);
- an analysis of the astrometry of images, using SCAMP. For CFHT input images (QualityFITS-in), the astrometry analysis is rough, and just relies on the FITS keywords. For CFHTLS stacks (QualityFITS-out), the analysis is based on a comparison between the CFHTLS and the 2MASS source catalogues;
- a properly oriented (in case of reversed detector images due to reversed positions of output amplifiers), scaled and astrometred binned view of each CCD and of the whole MegaCam field,
- close up views of the central and the 4 corner regions of the MegaCam image. The views are unbinned 512×512 pixels JPEG sub-images of the 5 regions, but is sometimes expanded to 1024×1024 pixels when necessary;

[16] http://youpi.terapix.fr
[17] http://adsabs.harvard.edu/abs/2008ASPC..394..619M
[18] half-light radius

- a series of tables that contain information from the image FITS header, or statistics on the seeing, the background, the number of detections, either over the whole image or CCD by CCD for a mosaic.

The `QualityFITS` output files are all available to CFHTLS registered users. The `QualityFITS` QA pages are available from `http://terapix.iap.fr/cplt/table_syn_T0006.html`. The T0006 synoptic table is a convenient way to have a quick look to images.

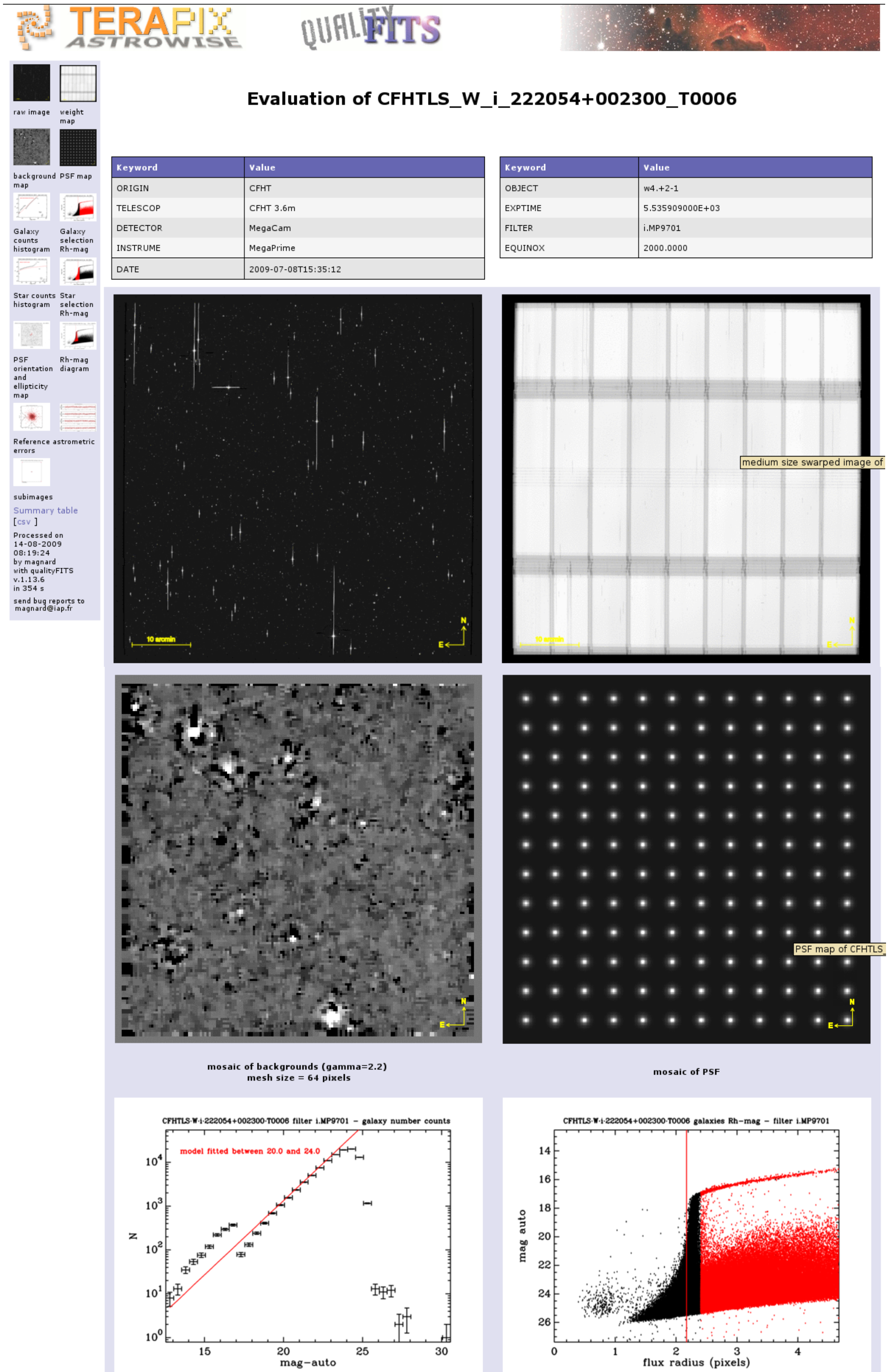



Figure 40: QFITS-out page of the W4 CFHTLS_W_i_222054+002300 stack. The table on top summarises the origin of images and the nature of the stack. The next views show, from top left to bottom right: binned images of the stack, its weight-map, and of the sky background; the PSF over the MegaCam field. The plots at the bottom show the galaxy-counts (left) derived from the `.ldac` catalogue. The galaxies are extracted from a blind selection of the sources shown on the right $r_h - mag.$ plot (red points). The red line on the galaxy count plot is the expectation.

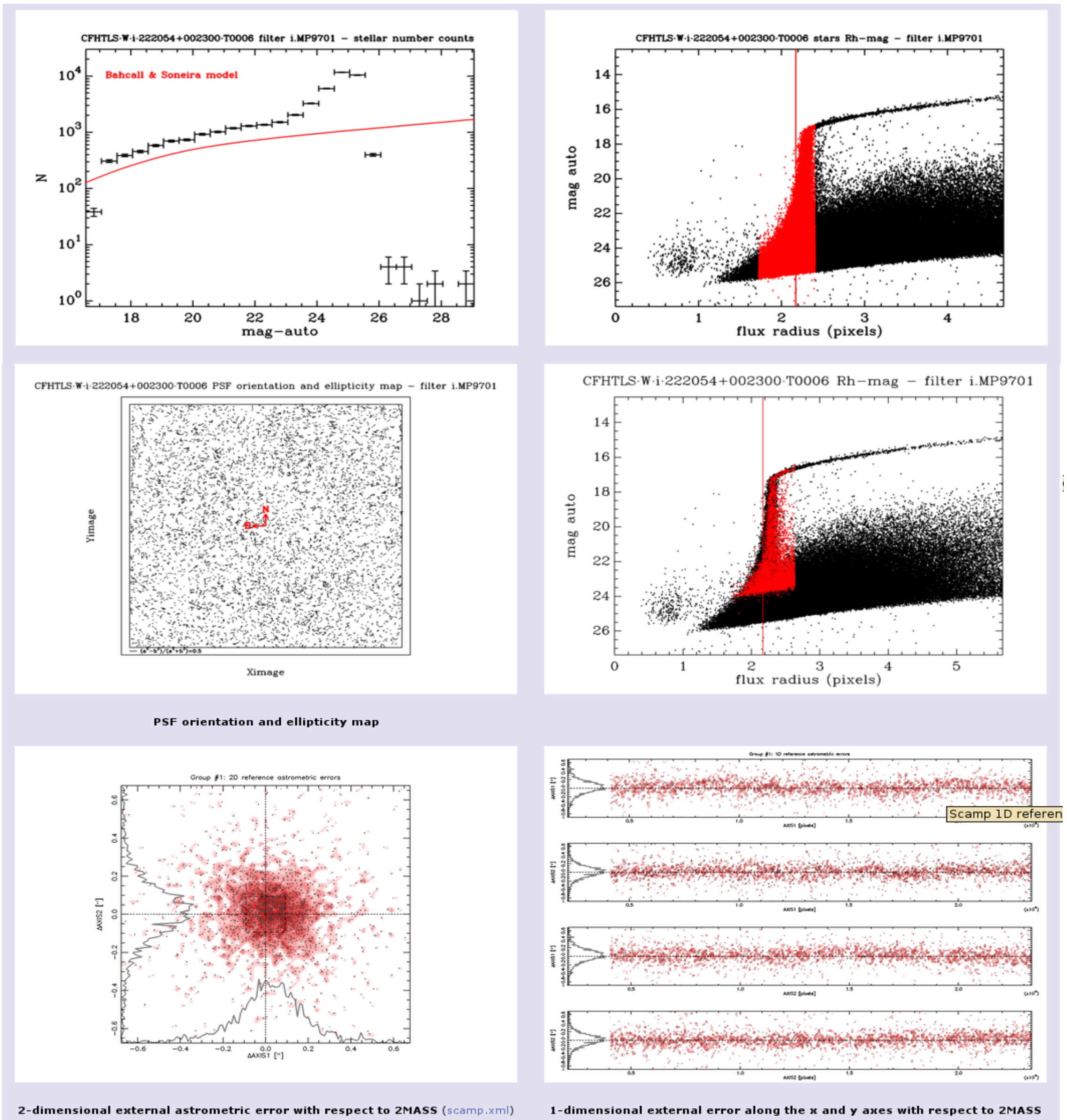
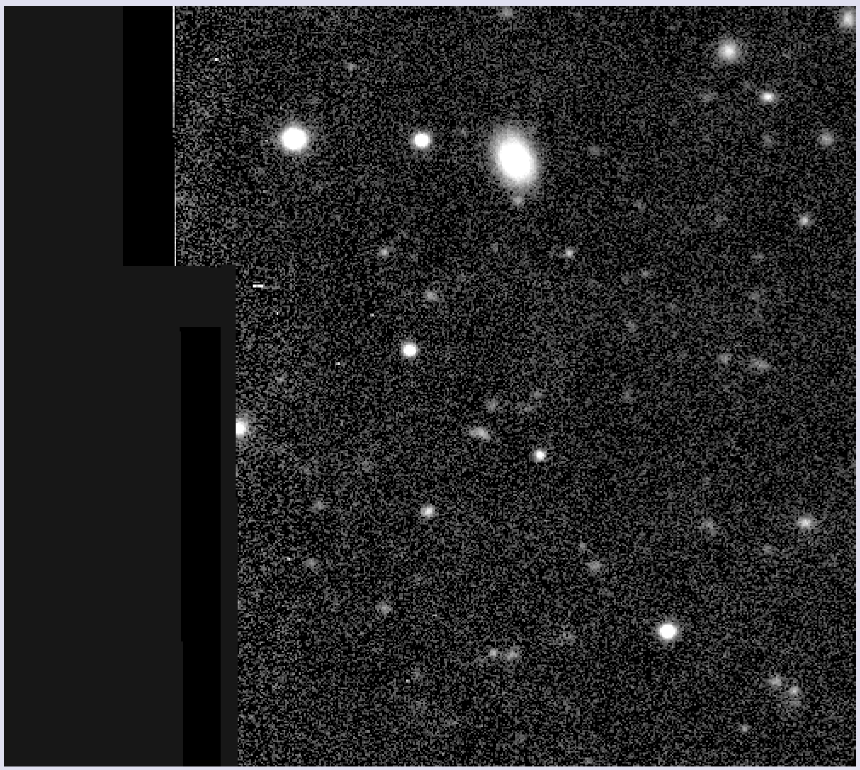


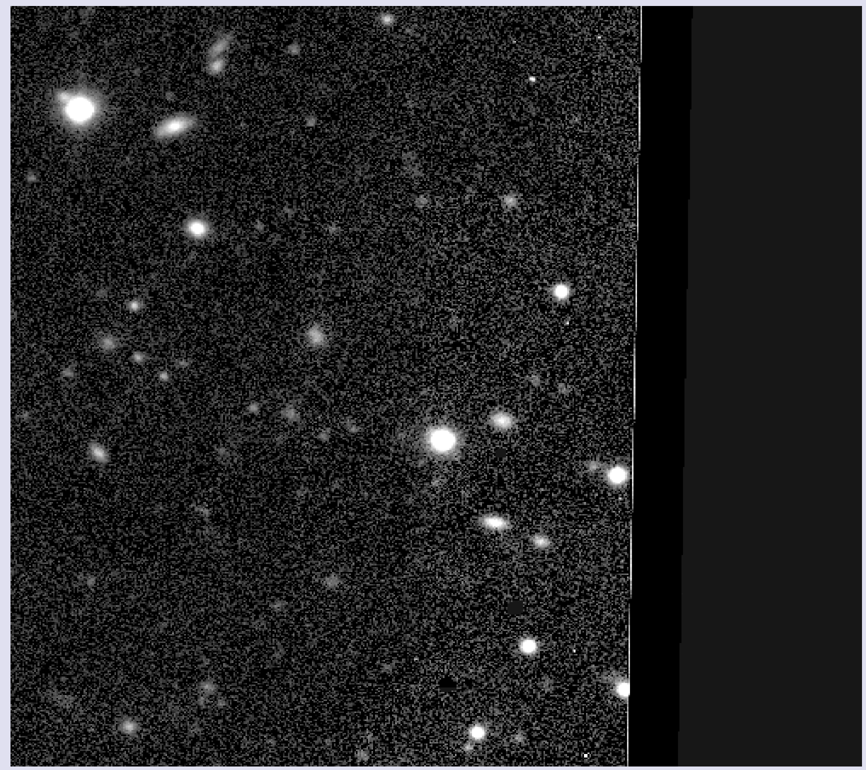

Figure 41: QFITS-out page of the same field (cont'd). The clickable plots show, from top left to bottom right, the stellar-counts (left) derived from a blind selection of red sources shown on the right $r_h - magnitude$ plot. The red line on the predictions of the Bahcall-Soneira model. The plot on the middle panel show the the amplitude ($(a^2 - b^2)/(a^2 + b^2)$ = length of lines) and the orientation (= orientation of lines) of the stellar ellipticity vectors over the MegaCam field. The seelcted sources are the red points shown on the right $r_h - magnitude$ plot. The plots at the bottom are the 2-dimension (left) and 1-dimension astrometric errors of sources with respect to the 2MASS catalogue. They are produced by running SCAMP in a simple diagnostic mode (-MATCH N -SLOVE_ASTROM N -SOLVE_PHOTOM N).

| Summary of scamp astrometric statistics | |
|---|---|
| AstromChi2_Internal_HighSN | 0 |
| AstromChi2_Reference | 1.99 |
| AstromChi2_Reference_HighSN | 1.98 |
| AstromNDets_Internal_HighSN | 2505 |
| AstromNDets_Reference | 2507 |

| Summary of scamp astrometric statistics | |
|---|---|
| AstromNDets_Reference_HighSN | 2505 |
| AstromSigma_Internal_HighSN (arcsec) | 0 0 |
| AstromSigma_Reference (arcsec) | 0.23 0.22 |
| AstromSigma_Reference_HighSN (arcsec) | 0.22 0.22 |



subimage1 CFHTLS_W_i_222054+002300_T0006[0] (EXT_0)



subimage2 CFHTLS_W_i_222054+002300_T0006[0] (EXT_0)

| 4x4 binned chip pixel (1,1) is at lower left | background (ADU) | sigma_bkg (ADU) | background (mag/arcsec$^2$) | nsexdet | seeing (pix) | FRseeing (pix) | seeing (arcsec) | FRseeing (arcsec) | sloaded | saccepted | schi2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EXT_0 | -0.0 | 1.8 | -0.22 | 150786 | 3.512 | 4.348 | 0.653 | 0.809 | 8414 | 8085 | 3.51 |

**qualityFITS command line** : /usr/local/bin/qualityFITS -vvv --pass2 --scamp --subin 500 CFHTLS_W_i_222054+002300_T0006.fits --weight CFHTLS_W_i_222054+002300_T0006_weight.fits --sexldac CFHTLS_W_i_222054+002300_T0006.ldac --background CFHTLS_W_i_222054+002300_T0006_mbkg.fits --logfile CFHTLS_W_i_222054+002300_T0006.log --filterfile /usr/local/etc/qualityFITS/filters_megacam.dat -c qualityFITSout-SKey-SLevel20000-2MASS.rc

Figure 42: QFITS-out page of the same field (cont'd). The clickable images are full resolution sub-images of the bottom left corners of the stack. The table below summarises some basic information of the stack: sky background, mean seeing, number of sources.

### 5.5 Transfer to CADC and data integrity check

The unique access point for the distribution of TERAPIX restricted T0006 CFHTLS data is at the CADC center `http://www.cadc-ccda.hia-iha.nrc-cnrc.gc.ca/cfht/T0006.html`. The data are restricted to CFHTLS users affiliated to Canadian or French institutes who registered after request to the CFHT Director (`veillet@cfht.hawaii.edu`).

The data products that are archived and distributed by CADC are all MD5-encrypted and checksumed by TERAPIX prior to open them for delivery to CADC. The MD5-checksum is done again immediately before and after the transfer, and the checksum values are all preserved in the CADC archive. TERAPIX verified the integrity of the whole T0006 release by comparing the TERAPIX and CADC checksum values. The checksums can be downloaded by the CFHTLS users, so anyone can check that the images are not corrupted after the transfer from CADC to his own disk.

Note that prior to transfer all data are now gzipped compressed. There is no longer RICE compressed data in the T0006 archived because all weight-map and stack images are not 16-bit Integer FITS files. CFHTLS users also expressed a preference for gzipped data.

# 6 T0006 processing description

As all MegaCam images, the pre-processing of the raw images (masking the bad pixels, removing the overscan, subtracting the dark and the bias, flat fielding and illumination correction) is performed by the ELIXIR pipeline at CFHT (Magnier & Cuillandre 2004). All detrended images that were validated by CFHT are then transferred from CFHT or CADC to TERAPIX in order to produce the T0006 release. TERAPIX also download the QSO flags archived by CFHT[19].

The TERAPIX processing steps, from the early download of detrended CFHT images to the final stacked images and catalogues are shown on Fig. 43.

## 6.1 Image evaluation and early selection

In the first `QualityFITS` step (`QFTIS-in`), all single CFHTLS input images are used to produce an early input catalogue of sources. The catalogue will be used immediately, to assess the quality of the image, and later, during the `SCAMP` astrometric/photometric calibration. To take into account the significance of each pixel, `QualityFITS` first creates a pixel weight-map image. The weighting scheme takes into account the flat-field and the mask images produced by ELIXIR[20] at CFHT, as well as the variance of the flux on each pixel. The weight-map image will be used to produce the early input catalogue of sources and to to combine images into stacks.

The catalogue of sources is created with an extra-saturation level criterion. The saturation cut is much lower than the CCD limit provided in the FITS header (SATURATE FITS Keyword) in order to remove all bright stars and secure the star/galaxy separation. The input catalogue will be used later for the astrometric calibration and the flux re-scaling steps.

After `QFTIS-in`, all images are visually inspected and evaluated through the `Youpi` image evaluation interface[21]. `Youpi` links to a `QFITS-in` web page that summarizes and displays the properties of the images as an ID-card. All `QFITS`-ed images are then graded "A", "B" or "C", after a visual inspection of each ID-card (see Fig. 44), with special attention on the PSF and the seeing over the MegaCam field. Images with grade C are not within the CFHTLS specifications or show serious problems (like data from several CCD's missing, huge scattered light over the whole MegaCam field, obvious guiding problems of the telescope). Grade B are acceptable images, within the specifications, but the `QFTIS-in` revealed minor problems (like unusual galaxy or stellar counts, or seeing values very close to the upper limit). The grading step is applied to all CFHT-*validated* images and therefore secures the whole CFHTLS image selection process.

With the `QFITS-in` information in hands, TERAPIX runs a first selection of T0006 images by applying the following criteria:

- TERAPIX class: A or B grades;
- Exposure time higher than 60 sec. ;
- Seeing (FWHM) $< 1.3$" , except for $u^*$ ($< 1.4$") ;
- Airmass lower than 1.7 ;

Rejected images will no longer be considered. TERAPIX then uses the early `QFITS`-in catalogues of the remaining sample to derive the astrometric and photometric calibrations of the release.

[19] `htpp://www.cfht.hawaii.edu/Science/CFHTLS-DATA`
[20] Magnier & Cuillandre 2004
[21] `http://youpi.terapix.fr`

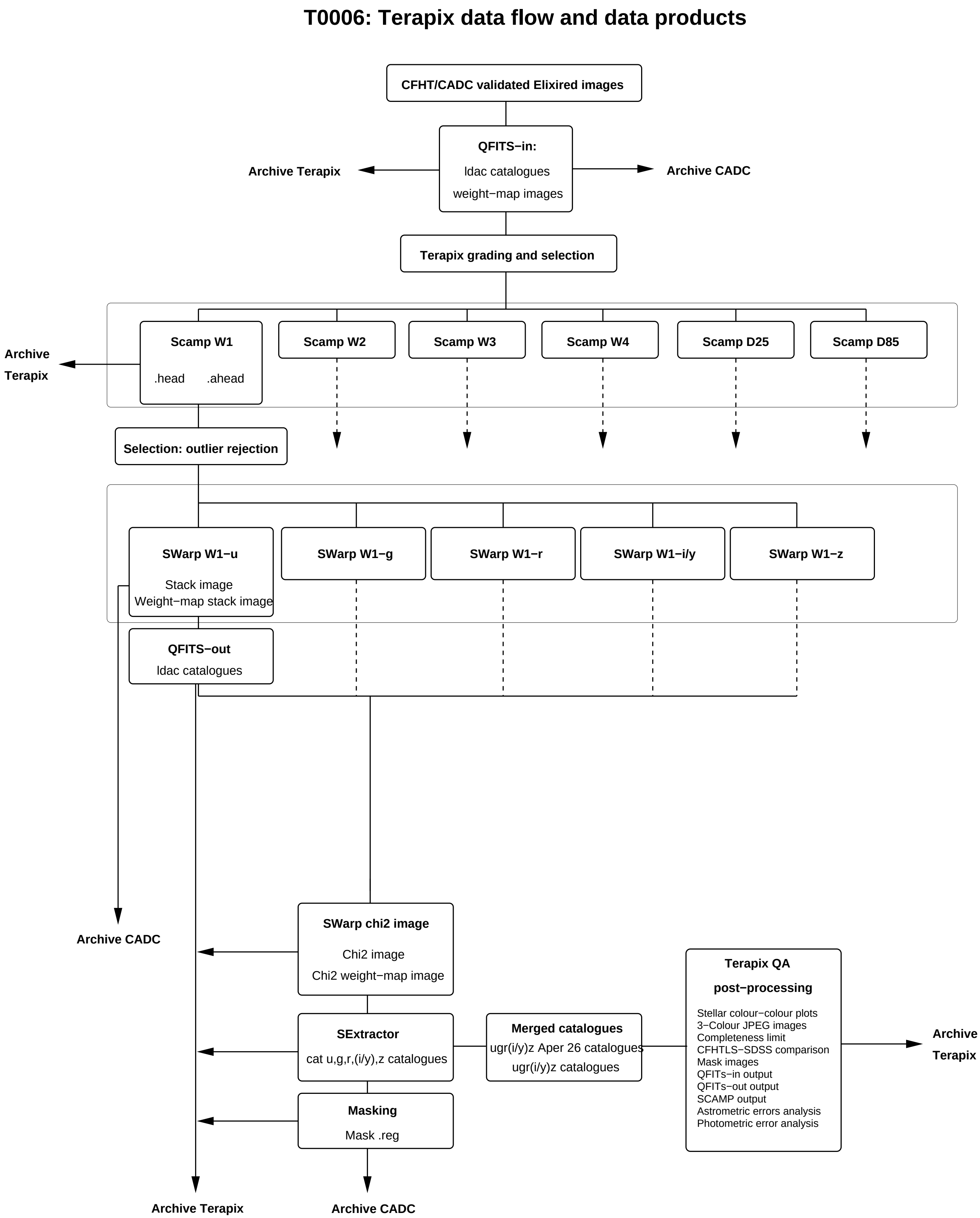



Figure 43: Flow chart of the TERAPIX data processing pipeline for T0006.

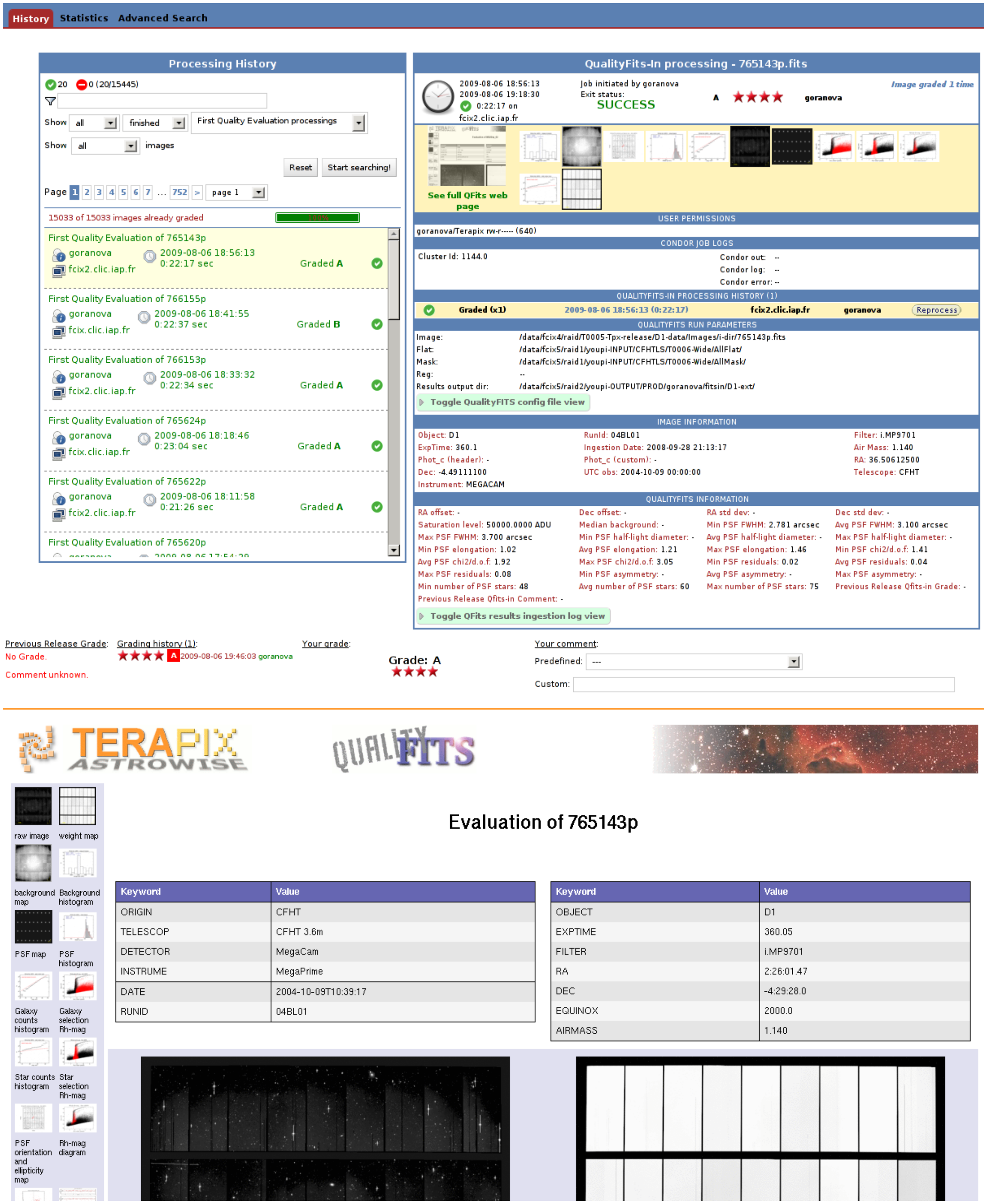



Figure 44: The youpi-QualityFITS grading interface. The top panels show the youpi-QualityFITS front page that displays the current status of QualityFITS evaluations of all images (left), and the QualityFITS evaluation of a user-selected image (right). On top of the right panel the status of the grading of the selected image is displayed. The grade can be modified. In that case the QualityFITS page (bottom panel) is loaded by youpi and options to grade a new image or to update the grade of an image are displayed on a top menu. The users can then have a look at the data shown on Fig. 40 to 42. The grading interface minimises the number of actions (3 cliks only per image for the whole process), and keeps the grading very quick and easy. All T0006 images were inspected with this tool. The youpi data base preserves the evaluation history of all images, so it also archives the T0005 grades.

Prior to run SCAMP, the .ahead files are created in order to flag the photometric/non-photometric images and to correct the FITS header magnitude ZPs already used in T0004 by a small correction provided by CFHT. This correction was already done in T0005. It takes into account the new collection of magnitude ZPs that were tuned last year by CFHT on all images obtained during the period 2003-2009. Images obtained after T0005 already have the new magnitude ZPs and do not need further correction.

## 6.2 Astrometric calibration

The astrometric solution is computed using SCAMP[22]. The SCAMP configuration file for the calibration of T0006 is presented in the Appendix.

SCAMP first examines all image headers and then split the exposures into a series of astrometric contexts. Each context singles out blocks of observing epochs where the instrument focal plane is in a fixed and (almost) stable position. In practice it can be labeled by the CFHT QRunID's. The detections and positions of astrometric sources on MegaCam images are derived by the cross-identification of sources of the QFITS-in .ldac catalogues with the 2MASS astrometric reference catalogue. We choose 2MASS because it returned more stable and accurate astrometric solutions than USNO for the CFHTLS data. The SDSS R6 catalogue would be better because CFHTLS and SDSS have similar filters, but it only covers a small fraction of the CFHTLS Wide survey. W2 is not covered and W1 and W4 are only partially comprised in SDSS. The selection of 2MASS astrometric reference is done as the expense of an accurate field-to-field photometric rescaling as one could expect if the calibration was based on direct comparison with SDSS. This difficulty has motivated the careful CFHTLS-SDSS photometric comparison we have carried out and discussed in the previous sections of this document.

As previous releases, for T0006 the source matching exploration radius is set to 2 arcsecond for all Deep and Wide fields. A $3^{rd}$ order polynomial distortion model is then derived by minimizing a weighted quadratic sum of differences in positions between the 2MASS and the QFITS-in matched sources, and, internally, between different QFITS-in catalogues with overlapping regions of MegaCam images (see Fig. 7). SCAMP then computes the astrometric internal errors from the differences of astrometric positions of sources inside the overlapping regions and the external errors for the comparisons of astrometric positions of MegaCam sources with the 2MASS catalogue. At this stage, the calibration process depends on the field:

- For the Wide W2, W3 and and W4 fields, the astrometric solution is performed only once for each Wide field, by taking together all CFHT selected images simultaneously, regardless the filter and the epoch. During the calibration process, photometric short exposures and sub-samples of Pre-Wide survey images are taken into account. All images of a given Wide field are then calibrated globally and in a homogeneous way. The unique reference catalogue is 2MASS.
- For W1, the astrometric calibration must be computed differently. As for other wide fields, photometric short exposures and sub-samples of Pre-Wide survey images are taken into account. However, the number of observing runs produces too many astrometric contexts that cannot be handled into one single matrix by SCAMP with the current TERAPIX computing resources. The W1 calibration is then split into two steps:
  - we first combine together the early $g$+$r$ .ldac catalogues and find an astrometric solution using the 2MASS reference catalogue;

[22] http://terapix.iap.fr/rubrique.php?id_rubrique=105

  - we then produce a new internal $g$+$r$ astrometric reference catalogue, calibrated with 2MASS;
  - we finally run `SCAMP` in a standard way using this internal reference catalogue on the $u, g, r$ and on the $r, i, z$ `.ldac` samples separately. The homogeneity and consistency of the calibrations are secured by the $r$-band data.

  The quality and validity of the solution has been checked after visual inspection. If acceptable, the astrometric solution is then written in the `.head` file attached to each image.

- The Deep images are calibrated in a similar way as the Wide fields (with SCAMP). However, the construction of the primary reference internal source catalogue calibrated on 2MASS were produced differently for each Deep sample, using specific sub-set of images:
  - For the D1 field the astrometric solution was calculated for each filter separately, using a merged reference catalogue. This catalogue was created from two images from each QRUNID drawn from all $i$ and $r$-band observations, as well as a supplemental set of $i$-band astrometric fields surrounding the deep pointing;
  - For the D3 field the astrometric solution was calculated for each filter separately as well, but using a special merged $i$-band reference catalogue. This catalogue was created from two images from each QRUNID drawn from all $i$-band observations. As D1, a supplemental set of astrometric fields surrounding the deep pointing was included;
  - For D2 and D4, the calibrations are done with respect to 2MASS, as usual. However, as in T0005, they are done in each filter separately, with a supplemental set of of astrometric fields that are common to all filters. These astrometric catalogues contain observations, either centered or surrounding the field, with shifts of $\sim 30$ arcminutes with respect to the Deep center fields. The extra-data sets spread over many different observing periods and sample all QRUNID.

  As for the Wide, the quality and validity of the solution has been checked after visual inspection. If acceptable, the astrometric solution is then written in the `.head` file attached to each image.

## 6.3 Photometric rescaling

`SCAMP` is also used to derive the photometric calibration and the field-to-field photometric rescaling. The rescaling is applied the same way to both Wide and deep fields. Images flagged as "photometric" by CFHT are used as references. The photometric flag is written in the `.ahead` file. The magnitude ZP is extracted from the input image FITS header, but for all images with a new CFHT magnitude ZP TERAPIX writes the new value in the `.ahead` file. The new magnitude ZPs will then automatically supersede the FITS header value.

As for the astrometric calibration, `SCAMP` minimizes the quadratic sum of magnitudes using the overlapping regions between images. It then re-scales the flux of non photometric images accordingly. Typical re-scaling amplitudes in T0006 are $\pm 0.02$ magnitude. However, for some highly non-photometric images, it may reach $\pm 0.50$ magnitude.

## 6.4 Production of the Deep and Wide stacks

Each Deep or Wide stack is only composed of all images obtained during a CFHTLS observing sequence and located inside a radius of 3' with respect to a tile center position. The shifts

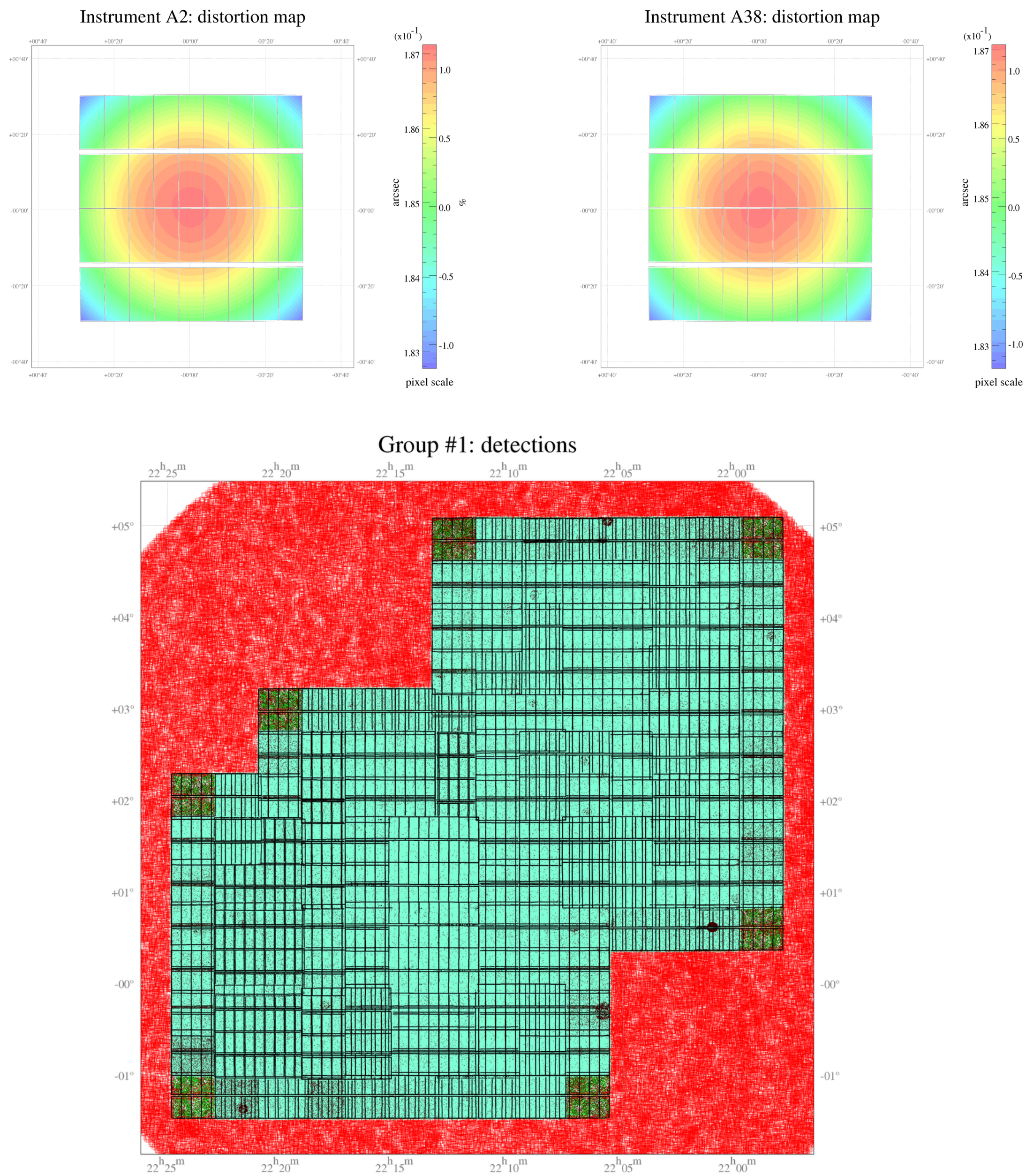



Figure 45: Outputs of the SCAMP calibration process of the W4 field. The panels on top show the first and last maps of the 38 MegaPrime distortion models built by SCAMP for the whole set of W4 contexts. They provide distortion models for all images shown on the Group #1 detections shown at the bottom. The Group detection plot show the 2MASS sources in red and the matched CFHTLS-2MASS detections in green. The MegaCam field of view and the CCDs are easily identified on this image.

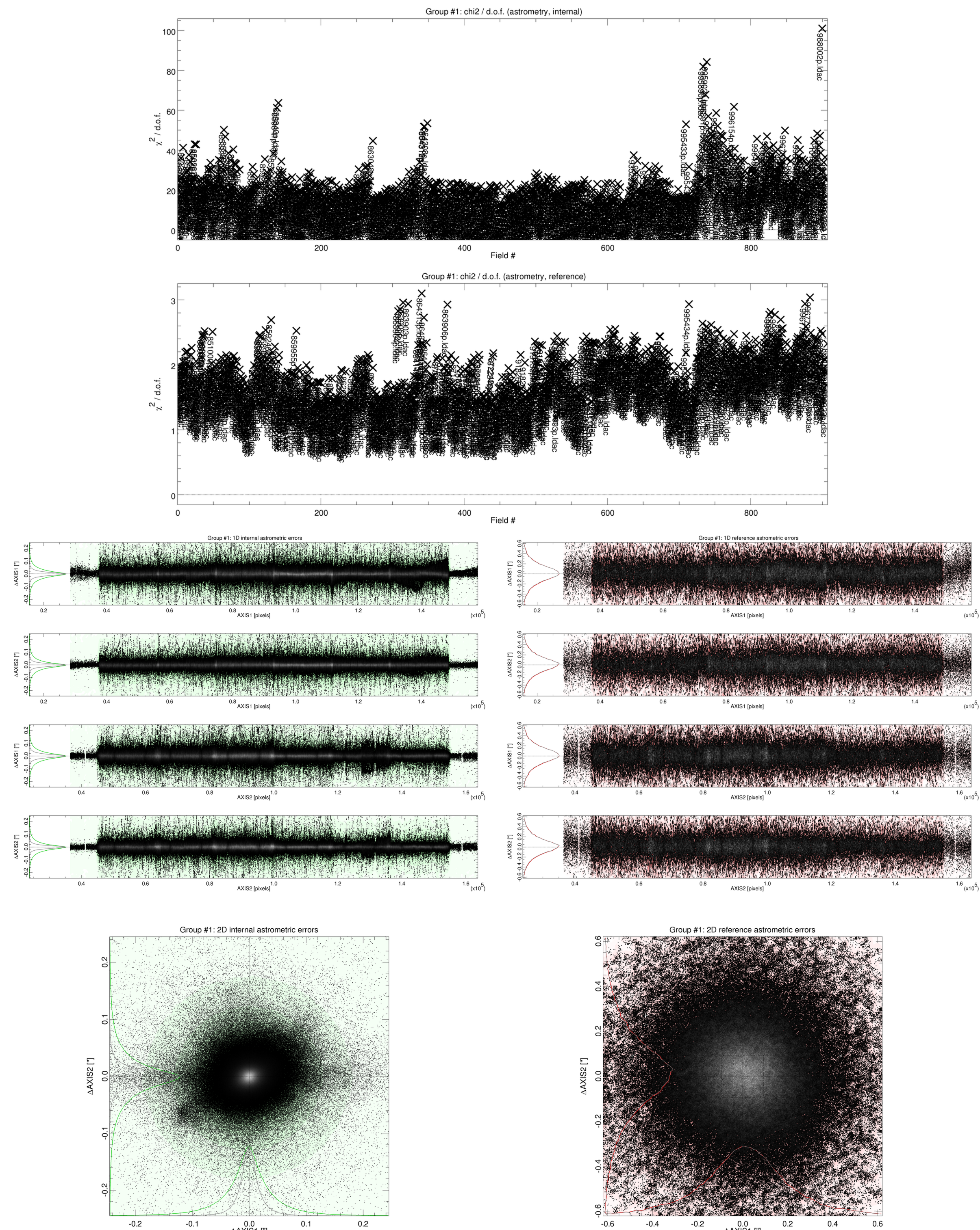



Figure 46: Outputs of the SCAMP calibration process of the W4 field (cont'd). Astrometric calibration of W4 images.

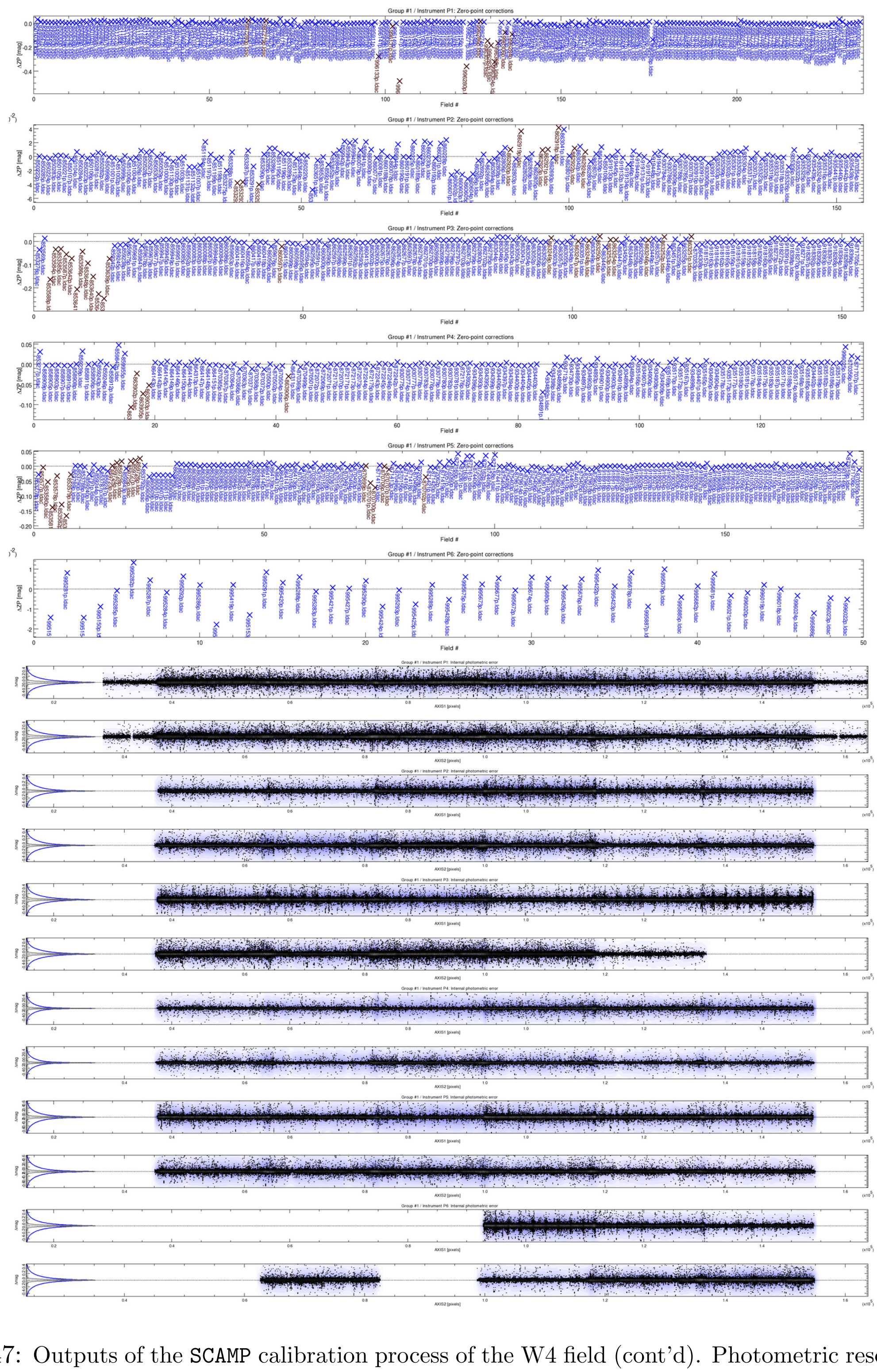



Figure 47: Outputs of the SCAMP calibration process of the W4 field (cont'd). Photometric rescaling and calibration of W4 images.

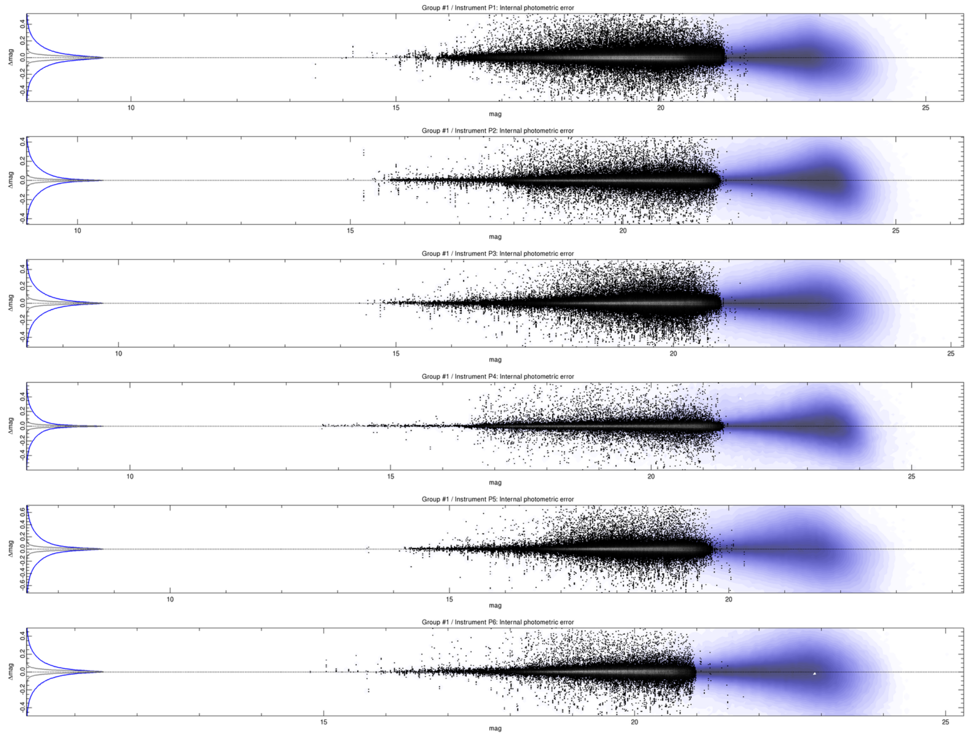



Figure 48: Outputs of the SCAMP calibration process of the W4 field (cont'd). Internal photometric error as function of magnitudes of W4 images.

between each exposure of an observing sequence guarantee that the final stack image will fill the gaps between the CCDs. Note that in the case of Wide images, the overlapping pixels of nearest neighbor tiles are used for the field-to-field calibration but not used during the image combine process of the Wide survey. This restriction is not relevant for the Deep, and does not apply to D2-$u^*$ in order to select all COSMOS data.

The T0006 stacks are averaged using a median filter for the Wide and Deep surveys. Both combine images with a `Lanczos-3` interpolation kernel. All stacks have 19354× 19354 pixels of 0.186" (*i.e.* exactly 1 deg.× 1 deg.).

All images have the same new magnitude ZP set to 30. The magnitude system is the instrumental $AB$. The magnitudes of objects in the final stacks are computed as follows: $m = 30 - 2.5\ log(counts)$. The SWARP configuration file for the production of the T0006 stacks is presented in the Appendix.

Once the $g$, $r$ and $i$ band data are available, TERAPIX automatically combine them into a "chi2 image". The chi2-image has the same center position, same scale and same size as the input $g$, $r$ and $i$ images. The SWARP configuration file for the production of the T0006 chi2 images is presented in the Appendix.

## 6.5 Production of the Deep and Wide catalogues

For the Wide and Deep surveys, an `.ldac` `SExtractor` source catalogue is produced immediately after the production of each stack by `QualityFITS`-out. The T0006 Wide and Deep `.ldac` source catalogues have been produced using a 128 pixels mesh size to derive the local sky background. These catalogues are part of the `QFITS-out` output files. The `SExtractor` configuration file for the production of the T0006 `.ldac` catalogues in presented in the Appendix.

After the production of the chi2 image, `SExtractor` is run in dual-image mode on the $u^*$, $g$, $r$, $i$, $y$ and $z$ stacks, with the chi2 image as reference. The Wide and Deep chi2 `.cat` catalogues are produced with a mesh size of 256 pixels. All catalogues contain parameter values for all quantities listed in Tables 34, 35 and 36. The T0006 source catalogues are considerably expanded as compared to previous releases. For each source, MAG_APER is computed within 26 apertures, instead of 3 as before. The `SExtractor` configuration file for the production of the T0006 `.cat` dual-image mode catalogues is presented in the Appendix.

In addition, TERAPIX produces, for each pointing of the survey

- a ($u$, $g$, $r$ , $i/y$, $z$)-merged Wide, or a ($u$, $g$, $r$ , $i$, $y$, $z$)-merged Deep catalogue that includes a limited number of parameters (only MAG_AUTO, for example) plus the e(b-v) value at each source position derived from dust map images (Schlegel et al 1998, ApJ 500, 525; `http://adsabs.harvard.edu/abs/1998ApJ...500..525S`);
- a ($u$, $g$, $r$ , $i/y$, $z$)-merged Wide, or ($u$, $g$, $r$ , $i$, $y$, $z$)-merged Deep multi-aperture (`.ape`) extended catalogue that only includes the data concerning the 26 MAG_APER informations in all filters.

### 6.6 Post-processing and quality control

Finally, a series of post-processing analysis is then carried out in order to make quality assessments for

- each single $u^*, g, r, i/y, z$ Wide or $u$, $g$, $r$ , $i$, $y$, $z$ Deep stack,
- all $u^*, g, r, i/y, z$ Wide tiles,
- all Wide pachtes, W$k$ ($k$=1-4), and
- the whole Wide survey.

The `QFITS`-in, `SCAMP`, `QFITS`-out output files are full parts of quality assessments data. More specific control files are also created (completeness limit plots, stellar color-color track plots, 3-color images of stacks, maps of the survey, SLR color fitting plots, etc...) that are all available on the T0006 synoptic table `http://terapix.iap.fr/cplt/table_syn_T0006.html`. The details are presented in the previous sections. They also include discussions on the internal and external photometric and astrometric errors in the T0006 stacks.

## 7 Acknowledgements

We thank to Emmanuel Bertin for his numerous advices as well as his support to make his software suite working at TERAPIX, the CFHT staff, in particular Kanoa Wilkinson, the SNLS team, in particular Pierre Astier, Ray Carlberg, Julien Guy, Nicolas Regnault, Chris Pritchet, Raynald Pain, CADC, in particular JJ Kavelaars and John Ouelette, the CDS in Strasbourg, the CFHTLS Data Operation Group and the CFHTLS Steering Group. TERAPIX is funded by the French national research agency (CNRS/INSU), the Programme National Cosmologie et Galaxies (PNCG), the Service d'Astrophysique of the Commissariat à l'Energie Atomique (CEA/SAp), the Institut d'Astrophysique de Paris (IAP), the Agence National de la Recherche

(ANR) grants ECOSSTAT, DESIR and TG_REGALDIS, and the European FP5 RTD contracts "Astrowise" and "AVO" (Astrophysical Virtual Observatory).

# 8 Appendix

## 8.1 List of images in each Wide stack

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W1(-4-4) | $u^*$ | 1022212,1022213,1022214,1022215,1022216 |
| | $g$ | 942766,942767,942768,942769,942770 |
| | $r$ | 816609,816610,1014659,1014660 |
| | $y$ | 967664,967665,967666,967894,967895,967896,1030576,1030578,1030579,1030580,1030581,1038680 |
| | $z$ | 1037804,1037805,1037806,1037807,1037808,1037809 |
| W1(-4-3) | $u^*$ | 1022217,1022218,1022219,1022220,1022221 |
| | $g$ | 862819,862822,862823,862824,862956,862957 |
| | $r$ | 814948,814949,1014657,1014658 |
| | $i$ | 880193,880194,880195,880196,880197,880198,880199 |
| | $z$ | 1038038,1038039,1038040,1038041,1038042,1038043 |
| W1(-4-2) | $u^*$ | 1030705,1030706,1030708,1030710,1030748 |
| | $g$ | 879742,879743,879744,879745,879746 |
| | $r$ | 814942,814943,1014655,1014656 |
| | $i$ | 880200,880201,880203,880204,880205,880206,880207,880208 |
| | $z$ | 1038045,1038046,1038350,1038351,1038353,1038356,1038357 |
| W1(-4-1) | $u^*$ | 1030698,1030699,1030701,1030704,1038673 |
| | $g$ | 879977,879978,879979,879980,879981 |
| | $r$ | 811173,811174,811181,811186 |
| | $i$ | 880209,880210,880211,880212,880213,880214,880215 |
| | $z$ | 1038355,1038358,1038359,1038360,1038361,1038362 |
| W1(-4-0) | $u^*$ | 1030595,1030596,1030597,1030696,1030697 |
| | $g$ | 880967,880968,880969,880970,880971 |
| | $r$ | 814940,814941,1014651,1014652 |
| | $i$ | 880434,880436,880437,880438,880439,880440,880441 |
| | $z$ | 1038476,1038477,1038478,1038479,1038480,1038481 |
| W1(-4+1) | $u^*$ | 1030590,1030591,1030592,1030593,1038672 |
| | $g$ | 880972,880973,880974,880975,880976 |
| | $r$ | 810510,810511,1014649,1014650 |
| | $i$ | 880977,880978,880979,880980,880981,880982,880983 |
| | $z$ | 1038482,1038483,1038484,1038485,1038486,1038487 |
| W1(-4+2) | $u^*$ | 1030585,1030586,1030587,1030588,1030589 |
| | $g$ | 883305,883306,885065,885317,885318,885319 |
| | $r$ | 810504,810505,1014467,1014468 |
| | $i$ | 881254,881255,881256,881257,881258,881259,881260 |
| | $z$ | 1038488,1038489,1038490,1038491,1038493,1038661 |
| W1(-4+3) | $u^*$ | 1030476,1030477,1038669,1038670,1038671 |
| | $g$ | 885422,885423,885424,885425,1031327 |
| | $r$ | 810496,810497,1014465,1014466 |
| | $i$ | 881261,881262,881263,881264,881265,881266,881267 |
| | $z$ | 1038494,1038495,1038496,1038497,1038498,1038499 |
| W1(-3-4) | $u^*$ | 1030749,1030778,1030779,1030780,1030781 |
| | $g$ | 942771,942772,942773,942774,942775 |
| | $r$ | 816607,816608,1021185,1021186 |
| | $y$ | 964850,964851,964852,964853,964854,964855,964856 |
| | $z$ | 1037798,1037799,1037800,1037801,1037802,1037803 |
| W1(-3-3) | $u^*$ | 1030468,1030469,1030470,1030471,1030472 |
| | $g$ | 872207,872208,872209,872210,872211 |
| | $r$ | 814956,814957,1014463,1014464 |
| | $i$ | 879636,879638,879639,879640,879641,879642,879643 |
| | $z$ | 1030196,1030197,1030198,1030199,1030200,1030201 |
| W1(-3-2) | $u^*$ | 1022616,1022617,1022618,1022619,1022620 |
| | $g$ | 872212,872213,872214,872215,872216 |
| | $r$ | 810486,810487,1014461,1014462 |
| | $i$ | 879644,879645,879646,879647,879648,879649,879650 |
| | $z$ | 1030190,1030191,1030192,1030193,1030194,1030195 |

Table 37: Full list of CFHTLS input images included in each Wide stacks. The corresponding exposure times, or any details regarding each stack, are quoted in Tables 4 to 8, and at the T0006 synoptic table `http://terapix.iap.fr/cplt/table_syn_T0006.html`.

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W1(-3-1) | $u^*$ | 1022611,1022612,1022613,1022614,1022615 |
| | $g$ | 872217,872218,872219,872220,872222 |
| | $r$ | 810488,810516,1014459,1014460 |
| | $i$ | 879747,879748,879749,879750,879753,879982,879983,879984 |
| | $z$ | 1030075,1030076,1030077,1030078,1030079,1030080 |
| W1(-3-0) | $u^*$ | 1030463,1030464,1030465,1030466,1030467 |
| | $g$ | 872277,872279,872280,872281,872282,872283,872284,872285,872286,872287,872289,872290,872291 |
| | $r$ | 810491,810517,1014008,1014009 |
| | $i$ | 879985,879986,879987,879988,879989,879991,879992 |
| | $z$ | 1030069,1030070,1030071,1030072,1030073,1030074 |
| W1(-3+1) | $u^*$ | 1022472,1022473,1022475,1022476,1022610 |
| | $g$ | 875012,875013,875014,875015,875016,875017,875018 |
| | $r$ | 810492,810493,1014006,1014007 |
| | $i$ | 880087,880088,880089,880091,880092,880093 |
| | $z$ | 1030063,1030064,1030065,1030066,1030067,1030068 |
| W1(-3+2) | $u^*$ | 1022467,1022470,1022471,1022608,1022609 |
| | $g$ | 875122,875123,875124,875125,875126 |
| | $r$ | 810494,810495,1013887,1013888 |
| | $i$ | 880094,880095,880096,880097,880098,880099,880100 |
| | $z$ | 1022623,1022624,1022625,1022626,1022627,1030057,1030058,1030059,1030060,1030061,1030062 |
| W1(-3+3) | $u^*$ | 1022462,1022463,1022464,1022465,1022466 |
| | $g$ | 879631,879632,879633,879634,879635 |
| | $r$ | 809745,809746,1013885,1013886 |
| | $i$ | 880101,880102,880103,880104,880105,880106,880107 |
| | $z$ | 1022602,1022603,1022604,1022605,1022606,1022607 |
| W1(-2-4) | $u^*$ | 1030783,1030784,1030787,1030788,1030789,1030790 |
| | $g$ | 942777,942778,942779,942781,942782 |
| | $r$ | 816405,816406,1021187,1021188 |
| | $y$ | 964843,964844,964845,964846,964847,964848,964849 |
| | $z$ | 1033066,1033067,1033068,1033069,1033070,1033071 |
| W1(-2-3) | $u^*$ | 955734,955735,955736,955737,955738 |
| | $g$ | 872201,872202,872203,872205,872206 |
| | $r$ | 814962,814963,1022114,1022115 |
| | $i$ | 875622,875623,875627,875783,875784,875785,875786 |
| | $z$ | 964970,964971,964972,964973,964974,964975 |
| W1(-2-2) | $u^*$ | 948436,948437,948438,948439,948440 |
| | $g$ | 827404,827405,827406,827407,827408 |
| | $r$ | 810417,810484,810485,1022477,1022478 |
| | $i$ | 827409,827411,827412,827413,827414,827415,827416 |
| | $z$ | 948613,948614,948615,948616,948617,948618 |
| W1(-2-1) | $u^*$ | 948328,948329,948330,948331,948332 |
| | $g$ | 821835,821836,821837,821838,821839 |
| | $r$ | 809512,809612,809613,1022621,1022622 |
| | $i$ | 821845,821846,821847,821848,821849,821850,821851 |
| | $z$ | 947407,947409,955003,955004,955005,955006 |
| W1(-2-0) | $u^*$ | 948311,948312,948313,948314,948315 |
| | $g$ | 821598,821599,821600,821602,821603 |
| | $r$ | 809506,809610,809611,1022481,1022482 |
| | $i$ | 821604,821608,821609,821610,821612,821613,821614 |
| | $z$ | 947392,947393,947395,947396,947397,947398 |
| W1(-2+1) | $u^*$ | 947860,947861,947862,947863,947864 |
| | $g$ | 821593,821594,821595,821596,821597 |
| | $r$ | 809500,809501,1022225,1022226 |
| | $i$ | 820501,820502,820565,820566,820567,820568 |
| | $z$ | 942131,942132,942133,942134,942143,942197 |
| W1(-2+2) | $u^*$ | 947855,947856,947857,947858,947859 |
| | $g$ | 820488,820489,820490,820491,820492 |
| | $r$ | 806863,806864,1022222,1022223 |
| | $i$ | 820493,820494,820495,820496,820497,820498,820499 |
| | $z$ | 890897,890898,890899,890900,890901,890902 |
| W1(-2+3) | $u^*$ | 947845,947846,947847,947848,947849 |
| | $g$ | 820483,820484,820485,820486,820487 |
| | $r$ | 806861,806862,1022479,1022480 |
| | $i$ | 820409,820410,820411,820412,820413,820414,820415 |
| | $z$ | 891213,891214,891215,891216,891217,891218 |
| W1(-1-4) | $u^*$ | 1030791,1030792,1030793,1030794,1030795 |
| | $g$ | 948431,948432,948433,948434,948435 |
| | $r$ | 816403,816404,1021189,1021190 |
| | $y$ | 964005,964006,964007,964008,964009,964010,964011 |
| | $z$ | 1033060,1033061,1033062,1033063,1033064,1033065 |
| W1(-1-3) | $u^*$ | 955393,955394,955395,955396,955397 |
| | $g$ | 870647,870648,870649,870650,870802 |
| | $r$ | 814969,814970,1022112,1022113 |
| | $i$ | 875435,875436,875437,875438,875439,875441,875442 |
| | $z$ | 964962,964963,964964,964966,964967,964968 |
| W1(-1-2) | $u^*$ | 947850,947851,947852,947853,947854 |
| | $g$ | 827417,827418,827419,827420,827421 |
| | $r$ | 810415,810416,1021976,1021977 |
| | $i$ | 831270,831271,831272,831273,831274,831275,831276,831277 |
| | $z$ | 890762,890763,890764,890765,890767,890768 |

Table 38: Full list of CFHTLS input images included in each Wide stacks (cont'd)

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W1(-1-1) | $u^*$ | 942315,942316,942317,942318,942319 |
| | $g$ | 821840,821841,821842,821843,821844 |
| | $r$ | 809518,809519,1021974,1021975 |
| | $i$ | 821852,821853,821854,821855,821856,821857,821858 |
| | $z$ | 880680,880681,880682,880683,880684,880685 |
| W1(-1-0) | $u^*$ | 889435,889436,889437,889438,889439 |
| | $g$ | 820397,820398,820399,820400,820401 |
| | $r$ | 806859,806860,1021972,1021973 |
| | $i$ | 820402,820403,820404,820405,820406,820407,820408 |
| | $z$ | 874465,874466,874467,874468,874469,874470 |
| W1(-1+1) | $u^*$ | 880764,883008,883009,883011,883012,1031324 |
| | $g$ | 816622,816784,819864,819865,819866,819867,819868 |
| | $r$ | 806857,806858,1021970,1021971 |
| | $i$ | 821586,821587,821588,821589,821590,821591,821592 |
| | $z$ | 874117,874460,874461,874462,874463,874464 |
| W1(-1+2) | $u^*$ | 765305,765306,765307,765308,765309 |
| | $g$ | 765310,765316,765317,765318,765319 |
| | $r$ | 759164,765302,765303,1021968,1021969 |
| | $i$ | 764947,764948,764949,764950,764951,764952,764953 |
| | $z$ | 765761,765762,765763,765764,765765,765766,766294,766295,766296,766297,766298 |
| W1(-1+3) | $u^*$ | 765365,765366,765367,765368,765369 |
| | $g$ | 765354,765358,765359,765362,765363 |
| | $r$ | 758894,758895,1021966,1021967 |
| | $i$ | 762828,762832,762833,762834,762835,762836 |
| | $z$ | 765371,765372,765373,765374,765375,766359,766360,766361,766362,766363 |
| W1(-0-4) | $u^*$ | 1030962,1030963,1030964,1030965,1030966 |
| | $g$ | 942215,942216,942217,942219,942220 |
| | $r$ | 816397,816398,1021191,1021192 |
| | $y$ | 963763,963764,963765,963766,963767,963768,963769 |
| | $z$ | 1037792,1037793,1037794,1037795,1037796,1037797 |
| W1(-0-3) | $u^*$ | 948622,948623,948626,955391,955392 |
| | $g$ | 863927,864040,870641,870642,870643,870644,870645 |
| | $r$ | 814975,814976,1022110,1022111 |
| | $i$ | 863913,863914,863920,863922,863923,863924,863925 |
| | $z$ | 963435,963436,963437,963438,963439,963440 |
| W1(-0-2) | $u^*$ | 947503,947504,947505,947506,947507 |
| | $g$ | 827422,827423,827424,827425,827426 |
| | $r$ | 810993,810994,810995,810996,1021978,1021979 |
| | $i$ | 831160,831161,831162,831163,831164,831165,831166 |
| | $z$ | 890351,890352,890353,890354,890355,890356 |
| W1(-0-1) | $u^*$ | 942205,942206,942207,942208,942209 |
| | $g$ | 826625,826626,826627,826628,826629 |
| | $r$ | 809614,809615,1021830,1021831 |
| | $i$ | 826519,826520,826521,826522,826523,826524,826525 |
| | $z$ | 880664,880665,880666,880668,880669,880670 |
| W1(-0-0) | $u^*$ | 889633,889634,889635,889636,889637 |
| | $g$ | 816413,816414,816415,816416,816509 |
| | $r$ | 806855,806856,1021832,1021833 |
| | $i$ | 816895,819719,819720,819721,819722,819723,819724,819725 |
| | $z$ | 874471,874472,874473,874474,874475,874476 |
| W1(-0+1) | $u^*$ | 761701,761702,761703,761704,761705 |
| | $g$ | 761321,761322,761323,761324,761325 |
| | $r$ | 759155,761326,761327,1021834,1021835 |
| | $i$ | 762493,762494,762495,762496,762497,762498,762499 |
| | $z$ | 765767,765768,765769,765770,765771,765772,766289,766290,766291,766292,766293 |
| W1(-0+2) | $u^*$ | 761981,761982,761983,761984,761985 |
| | $g$ | 762628,765155,765156,765157,765158,765159 |
| | $r$ | 759153,759154,1021962,1021963 |
| | $i$ | 762474,762475,762476,762477,762478,762479,762480 |
| | $z$ | 764800,764801,764802,764803,764804,766177,766178,766179,766180,766181 |
| W1(-0+3) | $u^*$ | 761970,761971,761972,761973,761974 |
| | $g$ | 762623,762624,762625,762626,762627 |
| | $r$ | 758577,758578,1021964,1021965 |
| | $i$ | 762390,762391,762392,762393,762394,762395,762396 |
| | $z$ | 764795,764796,764797,764798,764799,766170,766171,766172,766173,766174 |
| W1(+1-4) | $u^*$ | 1030967,1030968,1030969,1030970,1030971 |
| | $g$ | 942210,942211,942212,942213,942214 |
| | $r$ | 815808,816392,1021193,1021194 |
| | $y$ | 963756,963757,963758,963759,963760,963761,963762 |
| | $z$ | 1032875,1032876,1032877,1032878,1032879,1032880 |
| W1(+1-3) | $u^*$ | 948451,948619,948620,948621,1031326 |
| | $g$ | 863283,863284,863285,863286,863287 |
| | $r$ | 815132,815133,1022108,1022109 |
| | $i$ | 875443,875444,875445,875446,875447,875489,875490 |
| | $z$ | 955020,955021,955212,955213,955214,955215 |
| W1(+1-2) | $u^*$ | 947498,947499,947500,947501,947502 |
| | $g$ | 827325,827326,827327,827328,827329 |
| | $r$ | 809776,809777,1021980,1021981 |
| | $i$ | 830980,831153,831154,831155,831156,831157,831158,831159 |
| | $z$ | 889306,889307,889308,889309,889310,889311 |

Table 39: Full list of CFHTLS input images included in each Wide stacks (cont'd)

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W1(+1-1) | $u^*$ | 883299,883300,883301,883302,883303 |
| | $g$ | 826630,826631,826645,826646,826647 |
| | $r$ | 809620,809621,1021828,1021829 |
| | $y$ | 1030480,1038662,1038663,1038664,1038665,1038666,1038667,1038668 |
| | $z$ | 884123,884124,884125,884126,884127,884128 |
| W1(+1-0) | $u^*$ | 942076,942077,942080,942081,942082 |
| | $g$ | 816407,816408,816409,816410,816411,816412 |
| | $r$ | 806761,806762,1021814,1021815 |
| | $i$ | 819869,819870,819871,819872,819873,819874,819875 |
| | $z$ | 831420,831421,831422,831423,831532,831533 |
| W1(+1+1) | $u^*$ | 761469,761470,761471,761472,761473 |
| | $g$ | 761197,761198,761199,761200,761320,761582,761583,761584,761585 |
| | $r$ | 758575,758576,1021683,1021684 |
| | $y$ | 1030457,1030458,1030459,1030460,1030461,1030462 |
| | $z$ | 761588,761592,761696,761697,761698,761699,761700,766164,766165,766166,766167,766168 |
| W1(+1+2) | $u^*$ | 761838,761839,761840,761841,761842 |
| | $g$ | 761826,761827,761828,761829,761830 |
| | $r$ | 758401,758402,1021681,1021682 |
| | $i$ | 760933,760934,760935,760936,760938,760939,760940 |
| | $z$ | 764954,764955,764956,764957,764958,765858,765859,765860,765861,765862 |
| W1(+1+3) | $u^*$ | 761832,761833,761834,761835,761836 |
| | $g$ | 728058,728059,728060,728061,728062 |
| | $r$ | 779979,779980,780209,1021679,1021680 |
| | $i$ | 758566,758567,758568,758569,758570,758571,758572,758573 |
| | $z$ | 761059,761060,761061,761062,761063,765851,765852,765853,765854,765855 |
| W1(+2-4) | $u^*$ | 1030972,1030973,1030974,1030975,1030976 |
| | $g$ | 942050,942051,942052,942053,942075 |
| | $r$ | 815620,815622,1021195,1021196 |
| | $y$ | 963132,963133,963134,963135,963136,963137,963138 |
| | $z$ | 1032233,1032234,1032235,1032236,1032237,1032238 |
| W1(+2-3) | $u^*$ | 948441,948442,948443,948444,948445 |
| | $g$ | 863090,863091,863092,863093,863094 |
| | $r$ | 815138,815139,1022106,1022107 |
| | $i$ | 875613,875614,875616,875617,875618,875619,875620 |
| | $z$ | 960408,962895,962896,962897,962898,962899,962900 |
| W1(+2-2) | $u^*$ | 947399,947400,947401,947402,1031325 |
| | $g$ | 827313,827314,827315,827316,827317 |
| | $r$ | 809770,809771,1021982,1021983 |
| | $i$ | 827318,827319,827320,827321,827322,827323,827324 |
| | $z$ | 885304,885306,885307,885308,885309,885310 |
| W1(+2-1) | $u^*$ | 942200,942201,942202,942203,942204 |
| | $g$ | 826736,826737,826738,826739,826740 |
| | $r$ | 809626,809627,1021826,1021827 |
| | $i$ | 826729,826731,826732,826733,826734,826735 |
| | $z$ | 881347,884117,884118,884119,884120,884121,884122 |
| W1(+2-0) | $u^*$ | 934919,934920,934921,935068,935200 |
| | $g$ | 732957,732958,732959,732960,732961 |
| | $r$ | 729725,729726,806759,806760,1021816,1021817 |
| | $i$ | 816763,816764,816765,816766,816768,816769 |
| | $z$ | 879864,879865,879866,879867,879868,879869 |
| W1(+2+1) | $u^*$ | 761975,761976,761977,761978,761979 |
| | $g$ | 728046,728047,728048,728049,728050 |
| | $r$ | 727579,727580,1021673,1021674 |
| | $i$ | 729718,729719,729720,729721,729722,729724 |
| | $z$ | 764693,764694,764695,764696,764697,765846,765847,765848,765849,765850 |
| W1(+2+2) | $u^*$ | 758888,758889,758890,758891,758892 |
| | $g$ | 727461,727462,727463,727464,727465 |
| | $r$ | 727459,727460,1021675,1021676 |
| | $y$ | 1030300,1030301,1030302,1030303,1030305,1030306,1038678,1038679 |
| | $z$ | 760942,760943,760944,760945,760946,765774,765775,765776,765777,765778 |
| W1(+2+3) | $u^*$ | 719023,719024,719025,719026,719027,719028,719029 |
| | $g$ | 715499,715500,715501,715502,715503 |
| | $r$ | 715071,715072,715073,715074,1021677,1021678 |
| | $i$ | 715226,715227,715228,715229,715230,715231,715232 |
| | $z$ | 718692,718693,718694,718695,718696,718697,718698,718699,718700 |
| W1(+3-4) | $u^*$ | 1030977,1030978,1030979,1030980,1030981 |
| | $g$ | 934780,934781,934782,934783,934784 |
| | $r$ | 815614,815615,1021370,1021371 |
| | $y$ | 963125,963126,963127,963128,963129,963130,963131 |
| | $z$ | 1032227,1032228,1032229,1032230,1032231,1032232 |
| W1(+3-3) | $u^*$ | 948333,948334,948335,948446,948447 |
| | $g$ | 863085,863086,863087,863088,863089 |
| | $r$ | 815145,815273,815274,1022104,1022105 |
| | $i$ | 874623,874624,874625,874626,874627,874628,874629 |
| | $z$ | 948635,948636,948637,948638,955017,955018 |
| W1(+3-2) | $u^*$ | 942325,942326,942397,942398,942399,942400,942401 |
| | $g$ | 827307,827308,827309,827310,827311 |
| | $r$ | 809764,809765,1022102,1022103 |
| | $i$ | 827300,827301,827302,827303,827304,827305,827306 |
| | $z$ | 885067,885068,885069,885070,885071,885072 |

Table 40: Full list of CFHTLS input images included in each Wide stacks (cont'd)

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W1(+3-1) | $u^*$ | 942045,942046,942047,942048,942049 |
| | $g$ | 826741,826742,826743,826744,826745 |
| | $r$ | 809632,809633,1021824,1021825 |
| | $i$ | 826746,826747,826748,826749,826750,826751,826752,826753 |
| | $z$ | 880424,880425,880430,880431,880432,880435 |
| W1(+3-0) | $u^*$ | 832185,832186,832187,832188,832189 |
| | $g$ | 724440,724441,724442,724443,724444 |
| | $r$ | 720440,720441,1021818,1021819 |
| | $i$ | 720087,720088,720089,720090,720091,720092,720093 |
| | $z$ | 832484,832485,832486,832487,832488,832489,832713,832714,832715,832716,832717,832719 |
| W1(+3+1) | $u^*$ | 831522,831523,831524,831525,831526 |
| | $g$ | 719196,719197,719198,719199,719200,719202 |
| | $r$ | 719194,719195,1021671,1021672 |
| | $y$ | 1030206,1030207,1030208,1038675,1038804 |
| | $z$ | 831967,831968,831969,831970,831971,831972 |
| W1(+3+2) | $u^*$ | 820092,826810,826811,831517,831518,831519,831520,831521 |
| | $g$ | 724435,724436,724437,724438,724439 |
| | $r$ | 719958,720444,720445,1021551,1021552 |
| | $i$ | 720094,720095,720096,720097,720098,720099,720100 |
| | $z$ | 831862,831863,831864,831865,831866,831867 |
| W1(+3+3) | $u^*$ | 816625,816626,816903,816904,1031323 |
| | $g$ | 719946,719947,719948,719949,719950 |
| | $r$ | 719944,719945,1021505,1021506 |
| | $i$ | 719951,719952,719953,719954,719955,719956 |
| | $z$ | 831631,831632,831633,831634,831635,831636 |
| W1(+4-4) | $u^*$ | 1031188,1031189,1031190,1031191,1038674 |
| | $g$ | 934914,934915,934916,934917,934918 |
| | $r$ | 815289,816391,1021501,1021502 |
| | $y$ | 962886,962887,962889,962890,962892,1030598,1030599,1030600,1030796,1030797,1030798,1030799 |
| | $z$ | 1032881,1032882,1032883,1032884,1032885,1032886 |
| W1(+4-3) | $u^*$ | 942402,942403,942404,948448,948449 |
| | $g$ | 862721,863278,863279,863280,863281,863282 |
| | $r$ | 815279,815287,1022100,1022101 |
| | $i$ | 862611,862612,862613,862614,862615,862616,862617 |
| | $z$ | 942760,942761,942762,942763,942764,942765 |
| W1(+4-2) | $u^*$ | 942320,942321,942322,942323,942324 |
| | $g$ | 826648,826649,826650,826651,826652 |
| | $r$ | 810325,810326,1022098,1022099 |
| | $i$ | 826960,826961,827067,827068,827069,827070,827071 |
| | $z$ | 884609,884610,884611,884612,884613,884614 |
| W1(+4-1) | $u^*$ | 940656,940658,941955,941956,942044 |
| | $g$ | 826954,826955,826956,826957,826958 |
| | $r$ | 810323,810324,1021822,1021823 |
| | $i$ | 826819,826820,826821,826822,826823,826824,826825 |
| | $z$ | 879878,879879,879880,879881,879882,879883 |
| W1(+4-0) | $u^*$ | 832057,832058,832059,832060,832061 |
| | $g$ | 724447,724448,724449,724450,724451 |
| | $r$ | 720442,720443,1021820,1021821 |
| | $i$ | 720102,720103,720104,720105,720106,720108,720109,720110 |
| | $z$ | 832478,832479,832480,832481,832482,832483 |
| W1(+4+1) | $u^*$ | 831857,831858,831859,831860,831861 |
| | $g$ | 724612,724613,724614,724615,724616 |
| | $r$ | 724371,724372,1021669,1021670 |
| | $i$ | 723402,723403,723404,723405,723406,723407,723408 |
| | $z$ | 832190,832191,832192,832193,832194,832195 |
| W1(+4+2) | $u^*$ | 831626,831627,831628,831629,831630 |
| | $g$ | 724606,724608,724609,724610,724611 |
| | $r$ | 724369,724370,1021667,1021668 |
| | $y$ | 1030216,1030217,1030218,1038676,1038677 |
| | $z$ | 832062,832063,832064,832065,832066,832067 |
| W1(+4+3) | $u^*$ | 831527,831528,831529,831530,831531 |
| | $g$ | 715504,715505,715506,715507,715820 |
| | $r$ | 715075,715076,1021503,1021504 |
| | $i$ | 720022,720023,720024,720025,720026,720027 |
| | $z$ | 831973,831974,831975,831976,831977,831978 |
| W2(-1-1) | $u^*$ | 906869,906870,906871,906872,906873 |
| | $g$ | 881306,883362,883363,883364,883365,883366 |
| | $r$ | 832209,832210,967608,967609 |
| | $i$ | 832213,832214,832215,832216,832217,832218,832219 |
| | $z$ | 900138,900139,900140,900141,900142,900143 |
| W2(-1-0) | $u^*$ | 906775,906776,906777,906867,906868 |
| | $g$ | 831665,831666,831667,831668,831669 |
| | $r$ | 831656,831657,967606,967607 |
| | $i$ | 831658,831659,831660,831661,831662,831663,831664 |
| | $z$ | 900132,900133,900134,900135,900136,900137 |
| W2(-1+1) | $u^*$ | 906177,906178,906179,906180,906181 |
| | $g$ | 831313,831315,831316,831333,831334,831335,831336,831337 |
| | $r$ | 831309,831310,831311,967604,967605 |
| | $i$ | 831201,831202,831203,831204,831205,831206,831207 |
| | $z$ | 900126,900127,900128,900129,900130,900131 |

Table 41: Full list of CFHTLS input images included in each Wide stacks (cont'd)

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W2(-1+2) | $u^*$ | 898948,898949,898951,898952,898953 |
| | $g$ | 831195,831196,831197,831198,831199,831200 |
| | $r$ | 831193,831194,967602,967603 |
| | $i$ | 830746,830747,830748,830749,830750,830751,830752 |
| | $z$ | 900037,900038,900039,900040,900041,900042 |
| W2(-1+3) | $u^*$ | 898954,898955,898956,898957,898958 |
| | $g$ | 731002,731003,731004,731005,731006 |
| | $r$ | 730895,731000,731001,962772,962773 |
| | $i$ | 775337,775339,775349,789017,789018,789019 |
| | $z$ | 900031,900032,900033,900034,900035,900036 |
| W2(-0-1) | $u^*$ | 963593,963594,963596,963597,987072 |
| | $g$ | 881290,881291,881292,881293,881294 |
| | $r$ | 832102,832103,967600,967601 |
| | $i$ | 832086,832087,832088,832089,832090,832091,832092 |
| | $z$ | 960992,960993,960994,960995,960996,960997 |
| W2(-0-0) | $u^*$ | 905607,905608,905609,905610,905611,905612 |
| | $g$ | 831561,831562,831563,831564,831565,831566 |
| | $r$ | 831654,831655,967598,967599 |
| | $i$ | 831549,831550,831551,831552,831553,831554,831555 |
| | $z$ | 899551,899552,899553,899554,899555,899556,899557 |
| W2(-0+1) | $u^*$ | 896035,896036,896037,896038,896039 |
| | $g$ | 826673,826674,826675,826676,826677 |
| | $r$ | 826541,826542,967596,967597 |
| | $i$ | 830739,830740,830741,830742,830743,830744,830745 |
| | $z$ | 899368,899369,899370,899371,899372,899373 |
| W2(-0+2) | $u^*$ | 895798,895799,895800,895801,895802 |
| | $g$ | 826839,826840,826841,826842,826843,826844 |
| | $r$ | 826539,826540,967594,967595 |
| | $i$ | 826665,826666,826667,826668,826669,826670,826671 |
| | $z$ | 899140,899141,899142,899144,899145,899146 |
| W2(-0+3) | $u^*$ | 895793,895794,895795,895796,895797 |
| | $g$ | 789020,789021,789022,789023,789024 |
| | $r$ | 730652,730653,777838,777839,962770,962771 |
| | $i$ | 784772,784773,784774,784775,784776,784777,784778 |
| | $z$ | 896289,896290,896291,896292,896293,896294 |
| W2(+1-1) | $u^*$ | 963346,963347,963348,963349,963350 |
| | $g$ | 880241,880242,880243,880244,880245 |
| | $r$ | 832100,832101,967592,967593 |
| | $i$ | 832093,832094,832095,832096,832097,832098 |
| | $z$ | 960423,960424,960425,960428,960429,960431 |
| W2(+1-0) | $u^*$ | 905696,905697,905698,905699,905700 |
| | $g$ | 831556,831557,831558,831559,831560 |
| | $r$ | 831547,831548,967590,967591 |
| | $i$ | 831433,831434,831435,831436,831437,831438,831439 |
| | $z$ | 899558,899559,899560,899561,899562,899563 |
| W2(+1+1) | $u^*$ | 896030,896031,896032,896033,896034 |
| | $g$ | 789148,826660,826661,826662,826663,826664 |
| | $r$ | 777631,777632,963359,963360,963372,963373 |
| | $y$ | 986922,986923,986924,986925,986926,987068,987069 |
| | $z$ | 889524,889525,889526,889527,889528,889529 |
| W2(+1+2) | $u^*$ | 890112,890113,890114,890115,890117,890120 |
| | $g$ | 774795,774796,774797,774798,774799,774800 |
| | $r$ | 777305,777306,963157,963161 |
| | $i$ | 777301,777302,777303,777304,777309,777310,777311 |
| | $z$ | 889336,889337,889338,889339,889340,889341 |
| W2(+1+3) | $u^*$ | 890107,890108,890109,890110,890111 |
| | $g$ | 774288,774289,774293,774294,774295,774296 |
| | $r$ | 777307,777308,962768,962769 |
| | $i$ | 775154,775155,775158,775159,775161,775162 |
| | $z$ | 889343,889344,889345,889346,889347,889348 |
| W2(+2-1) | $u^*$ | 963166,963167,963168,963169,963170 |
| | $g$ | 880237,880238,880239,880476,880477 |
| | $r$ | 831997,831998,967588,967589 |
| | $i$ | 832006,832007,832008,832009,832010,832011,832012 |
| | $z$ | 956125,956126,956127,956128,956129,956130 |
| W2(+2-0) | $u^*$ | 905819,905820,905821,905822,905823 |
| | $g$ | 831347,831348,831349,831350,831351 |
| | $r$ | 831345,831346,967586,967587 |
| | $i$ | 831338,831339,831340,831341,831342,831343,831344 |
| | $z$ | 899564,899565,899566,899568,899569,899570 |
| W2(+2+1) | $u^*$ | 896025,896026,896027,896028,896029 |
| | $g$ | 774116,774117,774118,774119,774120,774121 |
| | $r$ | 774129,774130,962801,962802 |
| | $i$ | 774122,774123,774124,774125,774126,774127,774128 |
| | $z$ | 889530,889531,889532,889533,889534,889535 |
| W2(+2+2) | $u^*$ | 890407,890408,890409,890410,890411 |
| | $g$ | 774281,774282,774283,774284,774285,774286 |
| | $r$ | 731035,731036,963159,963160 |
| | $y$ | 1038712,1038713,1038714,1038840,1038841,1038842,1038843 |
| | $z$ | 889350,889351,889352,889353,889354,889355 |

Table 42: Full list of CFHTLS input images included in each Wide stacks (cont'd)

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W2(+2+3) | $u^*$ | 895788,895789,895790,895791,895792 |
| | $g$ | 731007,731008,731009,731010,731011 |
| | $r$ | 730922,962766,962767,987075 |
| | $i$ | 777315,777316,777317,777318,777446,777447,777448 |
| | $z$ | 895598,895599,895600,896295,896296,896297 |
| W2(+3-1) | $u^*$ | 963052,963053,963054,963055,963056 |
| | $g$ | 880225,880226,880227,880228,880229 |
| | $r$ | 831995,831996,967584,967585 |
| | $i$ | 831999,832000,832001,832002,832003,832004,832005 |
| | $z$ | 955447,955448,955449,955450,955451,955452 |
| W2(+3-0) | $u^*$ | 905935,905936,905937,905938,905939 |
| | $g$ | 739202,739203,739204,739205,739650 |
| | $r$ | 730941,730942,963591,963592 |
| | $i$ | 784765,784766,784767,784768,784769,784770,784771 |
| | $z$ | 899936,899937,899938,899939,899940,899941 |
| W2(+3+1) | $u^*$ | 890565,890566,890567,890568,890569 |
| | $g$ | 733290,733291,733292,733293,733294 |
| | $r$ | 730939,730940,963164,963165 |
| | $i$ | 777312,777313,777314,777442,777443,777445 |
| | $z$ | 889356,889357,889358,889359,889360,889361 |
| W2(+3+2) | $u^*$ | 890560,890561,890562,890563,890564 |
| | $g$ | 732998,732999,733000,733001,733002 |
| | $r$ | 730738,730739,963162,963163 |
| | $i$ | 732380,732381,732382,732383,781182,781183,781184 |
| | $z$ | 781185,781186,781187,781188,781189,781190,781191,781192,781195,781196,781197,781198 |
| W2(+3+3) | $u^*$ | 895593,895594,895595,895596,895597 |
| | $g$ | 732991,732992,732993,732994,732996 |
| | $r$ | 732760,732762,962764,962765 |
| | $i$ | 784758,784759,784760,784761,784762,784763,784764 |
| | $z$ | 895572,895573,895574,895575,895576,895577 |
| W3(-3-3) | $u^*$ | 850250,850251,850252,850253,850254 |
| | $g$ | 792941,792942,792943,792944,792945 |
| | $r$ | 792446,792447,967513,967514 |
| | $i$ | 793316,793317,793318,793319,793320,793321,793322 |
| | $z$ | 850441,850442,850443,850444,850445,850446 |
| W3(-3-2) | $u^*$ | 850245,850246,850247,850248,850249 |
| | $g$ | 793176,793177,793178,793179,793180 |
| | $r$ | 792448,792449,967515,967516 |
| | $i$ | 793323,793324,793325,793326,793327,793328,793329 |
| | $z$ | 850255,850256,850257,850258,850259,850260,850261 |
| W3(-3-1) | $u^*$ | 905718,905719,905720,905721,905722 |
| | $g$ | 708589,708590,708591,708592,708593 |
| | $r$ | 708586,708587,967972,967973 |
| | $i$ | 708704,708705,708706,708707,708708,708709 |
| | $z$ | 850962,850963,850964,850965,850966,850967 |
| W3(-3-0) | $u^*$ | 905849,905850,905851,905852,905853 |
| | $g$ | 793330,793331,793332,793333,793334 |
| | $r$ | 792953,792954,967981,967982 |
| | $i$ | 793456,793457,793458,793459,793460,793461,793462 |
| | $z$ | 850956,850957,850958,850959,850960,850961 |
| W3(-3+1) | $u^*$ | 918225,918226,918227,918228,918229 |
| | $g$ | 800976,800977,800978,800979,800980 |
| | $r$ | 797257,797258,974334,974335 |
| | $y$ | 986927,986928,986929,986930,986931,986932,986933 |
| | $z$ | 905021,905022,905023,905024,905025,905026 |
| W3(-3+2) | $u^*$ | 918977,918978,918979,918980,918981 |
| | $g$ | 800982,800983,800984,800985,800986 |
| | $r$ | 797662,797663,974350,974675,974676 |
| | $i$ | 797761,797762,797763,797764,797765,797766,797767 |
| | $z$ | 905499,905500,905501,905502,905503,905504 |
| W3(-3+3) | $u^*$ | 975448,975449,975450,994906,994907 |
| | $g$ | 849609,849610,849611,849612,849613 |
| | $r$ | 844750,844751,975587,975588 |
| | $i$ | 845231,845232,845233,845234,845235,845236,845237 |
| | $z$ | 964907,964908,964909,964910,964911,964912 |
| W3(-2-3) | $u^*$ | 899071,899072,899075,994908,994909 |
| | $g$ | 788717,788718,789050,789051,789052 |
| | $r$ | 781209,781210,967613,967614 |
| | $i$ | 792946,792947,792948,792949,792950,792951,792952 |
| | $z$ | 850359,850360,850361,850362,850364,850365 |
| W3(-2-2) | $u^*$ | 850348,850349,850350,850351,850352 |
| | $g$ | 788842,788843,788844,788845,788846 |
| | $r$ | 780551,780553,967611,967612 |
| | $i$ | 793051,793052,793053,793054,793055,793056,793057 |
| | $z$ | 850353,850354,850355,850356,850357,850358 |
| W3(-2-1) | $u^*$ | 905723,905724,905725,905726,905727 |
| | $g$ | 788847,788848,788849,788850,788851 |
| | $r$ | 781217,781218,967970,967971 |
| | $y$ | 987079,987080,987081,987082,987083,987084,987085 |
| | $z$ | 851164,851165,851166,851167,851168,851170 |

Table 43: Full list of CFHTLS input images included in each Wide stacks (cont'd)

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W3(-2-0) | $u^*$ | 905854,905855,905856,905857,905858 |
| | $g$ | 792935,792936,792937,792938,792939 |
| | $r$ | 781219,781220,967983,967984 |
| | $i$ | 793065,793066,793068,793069,793070,793071 |
| | $z$ | 851171,851172,851174,851175,851176,851177 |
| W3(-2+1) | $u^*$ | 918456,918457,918458,918459,918460 |
| | $g$ | 796972,796973,796974,796975,796981 |
| | $r$ | 796979,796980,973413,974332,974333 |
| | $y$ | 987093,987094,987095,987096,987097,987098,987099 |
| | $z$ | 905027,905028,905029,905030,905031,905032 |
| W3(-2+2) | $u^*$ | 919084,919085,919086,919087,919088 |
| | $g$ | 802356,802357,802358,802359,802360 |
| | $r$ | 797670,797671,974677,974678 |
| | $i$ | 845099,845100,845101,845102,845103,845104 |
| | $z$ | 906682,906683,906684,906685,906686,906687 |
| W3(-2+3) | $u^*$ | 975577,975578,975579,975580,975581 |
| | $g$ | 849614,849615,849616,849617,849618 |
| | $r$ | 845365,845366,975457,975458,975589,975590 |
| | $y$ | 987086,987087,987088,987089,987090,987091,987092 |
| | $z$ | 965362,965363,965364,965365,965366,965367 |
| W3(-1-3) | $u^*$ | 850753,850754,850755,850756,850757 |
| | $g$ | 788200,788201,788202,788203,788204 |
| | $r$ | 777535,777536,967615,967616 |
| | $i$ | 789162,789163,789164,789165,789166,789167,789168,789169,789170,789171 |
| | $z$ | 850758,850759,850760,850761,850762,850763 |
| W3(-1-2) | $u^*$ | 850851,850852,850853,850854,850855 |
| | $g$ | 788205,789173,789174,789176,789177 |
| | $r$ | 781215,781216,967871,967966,967967 |
| | $i$ | 792430,792431,792432,792433,792434,792435,792438 |
| | $z$ | 850856,850857,850858,850859,850860,850861 |
| W3(-1-1) | $u^*$ | 905729,905730,905731,905732,905733 |
| | $g$ | 792425,792426,792427,792428,792429 |
| | $r$ | 781213,781214,967968,967969 |
| | $i$ | 792439,792440,792441,792442,792443,792444,792445 |
| | $z$ | 850862,850863,850864,850865,850866,850867 |
| W3(-1-0) | $u^*$ | 905859,905860,905861,905862,905863 |
| | $g$ | 788853,788854,788857,789053,789054 |
| | $r$ | 781211,781212,967985,967986 |
| | $i$ | 792617,792618,792619,792620,792621,792622,792623 |
| | $z$ | 853250,853251,853252,853253,853254,853255 |
| W3(-1+1) | $u^*$ | 918461,918462,918463,918464,918465 |
| | $g$ | 796967,796968,796969,796970,796971 |
| | $r$ | 796977,796978,973411,973412 |
| | $i$ | 796982,796983,796984,796985,796986,796987 |
| | $z$ | 905034,905035,905036,905038,905039,905040 |
| W3(-1+2) | $u^*$ | 919089,919090,919091,919092,919093 |
| | $g$ | 802361,802362,802363,802364,802365 |
| | $r$ | 802664,802665,974987,974988 |
| | $i$ | 845105,845106,845107,845108,845109,845110,845111 |
| | $z$ | 906780,906781,906782,906783,906784,906785 |
| W3(-1+3) | $u^*$ | 975905,975906,975907,975908,975909 |
| | $g$ | 849619,849620,849621,849622,849623 |
| | $r$ | 845367,845368,975595,975596 |
| | $y$ | 986956,986957,986958,986959,986960,986961,986962 |
| | $z$ | 964459,964460,964461,964462,964463,964464 |
| W3(-0-3) | $u^*$ | 918116,918117,918118,918119,918120 |
| | $g$ | 707655,707656,707657,707658,707659 |
| | $r$ | 707662,707663,973397,973781,974184,974185 |
| | $i$ | 705484,705485,705486,705487,705488,705489,705490 |
| | $z$ | 905014,905015,905016,905017,905018,905019 |
| W3(-0-2) | $u^*$ | 912457,912458,912459,912460,912461 |
| | $g$ | 707554,707555,707556,707557,707558 |
| | $r$ | 707559,707560,973350,973395,973396 |
| | $i$ | 705403,705404,705405,705406,705407,705408,705409 |
| | $z$ | 895845,895846,895847,895848,895849,895850 |
| W3(-0-1) | $u^*$ | 905987,905988,905989,905990,905991 |
| | $g$ | 707434,707435,707436,707437,707438 |
| | $r$ | 707432,707433,973348,973926,973927 |
| | $i$ | 705391,705397,705398,705399,705400,705401 |
| | $z$ | 895517,895520,895522,895525,895526,895527 |
| W3(-0-0) | $u^*$ | 905982,905983,905984,905985,905986 |
| | $g$ | 707276,707277,707278,707279,707280 |
| | $r$ | 707274,707275,973346,973347 |
| | $i$ | 705244,705245,705246,705247,705248,705249,705250 |
| | $z$ | 853918,853919,853920,853921,853922,853923 |
| W3(-0+1) | $u^*$ | 918466,918467,918468,918589,918590 |
| | $g$ | 796616,796617,796618,796619,796620 |
| | $r$ | 796623,796624,973409,973410 |
| | $i$ | 796626,796744,796745,796746,796747,796748,796749 |
| | $z$ | 905224,905225,905226,905227,905228,905229 |

Table 44: Full list of CFHTLS input images included in each Wide stacks (cont'd)

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
| --- | --- | --- |
| W3(-0+2) | $u^*$ | 919602,919603,919604,919605,919606 |
| | $g$ | 802366,802367,802368,802369,802370 |
| | $r$ | 802671,802672,974989,974990 |
| | $i$ | 844865,844866,844867,844868,844869,844870,844871 |
| | $z$ | 906810,906811,906812,906813,906814,906815 |
| W3(-0+3) | $u^*$ | 979597,979598,979599,979600,979601 |
| | $g$ | 849695,849696,849697,849698,849699 |
| | $r$ | 845369,845370,975593,975594 |
| | $i$ | 849624,849625,849626,849627,849628,849629,849630 |
| | $z$ | 964178,964179,964180,964181,964182,964458 |
| W3(+1-3) | $u^*$ | 918982,918983,918984,918985,918986 |
| | $g$ | 739209,739210,739211,739212,739216,739218 |
| | $r$ | 739207,739208,973400,974186,974187 |
| | $i$ | 742622,742880,742881,742882,742883,742884,742885 |
| | $z$ | 906521,906654,906655,906656,906657,906658,906659 |
| W3(+1-2) | $u^*$ | 918842,918843,918844,918845,918846 |
| | $g$ | 742886,742887,742888,742889,742890 |
| | $r$ | 742236,742237,973401,973402 |
| | $i$ | 743062,743063,743065,743066,743067,743068,743069 |
| | $z$ | 906515,906516,906517,906518,906519,906520 |
| W3(+1-1) | $u^*$ | 918837,918838,918839,918840,918841 |
| | $g$ | 745141,745142,745143,745144,745145 |
| | $r$ | 745147,745148,973403,973404 |
| | $i$ | 743070,743071,743072,743073,743074,743075,743076 |
| | $z$ | 906355,906356,906357,906358,906508,906509,906510,906511,906513,906514 |
| W3(+1-0) | $u^*$ | 918596,918597,918598,918599,918600 |
| | $g$ | 742892,742893,742894,742895,742896 |
| | $r$ | 745149,745150,973405,973406 |
| | $i$ | 743078,743079,743080,743081,743082,743083,743084 |
| | $z$ | 906234,906235,906236,906349,906350,906351,906352,906353,906354 |
| W3(+1+1) | $u^*$ | 918591,918592,918593,918594,918595 |
| | $g$ | 796611,796612,796613,796614,796615 |
| | $r$ | 796621,796622,973407,973408 |
| | $i$ | 796485,796486,796487,796488,796489,796490,796491 |
| | $z$ | 905230,905231,905233,905234,905235,905236 |
| W3(+1+2) | $u^*$ | 919758,919759,919760,919761,919762,974999,975000,975001,975002,975003 |
| | $g$ | 844738,844739,844740,844741,844742 |
| | $r$ | 780364,780365,974991,974992 |
| | $i$ | 797645,797646,797647,797648,797649,797650,797651 |
| | $z$ | 907094,907095,907096,907097,907098,907099 |
| W3(+1+3) | $u^*$ | 975910,975911,975912,975913,975914 |
| | $g$ | 849700,849701,849702,849703,849704 |
| | $r$ | 845477,845478,975591,975592 |
| | $i$ | 849705,849706,849772,849773,849774,849775,849776 |
| | $z$ | 963929,963930,963931,964175,964176,964177 |
| W3(+2-3) | $u^*$ | 975221,975222,975223,975224,975225 |
| | $g$ | 750105,750106,750107,750187,750188 |
| | $r$ | 745594,745595,975013,975014 |
| | $i$ | 743140,745587,745588,745589,745590,745591,745592,745593 |
| | $z$ | 918131,918132,918133,918134,918135,918136,918137 |
| W3(+2-2) | $u^*$ | 975131,975132,975133,975134,975135 |
| | $g$ | 750322,750323,750959,750960,750961,750962,750963 |
| | $r$ | 750965,750967,975011,975012 |
| | $i$ | 745599,745600,745601,745602,745604,745605,745606 |
| | $z$ | 918125,918126,918127,918128,918129,918130 |
| W3(+2-1) | $u^*$ | 975004,975005,975006,975007,975008 |
| | $g$ | 753782,753783,753784,753785,753786 |
| | $r$ | 753780,755116,975009,975010 |
| | $i$ | 751034,751197,751198,751199,751200,751201,751202,751203 |
| | $z$ | 918027,918028,918029,918030,918031,918032 |
| W3(+2-0) | $u^*$ | 973921,973922,973923,973924,973925 |
| | $g$ | 755117,755118,755119,755120,755244 |
| | $r$ | 753788,753789,974997,974998 |
| | $i$ | 789056,789057,789058,789059,789060,789061,789062 |
| | $z$ | 918021,918022,918023,918024,918025,918026 |
| W3(+2+1) | $u^*$ | 973916,973917,973918,973919,973920 |
| | $g$ | 796351,796352,796608,796609,796610 |
| | $r$ | 780366,780367,974995,974996 |
| | $i$ | 793809,793810,793811,793812,793813,793814,793815 |
| | $z$ | 912552,912553,917941,917942,917943,917944,917945,917946 |
| W3(+2+2) | $u^*$ | 973911,973912,973913,973914,973915 |
| | $g$ | 802666,802667,802668,802669,802670 |
| | $r$ | 802673,802674,974993,974994 |
| | $i$ | 844743,844744,844745,844746,844747,844748,844749 |
| | $z$ | 917935,917936,917937,917938,917939,917940 |
| W3(+2+3) | $u^*$ | 979602,979603,979604,979605,979606 |
| | $g$ | 849767,849768,849769,849770,849771 |
| | $r$ | 845479,845480,975235,975236 |
| | $i$ | 849777,849778,849779,849780,849781,849782,849783 |
| | $z$ | 963923,963924,963925,963926,963927,963928 |

Table 45: Full list of CFHTLS input images included in each Wide stacks (cont'd)

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W3(+3-3) | $u^*$ | 975226,975227,975228,975229,975230 |
| | $g$ | 859218,859219,859623,859624,859625 |
| | $r$ | 852994,852995,975115,975116 |
| | $i$ | 853622,853623,853624,853625,853626,853739 |
| | $z$ | 930854,930855,930856,930857,930858,930859 |
| W3(+3-2) | $u^*$ | 975582,975583,975584,975585,975586 |
| | $g$ | 860019,860020,860021,987108,987109 |
| | $r$ | 852996,852997,975117,975118 |
| | $i$ | 853849,853912,853913,853914,853915,853916 |
| | $z$ | 930860,930861,930862,930863,930864,930865 |
| W3(+3-1) | $u^*$ | 980090,980091,980092,980093,980094 |
| | $g$ | 890597,890600,890601,890603,890604 |
| | $r$ | 852998,852999,975119,975120 |
| | $y$ | 987229,987230,987231,987232,987233,987234,987235 |
| | $z$ | 931000,931001,931002,931003,931004,931005 |
| W3(+3-0) | $u^*$ | 979853,979854,979855,979856,979857 |
| | $g$ | 899066,899067,899068,899069,899070 |
| | $r$ | 853000,853001,975122,975123 |
| | $i$ | 899485,899486,899487,899488,899489,899490,899491 |
| | $z$ | 931006,931007,931008,931009,931010,987110 |
| W3(+3+1) | $u^*$ | 975915,975916,975917,975918,975919 |
| | $g$ | 899576,899577,899578,899579,899580 |
| | $r$ | 853002,853003,975136,975137 |
| | $i$ | 900058,900059,900060,900061,900062,900063,900064 |
| | $z$ | 931115,931116,931117,931118,931119,931120 |
| W3(+3+2) | $u^*$ | 980095,980096,980097,980098,980099 |
| | $g$ | 899971,899972,899973,899974,899975 |
| | $r$ | 853004,853005,975231,975232 |
| | $y$ | 987236,987237,987238,987239,987240,987241,987242,987243 |
| | $z$ | 931121,931122,931123,931124,931125,931126 |
| W3(+3+3) | $u^*$ | 981430,981431,981432,981433,981434 |
| | $g$ | 905494,905495,905496,905497,905498 |
| | $r$ | 853006,853007,975233,975234 |
| | $i$ | 900166,900167,900168,900169,900170,900171,900172 |
| | $z$ | 964913,964914,964915,964916,964917,964918 |
| W4(-3-0) | $u^*$ | 934901,934902,934903,934904,934905 |
| | $g$ | 930784,930785,930786,930787,930788 |
| | $r$ | 919694,919695,988176,988177 |
| | $i$ | 918162,918163,918164,918165,918265,918266,918267 |
| | $z$ | 918919,918920,918921,918922,918923,918924 |
| W4(-3+1) | $u^*$ | 934712,934730,934891,934892,934893,934894,934895 |
| | $g$ | 930908,930909,930910,930911,930912 |
| | $r$ | 930675,930676,987485,987486 |
| | $i$ | 918268,918269,918270,918271,918272,918273,918391 |
| | $z$ | 919025,919026,919027,919028,919029,919030 |
| W4(-3+2) | $u^*$ | 935165,935166,935167,935168,935169 |
| | $g$ | 919445,919446,919447,919448,919449 |
| | $r$ | 930768,930769,987279,987280 |
| | $i$ | 918392,918393,918394,918395,918396,918397,918398 |
| | $z$ | 919031,919032,919033,919034,919035,919036 |
| W4(-3+3) | $u^*$ | 935185,935186,935187,935188,935189 |
| | $g$ | 935326,935438,935439,935440,935441,935442 |
| | $r$ | 934411,934412,987128,987129 |
| | $y$ | 995422,995423,995424,995425,995426,995427,995428 |
| | $z$ | 931298,931299,931300,931301,931302,931303 |
| W4(-2-0) | $u^*$ | 934896,934897,934898,934899,934900 |
| | $g$ | 850526,850527,850528,850529,850530 |
| | $r$ | 850531,850532,996131,996133,996134 |
| | $i$ | 853639,853640,853641,853642,853643,853647,853648,862673,862674,862675,862676,862677,862678 |
| | $z$ | 874406,874407,874408,874409,874410,874411 |
| W4(-2+1) | $u^*$ | 934402,934403,934404,934405,934406 |
| | $g$ | 919130,919131,919132,919133,919134 |
| | $r$ | 919450,919451,996142,996143 |
| | $i$ | 918155,918156,918157,918158,918159,918160,918161 |
| | $z$ | 918912,918913,918915,918916,918917,918918 |
| W4(-2+2) | $u^*$ | 934906,934907,934908,934909,934910 |
| | $g$ | 935299,935300,935301,935302,935303 |
| | $r$ | 930770,930771,987643,987644 |
| | $y$ | 995150,995151,995152,995153,995154,995281,995282 |
| | $z$ | 919688,919689,919690,919691,919692,919693 |
| W4(-2+3) | $u^*$ | 935180,935181,935182,935183,935184 |
| | $g$ | 935321,935322,935323,935324,935325 |
| | $r$ | 934409,934410,987806,987807 |
| | $y$ | 995672,995673,995674,995675,995676,995677,995678 |
| | $z$ | 931148,931149,931150,931151,931152,931153 |
| W4(-1-2) | $u^*$ | 864142,864143,864144,864145,864146 |
| | $g$ | 860225,860228,860229,860230,860231 |
| | $r$ | 851200,851202,996280,996282,996284,996286 |
| | $i$ | 862697,862698,862699,862700,862701,862702,862703 |
| | $z$ | 864136,864137,864138,864139,864140,864141 |

Table 46: Full list of CFHTLS input images included in each Wide stacks (cont'd)

| W Cartesian Ident Name | Filter | CFHT odometer number of input images combined in stacks |
|---|---|---|
| W4(-1-1) | $u^*$ | 870363,870364,870365,870366,870367 |
| | $g$ | 860601,860602,860603,860604,860605,862806,862807,862808,862809,862918,862919 |
| | $r$ | 850808,850809,996449,996450 |
| | $y$ | 995679,995680,995681,995682,995885,995886,995887 |
| | $z$ | 870155,870156,870157,870158,870159,870160 |
| W4(-1-0) | $u^*$ | 930774,930775,930776,930777,930778 |
| | $g$ | 859940,859941,859942,859943,859944 |
| | $r$ | 850996,850997,996146,996147 |
| | $i$ | 859945,859946,859947,859949,859951,859952,859953 |
| | $z$ | 859723,859724,859725,859726,859727,859728 |
| W4(-1+1) | $u^*$ | 934397,934398,934399,934400,934401 |
| | $g$ | 853649,853650,853651,853652,853653,862692,862693,862694,862695,862696 |
| | $r$ | 850286,850287,996144,996145 |
| | $y$ | 996018,996019,996020,996021,996022,996023,996024 |
| | $z$ | 875403,875404,875405,875406,875407,875408 |
| W4(-1+2) | $u^*$ | 935170,935171,935172,935173,935174 |
| | $g$ | 935304,935305,935306,935307,935308 |
| | $r$ | 930772,930773,987645,987646 |
| | $y$ | 995283,995284,995285,995286,995287,995288,995289 |
| | $z$ | 931043,931044,931050,931051,931052,931053 |
| W4(-1+3) | $u^*$ | 935175,935176,935177,935178,935179 |
| | $g$ | 935316,935317,935318,935319,935320 |
| | $r$ | 934407,934408,987804,987805 |
| | $y$ | 995290,995291,995292,995293,995419,995420,995421 |
| | $z$ | 931054,931055,931056,931057,931058,931059 |
| W4(-0-2) | $u^*$ | 864147,864148,864149,864150,864151 |
| | $g$ | 853285,853286,853287,853288,853289,862801,862802,862803,862804,862805 |
| | $r$ | 851127,851128,996451,996452 |
| | $i$ | 862597,862598,862599,862600,862601,862602,862603 |
| | $z$ | 863984,863985,863986,863987,863988,863989 |
| W4(-0-1) | $u^*$ | 870368,870369,870371,870372,996025 |
| | $g$ | 853290,853291,853292,853293,853294,862920,862921,862922,862923,862924 |
| | $r$ | 850994,850995,996453,996454 |
| | $i$ | 862794,862795,862796,862797,862798,862799,862800 |
| | $z$ | 870357,870358,870359,870360,870361,870362 |
| W4(-0-0) | $u^*$ | 872170,872171,872173,872175,872176 |
| | $g$ | 860077,860078,860079,860080,860081 |
| | $r$ | 851189,851190,851191,996455,996456 |
| | $i$ | 863246,863247,863248,863249,863250,863251,863252 |
| | $z$ | 860606,860607,860608,860609,860610,860611,872158,872159,872160,872161,872162,872163 |
| W4(-0+1) | $u^*$ | 934392,934393,934394,934395,934396 |
| | $g$ | 860188,860189,860190,860191,860192 |
| | $r$ | 851192,851193,996457,996458 |
| | $i$ | 863445,863446,863447,863448,863449,863450,863451 |
| | $z$ | 879612,879613,879614,879615,879616,879617 |
| W4(+1-2) | $u^*$ | 863902,863903,863904,863905,863906 |
| | $g$ | 850998,850999,851000,851001,851002 |
| | $r$ | 850000,850001,996629,996630 |
| | $i$ | 859675,859676,859677,859678,859679,859681 |
| | $z$ | 863896,863897,863898,863899,863900,863901 |
| W4(+1-1) | $u^*$ | 870499,870500,870501,870502,870504 |
| | $g$ | 851003,851004,851005,851006,851007 |
| | $r$ | 850102,850103,996627,996628 |
| | $i$ | 860594,860595,860596,860597,860598,860599,860600,863044,863045,863046,863047,863048,863049,863050 |
| | $z$ | 870493,870494,870495,870496,870497,870498 |
| W4(+1-0) | $u^*$ | 872242,872243,872244,872245,872246 |
| | $g$ | 851129,851130,851131,851132,851194 |
| | $r$ | 850638,850639,996625,996626 |
| | $i$ | 863051,863052,863053,863054,863055,863056,863057 |
| | $z$ | 872057,872058,872059,872060,872061,872062 |
| W4(+1+1) | $u^*$ | 930779,930780,930781,930782,930783 |
| | $g$ | 851195,851196,851197,851198,851199 |
| | $r$ | 850636,850637,996623,996624 |
| | $i$ | 863253,863254,863255,863256,863257,863258,863259 |
| | $z$ | 879618,879619,879621,879622,879623,879624 |
| W4(+2-2) | $u^*$ | 858903,858905,858906,858907,859955 |
| | $g$ | 850104,850105,850106,850107,850108 |
| | $r$ | 849847,849848,996631,996632 |
| | $i$ | 853569,853584,853585,853586,853587,853588,862590,862591,862592,862593,862594,862595,862596 |
| | $z$ | 853577,853578,853579,853580,853581,853582,853583,863977,863978,863980,863981,863982,863983 |
| W4(+2-1) | $u^*$ | 858908,858909,858910,858911,858912 |
| | $g$ | 850220,850221,850222,850223,850224 |
| | $r$ | 849849,849850,996633,996634 |
| | $i$ | 860082,860083,860084,860085,860086,860087,860088 |
| | $z$ | 853787,853788,853789,853790,853791,853792,870699,870700,870701,870702,870706,870707 |
| W4(+2-0) | $u^*$ | 872069,872070,872071,872072,872073 |
| | $g$ | 850281,850282,850283,850284,850285 |
| | $r$ | 849998,849999,996635,996636 |
| | $i$ | 860413,860414,860415,860416,860417,860418,860419 |
| | $z$ | 871416,871417,871418,871419,871420,871421 |

Table 47: Full list of CFHTLS input images included in each Wide stacks (cont'd)

## 8.2 CFHTLS T0006 Wide configuration files

### 8.2.1 SCAMP configuration file for T0006 Wide

```
# Default configuration file for SCAMP 1.5.5
# EB 2009-04-10
#
# Last modified for CFHTLS-T0006 (MegaCam):
# YG 2009-07-09

#----------------------------- Field grouping ---------------------------------

FGROUP_RADIUS          1.0             # Max dist (deg) between field groups

#---------------------------- Reference catalogues ------------------------------

REF_SERVER         cocat1.u-strasbg.fr # Internet addresses of catalogue servers
REF_PORT               1660            # Ports to connect to catalogue servers
CDSCLIENT_EXEC         aclient         # CDSclient executable
ASTREF_CATALOG         2MASS           # NONE, FILE, USNO-A1, USNO-A2, USNO-B1,
                                      # GSC-1.3, GSC-2.2, UCAC-1, UCAC-2,
                                      # NOMAD-1, 2MASS, DENIS-3,
                                      # SDSS-R3, SDSS-R5 or SDSS-R6
ASTREF_BAND            DEFAULT         # Photom. band for astr.ref.magnitudes
                                      # or DEFAULT, BLUEST, or REDDEST
ASTREFCAT_NAME         astrefcat.cat   # Local astrometric reference catalogues
ASTREFCENT_KEYS        X_WORLD,Y_WORLD # Local ref.cat.centroid parameters
ASTREFERR_KEYS         ERRA_WORLD, ERRB_WORLD, ERRTHETA_WORLD
                                      # Local ref.cat.error ellipse parameters
ASTREFMAG_KEY          MAG             # Local ref.cat.magnitude parameter
SAVE_REFCATALOG        N               # Save ref catalogues in FITS-LDAC format?
REFOUT_CATPATH         .               # Save path for reference catalogues

#--------------------------- Merged output catalogues ---------------------------

MERGEDOUTCAT_NAME      SCAMP.cat       # Merged output catalogue filename
MERGEDOUTCAT_TYPE      NONE            # NONE, ASCII_HEAD, ASCII, FITS_LDAC

#----------------------------- Pattern matching -------------------------------

MATCH                  Y               # Do pattern-matching (Y/N) ?
MATCH_NMAX             0               # Max.number of detections for MATCHing
                                      # (0=auto)
PIXSCALE_MAXERR        1.2             # Max scale-factor uncertainty
POSANGLE_MAXERR        5.0             # Max position-angle uncertainty (deg)
POSITION_MAXERR        1.0             # Max positional uncertainty (arcmin)
MATCH_RESOL            0               # Matching resolution (arcsec); 0=auto
MATCH_FLIPPED          N               # Allow matching with flipped axes?
MOSAIC_TYPE            SAME_CRVAL      # UNCHANGED, SAME_CRVAL, SHARE_PROJAXIS,
                                      # FIX_FOCALPLANE or LOOSE
FIXFOCALPLANE_NMIN     1               # Min number of dets for FIX_FOCALPLANE

#---------------------------- Cross-identification ----------------------------

CROSSID_RADIUS         2.0             # Cross-id initial radius (arcsec)
```

```
#---------------------------- Astrometric solution ----------------------------

SOLVE_ASTROM           Y               # Compute astrometric solution (Y/N) ?
ASTRINSTRU_KEY         FILTER,QRUNID   # FITS keyword(s) defining the astrom
STABILITY_TYPE         INSTRUMENT      # EXPOSURE, GROUP, INSTRUMENT or FILE
CENTROID_KEYS          XWIN_IMAGE,YWIN_IMAGE
               # Cat. parameters for centroiding
CENTROIDERR_KEYS       ERRAWIN_IMAGE,ERRBWIN_IMAGE,ERRTHETAWIN_IMAGE
                                      # Cat. params for centroid err ellipse
DISTORT_KEYS           XWIN_IMAGE,YWIN_IMAGE
                                      # Cat. parameters or FITS keywords
DISTORT_GROUPS         1,1             # Polynom group for each context key
DISTORT_DEGREES        3               # Polynom degree for each group
ASTREF_WEIGHT          1.0             # Relative weight of ref.astrom.cat.
ASTRCLIP_NSIGMA        3.0             # Astrom. clipping threshold in sigmas
CORRECT_COLOURSHIFTS   N               # Correct for colour shifts (Y/N)?

#---------------------------- Photometric solution ----------------------------

SOLVE_PHOTOM           Y               # Compute photometric solution (Y/N) ?
MAGZERO_OUT            30.0            # Magnitude zero-point(s) in output
MAGZERO_INTERR         0.01            # Internal mag.zero-point accuracy
MAGZERO_REFERR         0.03            # Photom.field mag.zero-point accuracy
PHOTINSTRU_KEY         FILTER          # FITS keyword(s) defining the photom.
MAGZERO_KEY            PHOT_C          # FITS keyword for the mag zero-point
EXPOTIME_KEY           EXPTIME         # FITS keyword for the exposure time (s)
AIRMASS_KEY            AIRMASS         # FITS keyword for the airmass
EXTINCT_KEY            PHOT_K          # FITS keyword for the extinction coeff
PHOTOMFLAG_KEY         PHOTFLAG        # FITS keyword for the photometry flag
PHOTFLUX_KEY           FLUX_AUTO       # Catalog param. for the flux measurement
PHOTFLUXERR_KEY        FLUXERR_AUTO    # Catalog parameter for the flux error
PHOTCLIP_NSIGMA        3.0             # Photom.clipping threshold in sigmas

#------------------------------- Check-plots ----------------------------------

CHECKPLOT_CKEY         SCAMPCOL        # FITS keyword for PLPLOT field colour
CHECKPLOT_DEV          PNG             # NULL, XWIN, TK, PS, PSC, XFIG, PNG,
                                      # JPEG, AQT, PDF or SVG
CHECKPLOT_RES          1600,1200       # Check-plot resolution (0 = default)
CHECKPLOT_ANTIALIAS    Y               # Anti-aliasing using convert (Y/N) ?
CHECKPLOT_TYPE         FGROUPS,DISTORTION,ASTR_INTERROR2D,ASTR_INTERROR1D,ASTR_REFERROR2D,
                      ASTR_REFERROR1D,ASTR_CHI2,PHOT_ERROR,PHOT_ERRORVSMAG,PHOT_ZPCORR,
                      PHOT_ZPCORR3D
CHECKPLOT_NAME         fgroups,distort,astr_interror2d,astr_interror1d,astr_referror2d,
                      astr_referror1d, astr_chi2,psphot_error,phot_errorvsmag,phot_zpcorr,
                      phot_zpcorr3d
                                      # Check-plot filename(s)

#------------------------------- Check-images ---------------------------------

CHECKIMAGE_TYPE        NONE            # NONE, AS_PAIR, AS_REFPAIR, or AS_XCORR
CHECKIMAGE_NAME        check.fits      # Check-image filename(s)

#------------------------------ Miscellaneous ---------------------------------

SN_THRESHOLDS          10.0,100.0      # S/N thresholds (in sigmas) for all and
```

```
                                      # high-SN sample
FWHM_THRESHOLDS        0.0,100.0       # FWHM thresholds (in pixels) for sources
FLAGS_MASK             0x00f0          # Rejection mask on SEx FLAGS
WEIGHTFLAGS_MASK       0x00ff          # Rejection mask on SEx FLAGS_WEIGHT
IMAFLAGS_MASK          0x0             # Rejection mask on SEx IMAFLAGS_ISO
AHEADER_GLOBAL         /usr/share/SCAMP/megacam.ahead
               # Filename of the global INPUT header
AHEADER_SUFFIX         .ahead          # Filename extension for additional
                                      # INPUT headers
HEADER_SUFFIX          .head           # Filename extension for OUTPUT headers
HEADER_TYPE            NORMAL          # NORMAL or FOCAL_PLANE
VERBOSE_TYPE           LOG             # QUIET, NORMAL, LOG or FULL
WRITE_XML              Y               # Write XML file (Y/N)?
XML_NAME               CFHTLS_W2_ugriz_T0006_SCamp.xml
                                      # Filename for XML output
XSL_URL                file:///usr/share/SCAMP/SCAMP.xsl
                                      # Filename for XSL style-sheet
NTHREADS               0               # Number of simultaneous threads for
                                      # the SMP version of SCAMP
                                      # 0 = automatic
```

### 8.2.2 SWARP stack configuration file for T0006 Wide

```
# Default configuration file for SWARP 2.17.6
# EB 2009-04-09
#
# Last modified for CFHTLS-T0006 (MegaCam):
# YG 2009-07-07


#----------------------------------- Output -----------------------------------

IMAGEOUT_NAME          CFHTLS_W_z_022929-075600_T0006.fits
                                      # Output filename
WEIGHTOUT_NAME         CFHTLS_W_z_022929-075600_T0006_weight.fits
                                      # Output weight-map filename

HEADER_ONLY            N               # Only a header as an output file (Y/N)?
HEADER_SUFFIX          .head           # Filename extension for additional headers

#------------------------------- Input Weights --------------------------------

WEIGHT_TYPE            MAP_WEIGHT      # BACKGROUND,MAP_RMS,MAP_VARIANCE
                                      # or MAP_WEIGHT
WEIGHT_SUFFIX          _weight.fits    # Suffix to use for weight-maps
WEIGHT_IMAGE                           # Weightmap filename if suffix not used
                                      # (all or for each weight-map)
WEIGHT_THRESH                          # Bad pixel weight-threshold

#------------------------------- Co-addition ----------------------------------

COMBINE                Y               # Combine resampled images (Y/N)?
COMBINE_TYPE           MEDIAN          # MEDIAN,AVERAGE,MIN,MAX,WEIGHTED,CHI2
                                      # or SUM
BLANK_BADPIXELS        N               # Set to 0 pixels having a weight of 0

#-------------------------------- Astrometry ----------------------------------

CELESTIAL_TYPE         NATIVE          # NATIVE, PIXEL, EQUATORIAL,
                                      # GALACTIC,ECLIPTIC, or SUPERGALACTIC
PROJECTION_TYPE        TAN             # Any WCS projection code or NONE
PROJECTION_ERR         0.001           # Maximum projection error (in output
                                      # pixels), or 0 for no approximation
CENTER_TYPE            MANUAL          # MANUAL, ALL or MOST
CENTER          02:29:29.14,-07:56:00  # Coordinates of the image center
PIXELSCALE_TYPE        MANUAL          # MANUAL,FIT,MIN,MAX or MEDIAN
PIXEL_SCALE            0.186           # Pixel scale
IMAGE_SIZE             19354,19354     # Image size (0 = AUTOMATIC)

#-------------------------------- Resampling ----------------------------------

RESAMPLE               Y               # Resample input images (Y/N)?
RESAMPLE_DIR           .               # Directory path for resampled images
RESAMPLE_SUFFIX        .resamp.fits    # filename extension for resampled images
```

```
RESAMPLING_TYPE        LANCZOS3        # NEAREST,BILINEAR,LANCZOS2,LANCZOS3
                                      # or LANCZOS4 (1 per axis)
OVERSAMPLING           0               # Oversampling in each dimension
                                      # (0 = automatic)
INTERPOLATE            Y               # Interpolate bad input pixels (Y/N)?
                                      # (all or for each image)

FSCALASTRO_TYPE        VARIABLE        # NONE,FIXED, or VARIABLE
FSCALE_KEYWORD         FLXSCALE        # FITS keyword for the multiplicative
                                      # factor applied to each input image
FSCALE_DEFAULT         1.0             # Default FSCALE value if not in header

GAIN_KEYWORD           GAIN            # FITS keyword for effect. gain (e-/ADU)
GAIN_DEFAULT           0.0             # Default gain if no FITS keyword found
                                      # 0 = infinity (all or for each image)
SATLEV_KEYWORD         SATURATE        # FITS keyword for saturation level (ADU)
SATLEV_DEFAULT         50000.0         # Default saturation if no FITS keyword

#--------------------------- Background subtraction ---------------------------

SUBTRACT_BACK          Y               # Subtraction sky background (Y/N)?
                                      # (all or for each image)

BACK_TYPE              AUTO            # AUTO or MANUAL
                                      # (all or for each image)
BACK_DEFAULT           0.0             # Default background value in MANUAL
                                      # (all or for each image)
BACK_SIZE              32              # Background mesh size (pixels)
                                      # (all or for each image)
BACK_FILTERSIZE        7               # Background map filter range (meshes)
                                      # (all or for each image)
BACK_FILTTHRESH        0.0             # Threshold above which the background-
                                      # map filter operates

#------------------------------ Memory management -----------------------------

VMEM_DIR               .               # Directory path for swap files
VMEM_MAX               2047            # Maximum amount of virtual memory (MB)
MEM_MAX                128             # Maximum amount of usable RAM (MB)
COMBINE_BUFSIZE        400             # RAM dedicated to co-addition(MB)

#------------------------------ Miscellaneous ---------------------------------

DELETE_TMPFILES        Y               # Delete temporary resampled FITS files
                                      # (Y/N)?
COPY_KEYWORDS          FILTER,INSTRUME,TELESCOP,DETECTOR,OBSERVER,PHOT_C,PHOT_K,OBJECT,
                      DATE_OBS,ORIGIN,SEEING,REL_DATE
                                      # List of FITS keywords to propagate
                                      # from the input to the output headers
WRITE_FILEINFO         N               # Write information about each input
                                      # file in the output image header?
WRITE_XML              Y               # Write XML file (Y/N)?
XML_NAME               CFHTLS_W_z_022929-075600_T0006_SWARP.xml
                                      # Filename for XML output
XSL_URL                file:///usr/share/swarp/swarp.xsl
                                      # Filename for XSL style-sheet
```

```
VERBOSE_TYPE           NORMAL          # QUIET,NORMAL or FULL
NNODES                 1               # Number of nodes (for clusters)
NODE_INDEX             0               # Node index (for clusters)

NTHREADS               0               # Number of simultaneous threads for
                                      # the SMP version of SWARP
                                      # 0 = automatic
```

### 8.2.3 SWARP image chi2 configuration file for T0006 Wide

```
# Default configuration file for SWARP 2.17.6
# EB 2009-04-09
#
# Last modified for CFHTLS-T0006 chi2 (MegaCam):
# YG 2009-07-13


#----------------------------------- Output -----------------------------------

IMAGEOUT_NAME          CFHTLS_W_gri_022929-075600_T0006.fits
                                      # Output filename
WEIGHTOUT_NAME         CFHTLS_W_gri_022929-075600_T0006_weight.fits
                                      # Output weight-map filename

HEADER_ONLY            N               # Only a header as an output file (Y/N)?
HEADER_SUFFIX          .head           # Filename extension for additional headers

#------------------------------- Input Weights --------------------------------

WEIGHT_TYPE            MAP_WEIGHT      # BACKGROUND,MAP_RMS,MAP_VARIANCE
                                      # or MAP_WEIGHT
WEIGHT_SUFFIX          _weight.fits    # Suffix to use for weight-maps
WEIGHT_IMAGE                           # Weightmap filename if suffix not used
                                      # (all or for each weight-map)
WEIGHT_THRESH                          # Bad pixel weight-threshold

#------------------------------- Co-addition ----------------------------------

COMBINE                Y               # Combine resampled images (Y/N)?
COMBINE_TYPE           CHI2            # MEDIAN,AVERAGE,MIN,MAX,WEIGHTED,CHI2
                                      # or SUM
BLANK_BADPIXELS        N               # Set to 0 pixels having a weight of 0

#-------------------------------- Astrometry ----------------------------------

CELESTIAL_TYPE         NATIVE          # NATIVE, PIXEL, EQUATORIAL,
                                      # GALACTIC,ECLIPTIC, or SUPERGALACTIC
PROJECTION_TYPE        TAN             # Any WCS projection code or NONE
PROJECTION_ERR         0.001           # Maximum projection error (in output
                                      # pixels), or 0 for no approximation
CENTER_TYPE            MANUAL          # MANUAL, ALL or MOST
CENTER          02:29:29.14,-07:56:00 # Coordinates of the image center
PIXELSCALE_TYPE        MANUAL          # MANUAL,FIT,MIN,MAX or MEDIAN
PIXEL_SCALE            0.186           # Pixel scale
IMAGE_SIZE             19354,19354     # Image size (0 = AUTOMATIC)

#-------------------------------- Resampling ----------------------------------

RESAMPLE               Y               # Resample input images (Y/N)?
RESAMPLE_DIR           .               # Directory path for resampled images
RESAMPLE_SUFFIX        .resamp.fits    # filename extension for resampled images

RESAMPLING_TYPE        LANCZOS3        # NEAREST,BILINEAR,LANCZOS2,LANCZOS3
```

```
                                      # or LANCZOS4 (1 per axis)
OVERSAMPLING           0               # Oversampling in each dimension
                                      # (0 = automatic)
INTERPOLATE            Y               # Interpolate bad input pixels (Y/N)?
                                      # (all or for each image)

FSCALASTRO_TYPE        VARIABLE        # NONE,FIXED, or VARIABLE
FSCALE_KEYWORD         FLXSCALE        # FITS keyword for the multiplicative
                                      # factor applied to each input image
FSCALE_DEFAULT         1.0             # Default FSCALE value if not in header

GAIN_KEYWORD           GAIN            # FITS keyword for effect. gain (e-/ADU)
GAIN_DEFAULT           0.0             # Default gain if no FITS keyword found
                                      # 0 = infinity (all or for each image)
SATLEV_KEYWORD         SATURATE        # FITS keyword for saturation level (ADU)
SATLEV_DEFAULT         50000.0         # Default saturation if no FITS keyword

#--------------------------- Background subtraction ---------------------------

SUBTRACT_BACK          Y               # Subtraction sky background (Y/N)?
                                      # (all or for each image)

BACK_TYPE              AUTO            # AUTO or MANUAL
                                      # (all or for each image)
BACK_DEFAULT           0.0             # Default background value in MANUAL
                                      # (all or for each image)
BACK_SIZE              64              # Background mesh size (pixels)
                                      # (all or for each image)
BACK_FILTERSIZE        3               # Background map filter range (meshes)
                                      # (all or for each image)
BACK_FILTTHRESH        0.0             # Threshold above which the background-
                                      # map filter operates

#------------------------------ Memory management -----------------------------

VMEM_DIR               .               # Directory path for swap files
VMEM_MAX               2047            # Maximum amount of virtual memory (MB)
MEM_MAX                4096            # Maximum amount of usable RAM (MB)
COMBINE_BUFSIZE        1024            # RAM dedicated to co-addition(MB)

#------------------------------ Miscellaneous ---------------------------------

DELETE_TMPFILES        Y               # Delete temporary resampled FITS files
                                      # (Y/N)?
COPY_KEYWORDS          OBJECT,FILTER
                                      # List of FITS keywords to propagate
                                      # from the input to the output headers
WRITE_FILEINFO         Y               # Write information about each input
                                      # file in the output image header?
WRITE_XML              Y               # Write XML file (Y/N)?
XML_NAME               CFHTLS_W_gri_022929-075600_T0006_SWARP_chi2.xml
                                      # Filename for XML output
XSL_URL                http://releasix.iap.fr/xsl/swarp.xsl
                                      # Filename for XSL style-sheet
VERBOSE_TYPE           NORMAL          # QUIET,NORMAL or FULL
NNODES                 1               # Number of nodes (for clusters)
```

```
NODE_INDEX             0                # Node index (for clusters)

NTHREADS               0                # Number of simultaneous threads for
                                       # the SMP version of SWARP
                                       # 0 = automatic
```

### 8.2.4 SExtractor .ldac catalogue configuration file for T0006 Wide

```
# Default configuration file for SExtractor 2.8.6
# EB 2009-04-09
#
# Last modified for CFHTLS-T0006 (MegaCam):
# YG 2009-07-20

#-------------------------------- Catalog ------------------------------------

CATALOG_NAME     CFHTLS_W_r_141754+543031_T0006.ldac
  # name of the output catalogue
CATALOG_TYPE     FITS_LDAC # NONE,ASCII,ASCII_HEAD, ASCII_SKYCAT,
# ASCII_VOTABLE, FITS_1.0 or FITS_LDAC
PARAMETERS_NAME  /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-auto.param
  # name of the file containing catalogue contents

#------------------------------- Extraction ----------------------------------

DETECT_TYPE      CCD            # CCD (linear) or PHOTO (with gamma correction)
DETECT_MINAREA   3 # minimum number of pixels above threshold
THRESH_TYPE      RELATIVE # threshold type: RELATIVE (in sigmas)
                               # or ABSOLUTE (in ADUs)
DETECT_THRESH    1.0          # <sigmas> or <threshold>,<ZP> in mag.arcsec-2
ANALYSIS_THRESH  1.0 # <sigmas> or <threshold>,<ZP> in mag.arcsec-2

FILTER           Y              # apply filter for detection (Y or N)?
FILTER_NAME      /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-auto.conv
  # name of the file containing the filter
FILTER_THRESH                   # Threshold[s] for retina filtering

DEBLEND_NTHRESH  32             # Number of deblending sub-thresholds
DEBLEND_MINCONT  0.002 # Minimum contrast parameter for deblending

CLEAN            Y              # Clean spurious detections? (Y or N)?
CLEAN_PARAM      1.0            # Cleaning efficiency

MASK_TYPE        CORRECT        # type of detection MASKing: can be one of
                               # NONE, BLANK or CORRECT

#-------------------------------- WEIGHTing ----------------------------------

WEIGHT_TYPE      MAP_WEIGHT     # type of WEIGHTing: NONE, BACKGROUND,
                               # MAP_RMS, MAP_VAR or MAP_WEIGHT
WEIGHT_IMAGE     CFHTLS_W_r_141754+543031_T0006_weight.fits
  # weight-map filename
WEIGHT_GAIN      Y              # modulate gain (E/ADU) with weights? (Y/N)
WEIGHT_THRESH     # weight threshold[s] for bad pixels

#-------------------------------- FLAGging -----------------------------------

FLAG_IMAGE       flag.fits
  # filename for an input FLAG-image
FLAG_TYPE        OR             # flag pixel combination: OR, AND, MIN, MAX
                               # or MOST
```

```
#------------------------------- Photometry -----------------------------------

PHOT_APERTURES   16.,22. # MAG_APER aperture diameter(s) in pixels
PHOT_AUTOPARAMS  2.5, 3.5       # MAG_AUTO parameters: <Kron_fact>,<min_radius>
PHOT_PETROPARAMS 2.0, 3.5       # MAG_PETRO parameters: <Petrosian_fact>,
                               # <min_radius>
PHOT_AUTOAPERS   0.0,0.0        # <estimation>,<measurement> minimum apertures
                               # for MAG_AUTO and MAG_PETRO
PHOT_FLUXFRAC    0.2,0.5,0.8    # flux fraction[s] used for FLUX_RADIUS

SATUR_LEVEL      50000.0        # level (in ADUs) at which arises saturation
SATUR_KEY        TOTO       # keyword for saturation level (in ADUs)

MAG_ZEROPOINT    30.0 # magnitude zero-point
MAG_GAMMA        4.0            # gamma of emulsion (for photographic scans)
GAIN             0.0            # detector gain in e-/ADU
GAIN_KEY         GAIN           # keyword for detector gain in e-/ADU
PIXEL_SCALE      0              # size of pixel in arcsec (0=use FITS WCS info)

#------------------------- Star/Galaxy Separation ----------------------------

SEEING_FWHM      0.9 # stellar FWHM in arcsec
STARNNW_NAME     /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-auto.nnw
  # Neural-Network_Weight table filename

#------------------------------- Background -----------------------------------

BACK_TYPE        AUTO           # AUTO or MANUAL
BACK_VALUE       0.0            # Default background value in MANUAL mode
BACK_SIZE        128    # Background mesh: <size> or <width>,<height>
BACK_FILTERSIZE  3              # Background filter: <size> or <width>,<height>

BACKPHOTO_TYPE   GLOBAL         # can be GLOBAL or LOCAL
BACKPHOTO_THICK  24             # thickness of the background LOCAL annulus
BACK_FILTTHRESH  0.0            # Threshold above which the background-
                               # map filter operates

#------------------------------ Check Image ----------------------------------

CHECKIMAGE_TYPE  MINIBACKGROUND # can be NONE, BACKGROUND, BACKGROUND_RMS,
                               # MINIBACKGROUND, MINIBACK_RMS, -BACKGROUND,
                               # FILTERED, OBJECTS, -OBJECTS, SEGMENTATION,
                               # or APERTURES
CHECKIMAGE_NAME  CFHTLS_W_r_141754+543031_T0006_mbkg.fits
  # Filename for the check-image

#--------------------- Memory (change with caution!) -------------------------

MEMORY_OBJSTACK  3000           # number of objects in stack
MEMORY_PIXSTACK  300000         # number of pixels in stack
MEMORY_BUFSIZE   1024           # number of lines in buffer

#------------------------------- ASSOCiation ---------------------------------

ASSOC_NAME       sky.list       # name of the ASCII file to ASSOCiate
```

```
ASSOC_DATA       2,3,4          # columns of the data to replicate (0=all)
ASSOC_PARAMS     2,3,4          # columns of xpos,ypos[,mag]
ASSOC_RADIUS     2.0            # cross-matching radius (pixels)
ASSOC_TYPE       NEAREST        # ASSOCiation method: FIRST, NEAREST, MEAN,
                               # MAG_MEAN, SUM, MAG_SUM, MIN or MAX
ASSOCSELEC_TYPE  MATCHED        # ASSOC selection type: ALL, MATCHED or -MATCHED

#----------------------------- Miscellaneous ---------------------------------

VERBOSE_TYPE     FULL           # can be QUIET, NORMAL or FULL
WRITE_XML        Y  # Write XML file (Y/N)?
XML_NAME         CFHTLS_W_r_141754+543031_T0006_SExtr.xml
  # Filename for XML output
XSL_URL          http://releasix.iap.fr/xsl/sextractor.xsl
# Filename for XSL style-sheet
NTHREADS          0             # Number of simultaneous threads for
                               # the SMP version of SExtractor
                               # 0 = automatic

FITS_UNSIGNED    N              # Treat FITS integer values as unsigned (Y/N)?
INTERP_MAXXLAG   16             # Max. lag along X for 0-weight interpolation
INTERP_MAXYLAG   16             # Max. lag along Y for 0-weight interpolation
INTERP_TYPE      ALL            # Interpolation type: NONE, VAR_ONLY or ALL

#--------------------------- Experimental Stuff -----------------------------

PSF_NAME         default.psf    # File containing the PSF model
PSF_NMAX         9              # Max.number of PSFs fitted simultaneously
PSFDISPLAY_TYPE  SPLIT          # Catalog type for PSF-fitting: SPLIT or VECTOR
PATTERN_TYPE     RINGS-HARMONIC # can RINGS-QUADPOLE, RINGS-OCTOPOLE,
                               # RINGS-HARMONICS or GAUSS-LAGUERRE
SOM_NAME         default.som    # File containing Self-Organizing Map weights
```

#### 8.2.5 SExtractor .cat DUAL MODE catalogue configuration file for T0006 Wide

```
# Default configuration file for SExtractor 2.8.6
# EB 2009-04-09
#
# Last modified for CFHTLS-T0006 chi2 (MegaCam):
# YG 2009-07-17

#-------------------------------- Catalog ------------------------------------

CATALOG_NAME     CFHTLS_W_r_141754+543031_T0006.cat
  # name of the output catalogue
CATALOG_TYPE     ASCII_HEAD # NONE,ASCII,ASCII_HEAD, ASCII_SKYCAT,
# ASCII_VOTABLE, FITS_1.0 or FITS_LDAC
PARAMETERS_NAME                /data/fcix5/raid1/youpi-INPUT/CFHTLS/T0006-Wide/
                              SExtrConfig/config/sextr-dp.chi2.T0006
  # name of the file containing catalogue contents

#------------------------------- Extraction ----------------------------------

DETECT_TYPE      CCD            # CCD (linear) or PHOTO (with gamma correction)
DETECT_MINAREA   3 # minimum number of pixels above threshold
THRESH_TYPE      ABSOLUTE # threshold type: RELATIVE (in sigmas)
                              # or ABSOLUTE (in ADUs)
DETECT_THRESH    0.4          # <sigmas> or <threshold>,<ZP> in mag.arcsec-2
ANALYSIS_THRESH  0.4 # <sigmas> or <threshold>,<ZP> in mag.arcsec-2

FILTER           Y              # apply filter for detection (Y or N)?
FILTER_NAME      /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-autochi2.conv
  # name of the file containing the filter
FILTER_THRESH                   # Threshold[s] for retina filtering

DEBLEND_NTHRESH  32             # Number of deblending sub-thresholds
DEBLEND_MINCONT  0.002 # Minimum contrast parameter for deblending

CLEAN            Y              # Clean spurious detections? (Y or N)?
CLEAN_PARAM      1.0            # Cleaning efficiency

MASK_TYPE        CORRECT        # type of detection MASKing: can be one of
                              # NONE, BLANK or CORRECT

#-------------------------------- WEIGHTing ----------------------------------

WEIGHT_TYPE      MAP_WEIGHT,MAP_WEIGHT
          # type of WEIGHTing: NONE, BACKGROUND,
                              # MAP_RMS, MAP_VAR or MAP_WEIGHT
WEIGHT_IMAGE                    CFHTLS_W_gri_141754+543031_T0006_weight.fits,
                              CFHTLS_W_r_141754+543031_T0006_weight.fits
  # weight-map filename
WEIGHT_GAIN      Y              # modulate gain (E/ADU) with weights? (Y/N)
WEIGHT_THRESH     # weight threshold[s] for bad pixels

#-------------------------------- FLAGging -----------------------------------
```

```
FLAG_IMAGE       flag.fits
  # filename for an input FLAG-image
FLAG_TYPE        OR             # flag pixel combination: OR, AND, MIN, MAX
                               # or MOST

#------------------------------ Photometry -----------------------------------

PHOT_APERTURES                  10.,12.,14.,16.,18.,20.,22.,24.,26.,28.,30.,32.,
                               34.,36.,38.,40.,42.,44.,46.,48.,50.,52.,54.,56.,
                               58.,60.
  # MAG_APER aperture diameter(s) in pixels
PHOT_AUTOPARAMS  2.5, 3.5       # MAG_AUTO parameters: <Kron_fact>,<min_radius>
PHOT_PETROPARAMS 2.0, 3.5       # MAG_PETRO parameters: <Petrosian_fact>,
                               # <min_radius>
PHOT_AUTOAPERS   16.0,16.0      # <estimation>,<measurement> minimum apertures
                               # for MAG_AUTO and MAG_PETRO
PHOT_FLUXFRAC    0.2,0.5,0.8    # flux fraction[s] used for FLUX_RADIUS

SATUR_LEVEL      50000.0        # level (in ADUs) at which arises saturation
SATUR_KEY        TOTO       # keyword for saturation level (in ADUs)

MAG_ZEROPOINT    30.0 # magnitude zero-point
MAG_GAMMA        4.0            # gamma of emulsion (for photographic scans)
GAIN             0.0            # detector gain in e-/ADU
GAIN_KEY         GAIN           # keyword for detector gain in e-/ADU
PIXEL_SCALE      0              # size of pixel in arcsec (0=use FITS WCS info)

#------------------------- Star/Galaxy Separation ----------------------------

SEEING_FWHM      0.9 # stellar FWHM in arcsec
STARNNW_NAME     /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-autochi2.nnw
  # Neural-Network_Weight table filename

#------------------------------ Background -----------------------------------

BACK_TYPE        AUTO           # AUTO or MANUAL
BACK_VALUE       0.0            # Default background value in MANUAL mode
BACK_SIZE        256    # Background mesh: <size> or <width>,<height>
BACK_FILTERSIZE  9              # Background filter: <size> or <width>,<height>

BACKPHOTO_TYPE   LOCAL          # can be GLOBAL or LOCAL
BACKPHOTO_THICK  30             # thickness of the background LOCAL annulus
BACK_FILTTHRESH  0.0            # Threshold above which the background-
                               # map filter operates

#------------------------------ Check Image ----------------------------------

CHECKIMAGE_TYPE  MINIBACKGROUND # can be NONE, BACKGROUND, BACKGROUND_RMS,
                               # MINIBACKGROUND, MINIBACK_RMS, -BACKGROUND,
                               # FILTERED, OBJECTS, -OBJECTS, SEGMENTATION,
                               # or APERTURES
CHECKIMAGE_NAME  CFHTLS_W_r_141754+543031_T0006_mbkg_chi2.fits
  # Filename for the check-image

#--------------------- Memory (change with caution!) -------------------------
```

```
MEMORY_OBJSTACK  5000           # number of objects in stack
MEMORY_PIXSTACK  1000000        # number of pixels in stack
MEMORY_BUFSIZE   1024           # number of lines in buffer

#------------------------------- ASSOCiation ---------------------------------

ASSOC_NAME       sky.list       # name of the ASCII file to ASSOCiate
ASSOC_DATA       2,3,4          # columns of the data to replicate (0=all)
ASSOC_PARAMS     2,3,4          # columns of xpos,ypos[,mag]
ASSOC_RADIUS     2.0            # cross-matching radius (pixels)
ASSOC_TYPE       NEAREST        # ASSOCiation method: FIRST, NEAREST, MEAN,
                               # MAG_MEAN, SUM, MAG_SUM, MIN or MAX
ASSOCSELEC_TYPE  MATCHED        # ASSOC selection type: ALL, MATCHED or -MATCHED

#----------------------------- Miscellaneous ---------------------------------

VERBOSE_TYPE     NORMAL         # can be QUIET, NORMAL or FULL
WRITE_XML        Y  # Write XML file (Y/N)?
XML_NAME         CFHTLS_W_r_141754+543031_T0006_SExtr_chi2.xml
  # Filename for XML output
XSL_URL          http://releasix.iap.fr/xsl/sextractor.xsl
# Filename for XSL style-sheet
NTHREADS          0             # Number of simultaneous threads for
                               # the SMP version of SExtractor
                               # 0 = automatic

FITS_UNSIGNED    N              # Treat FITS integer values as unsigned (Y/N)?
INTERP_MAXXLAG   16             # Max. lag along X for 0-weight interpolation
INTERP_MAXYLAG   16             # Max. lag along Y for 0-weight interpolation
INTERP_TYPE      ALL            # Interpolation type: NONE, VAR_ONLY or ALL

#--------------------------- Experimental Stuff -----------------------------

PSF_NAME         default.psf    # File containing the PSF model
PSF_NMAX         9              # Max.number of PSFs fitted simultaneously
PSFDISPLAY_TYPE  SPLIT          # Catalog type for PSF-fitting: SPLIT or VECTOR
PATTERN_TYPE     RINGS-HARMONIC # can RINGS-QUADPOLE, RINGS-OCTOPOLE,
                               # RINGS-HARMONICS or GAUSS-LAGUERRE
SOM_NAME         default.som    # File containing Self-Organizing Map weights
```

## 8.3 CFHTLS T0006 Deep configuration files

### 8.3.1 SCAMP configuration file for T0006 Deep

```
# Default configuration file for SCAMP 1.5.5
# EB 2009-04-10
#
# Last modified for CFHTLS-T0006 (Megacam):
# YG 2009-09-01

#---------------------------- Field grouping ---------------------------------

FGROUP_RADIUS          1.0             # Max dist (deg) between field groups

#--------------------------- Reference catalogs ------------------------------

REF_SERVER         cocat1.u-strasbg.fr # Internet addresses of catalog servers
REF_PORT               1660            # Ports to connect to catalog servers
CDSCLIENT_EXEC         aclient         # CDSclient executable
ASTREF_CATALOG         2MASS           # NONE, FILE, USNO-A1, USNO-A2, USNO-B1,
                                      # GSC-1.3, GSC-2.2, UCAC-1, UCAC-2,
                                      # NOMAD-1, 2MASS, DENIS-3,
                                      # SDSS-R3, SDSS-R5 or SDSS-R6
ASTREF_BAND            DEFAULT         # Photom. band for astr.ref.magnitudes
                                      # or DEFAULT, BLUEST, or REDDEST
ASTREFCAT_NAME         astrefcat.cat   # Local astrometric reference catalogs
ASTREFCENT_KEYS        X_WORLD,Y_WORLD # Local ref.cat.centroid parameters
ASTREFERR_KEYS         ERRA_WORLD, ERRB_WORLD, ERRTHETA_WORLD
                                      # Local ref.cat.error ellipse parameters
ASTREFMAG_KEY          MAG             # Local ref.cat.magnitude parameter
SAVE_REFCATALOG        Y               # Save ref catalogs in FITS-LDAC format?
REFOUT_CATPATH         .               # Save path for reference catalogs

#-------------------------- Merged output catalogs ---------------------------

MERGEDOUTCAT_NAME      scamp.cat       # Merged output catalog filename
MERGEDOUTCAT_TYPE      NONE            # NONE, ASCII_HEAD, ASCII, FITS_LDAC

#---------------------------- Pattern matching -------------------------------

MATCH                  Y               # Do pattern-matching (Y/N) ?
MATCH_NMAX             0               # Max.number of detections for MATCHing
                                      # (0=auto)
PIXSCALE_MAXERR        1.2             # Max scale-factor uncertainty
POSANGLE_MAXERR        5.0             # Max position-angle uncertainty (deg)
POSITION_MAXERR        1.0             # Max positional uncertainty (arcmin)
MATCH_RESOL            0               # Matching resolution (arcsec); 0=auto
MATCH_FLIPPED          N               # Allow matching with flipped axes?
MOSAIC_TYPE            SAME_CRVAL      # UNCHANGED, SAME_CRVAL, SHARE_PROJAXIS,
                                      # FIX_FOCALPLANE or LOOSE
FIXFOCALPLANE_NMIN     1               # Min number of dets for FIX_FOCALPLANE

#--------------------------- Cross-identification ----------------------------

CROSSID_RADIUS         2.0             # Cross-id initial radius (arcsec)
```

```
#---------------------------- Astrometric solution ----------------------------

SOLVE_ASTROM           Y                # Compute astrometric solution (Y/N) ?
ASTRINSTRU_KEY         FILTER,QRUNID    # FITS keyword(s) defining the astrom
STABILITY_TYPE         INSTRUMENT       # EXPOSURE, GROUP, INSTRUMENT or FILE
CENTROID_KEYS          XWIN_IMAGE,YWIN_IMAGE
               # Cat. parameters for centroiding
CENTROIDERR_KEYS       ERRAWIN_IMAGE,ERRBWIN_IMAGE,ERRTHETAWIN_IMAGE
                                       # Cat. params for centroid err ellipse
DISTORT_KEYS           XWIN_IMAGE,YWIN_IMAGE
                                       # Cat. parameters or FITS keywords
DISTORT_GROUPS         1,1              # Polynom group for each context key
DISTORT_DEGREES        3                # Polynom degree for each group
ASTREF_WEIGHT          1.0              # Relative weight of ref.astrom.cat.
ASTRCLIP_NSIGMA        3.0              # Astrom. clipping threshold in sigmas
CORRECT_COLOURSHIFTS   N                # Correct for colour shifts (Y/N)?

#---------------------------- Photometric solution ----------------------------

SOLVE_PHOTOM           Y                # Compute photometric solution (Y/N) ?
MAGZERO_OUT            30.0             # Magnitude zero-point(s) in output
MAGZERO_INTERR         0.01             # Internal mag.zero-point accuracy
MAGZERO_REFERR         0.03             # Photom.field mag.zero-point accuracy
PHOTINSTRU_KEY         FILTER           # FITS keyword(s) defining the photom.
MAGZERO_KEY            PHOT_C           # FITS keyword for the mag zero-point
EXPOTIME_KEY           EXPTIME          # FITS keyword for the exposure time (s)
AIRMASS_KEY            AIRMASS          # FITS keyword for the airmass
EXTINCT_KEY            PHOT_K           # FITS keyword for the extinction coeff
PHOTOMFLAG_KEY         PHOTFLAG         # FITS keyword for the photometry flag
PHOTFLUX_KEY           FLUX_AUTO        # Catalog param. for the flux measurement
PHOTFLUXERR_KEY        FLUXERR_AUTO     # Catalog parameter for the flux error
PHOTCLIP_NSIGMA        3.0              # Photom.clipping threshold in sigmas

#------------------------------- Check-plots ----------------------------------

CHECKPLOT_CKEY         SCAMPCOL         # FITS keyword for PLPLOT field colour
CHECKPLOT_DEV          PNG              # NULL, XWIN, TK, PS, PSC, XFIG, PNG,
                                       # JPEG, AQT, PDF or SVG
CHECKPLOT_RES          1600,1200        # Check-plot resolution (0 = default)
CHECKPLOT_ANTIALIAS    Y                # Anti-aliasing using convert (Y/N) ?
CHECKPLOT_TYPE         FGROUPS,DISTORTION,ASTR_INTERROR2D,ASTR_INTERROR1D,ASTR_REFERROR2D,
                      ASTR_REFERROR1D,ASTR_CHI2,PHOT_ERROR,PHOT_ERRORVSMAG,PHOT_ZPCORR,
                      PHOT_ZPCORR3D
CHECKPLOT_NAME         fgroups,distort,astr_interror2d,astr_interror1d,astr_referror2d,
                      astr_referror1d,astr_chi2,psphot_error,phot_errorvsmag,phot_zpcorr,
                      phot_zpcorr3d
                                       # Check-plot filename(s)

#------------------------------- Check-images ---------------------------------

CHECKIMAGE_TYPE        NONE             # NONE, AS_PAIR, AS_REFPAIR, or AS_XCORR
CHECKIMAGE_NAME        check.fits       # Check-image filename(s)

#------------------------------ Miscellaneous ---------------------------------
```

```
SN_THRESHOLDS          10.0,100.0      # S/N thresholds (in sigmas) for all and
                                      # high-SN sample
FWHM_THRESHOLDS        0.0,100.0       # FWHM thresholds (in pixels) for sources
FLAGS_MASK             0x00f0          # Rejection mask on SEx FLAGS
WEIGHTFLAGS_MASK       0x00ff          # Rejection mask on SEx FLAGS_WEIGHT
IMAFLAGS_MASK          0x0             # Rejection mask on SEx IMAFLAGS_ISO
AHEADER_GLOBAL         /usr/share/scamp/megacam.ahead
               # Filename of the global INPUT header
AHEADER_SUFFIX         .ahead          # Filename extension for additional
                                      # INPUT headers
HEADER_SUFFIX          .head           # Filename extension for OUTPUT headers
HEADER_TYPE            NORMAL          # NORMAL or FOCAL_PLANE
VERBOSE_TYPE           LOG             # QUIET, NORMAL, LOG or FULL
WRITE_XML              Y               # Write XML file (Y/N)?
XML_NAME               CFHTLS_D2_ugriz_T0006_SCamp.xml
                                      # Filename for XML output
XSL_URL                file:///usr/share/scamp/scamp.xsl
                                      # Filename for XSL style-sheet
NTHREADS               0               # Number of simultaneous threads for
                                      # the SMP version of SCAMP
                                      # 0 = automatic
```

#### 8.3.2 SWARP stack configuration file for T0006 Deep

```
# Default configuration file for SWarp 2.17.6
# EB 2009-04-09
#
# Last modified for CFHTLS-T0006 (Megacam):
# YG 2009-07-07


#----------------------------------- Output -----------------------------------

IMAGEOUT_NAME          CFHTLS_D-25_g_100028+021230_T0006.fits
                               # Output filename
WEIGHTOUT_NAME         CFHTLS_D-25_g_100028+021230_T0006_weight.fits
                               # Output weight-map filename

HEADER_ONLY            N                # Only a header as an output file (Y/N)?
HEADER_SUFFIX          .head            # Filename extension for additional headers

#------------------------------- Input Weights --------------------------------

WEIGHT_TYPE            MAP_WEIGHT       # BACKGROUND,MAP_RMS,MAP_VARIANCE
                                       # or MAP_WEIGHT
WEIGHT_SUFFIX          _weight.fits     # Suffix to use for weight-maps
WEIGHT_IMAGE                            # Weightmap filename if suffix not used
                                       # (all or for each weight-map)
WEIGHT_THRESH                           # Bad pixel weight-threshold

#------------------------------- Co-addition ----------------------------------

COMBINE                Y                # Combine resampled images (Y/N)?
COMBINE_TYPE           MEDIAN           # MEDIAN,AVERAGE,MIN,MAX,WEIGHTED,CHI2
                                       # or SUM
BLANK_BADPIXELS        N                # Set to 0 pixels having a weight of 0

#-------------------------------- Astrometry ----------------------------------

CELESTIAL_TYPE         NATIVE           # NATIVE, PIXEL, EQUATORIAL,
                                       # GALACTIC,ECLIPTIC, or SUPERGALACTIC
PROJECTION_TYPE        TAN              # Any WCS projection code or NONE
PROJECTION_ERR         0.001            # Maximum projection error (in output
                                       # pixels), or 0 for no approximation
CENTER_TYPE            MANUAL           # MANUAL, ALL or MOST
CENTER            10:00:28,+02:12:30    # Coordinates of the image center
PIXELSCALE_TYPE        MANUAL           # MANUAL,FIT,MIN,MAX or MEDIAN
PIXEL_SCALE            0.186            # Pixel scale
IMAGE_SIZE             19354,19354      # Image size (0 = AUTOMATIC)

#-------------------------------- Resampling ----------------------------------

RESAMPLE               Y                # Resample input images (Y/N)?
RESAMPLE_DIR           .                # Directory path for resampled images
RESAMPLE_SUFFIX        .resamp.fits     # filename extension for resampled images

RESAMPLING_TYPE        LANCZOS3         # NEAREST,BILINEAR,LANCZOS2,LANCZOS3
```

```
                                    # or LANCZOS4 (1 per axis)
OVERSAMPLING           0             # Oversampling in each dimension
                                    # (0 = automatic)
INTERPOLATE            Y             # Interpolate bad input pixels (Y/N)?
                                    # (all or for each image)

FSCALASTRO_TYPE        VARIABLE      # NONE,FIXED, or VARIABLE
FSCALE_KEYWORD         FLXSCALE      # FITS keyword for the multiplicative
                                    # factor applied to each input image
FSCALE_DEFAULT         1.0           # Default FSCALE value if not in header

GAIN_KEYWORD           GAIN          # FITS keyword for effect. gain (e-/ADU)
GAIN_DEFAULT           0.0           # Default gain if no FITS keyword found
                                    # 0 = infinity (all or for each image)
SATLEV_KEYWORD         SATURATE      # FITS keyword for saturation level (ADU)
SATLEV_DEFAULT         50000.0       # Default saturation if no FITS keyword

#-------------------------- Background subtraction ---------------------------

SUBTRACT_BACK          Y             # Subtraction sky background (Y/N)?
                                    # (all or for each image)

BACK_TYPE              AUTO          # AUTO or MANUAL
                                    # (all or for each image)
BACK_DEFAULT           0.0           # Default background value in MANUAL
                                    # (all or for each image)
BACK_SIZE              128           # Background mesh size (pixels)
                                    # (all or for each image)
BACK_FILTERSIZE        3             # Background map filter range (meshes)
                                    # (all or for each image)
BACK_FILTTHRESH        0.0           # Threshold above which the background-
                                    # map filter operates

#------------------------------ Memory management -----------------------------

VMEM_DIR               .             # Directory path for swap files
VMEM_MAX               2047          # Maximum amount of virtual memory (MB)
MEM_MAX                128           # Maximum amount of usable RAM (MB)
COMBINE_BUFSIZE        400           # RAM dedicated to co-addition(MB)

#------------------------------ Miscellaneous ---------------------------------

DELETE_TMPFILES        Y             # Delete temporary resampled FITS files
                                    # (Y/N)?
COPY_KEYWORDS          FILTER,INSTRUME,TELESCOP,DETECTOR,OBSERVER,PHOT_C,PHOT_K,
                      OBJECT,DATE_OBS,ORIGIN,SEEING,REL_DATE
                                    # List of FITS keywords to propagate
                                    # from the input to the output headers
WRITE_FILEINFO         N             # Write information about each input
                                    # file in the output image header?
WRITE_XML              Y             # Write XML file (Y/N)?
XML_NAME               CFHTLS_D-25_g_100028+021230_T0006_SWarp.xml
                                    # Filename for XML output
XSL_URL                file:///usr/share/swarp/swarp.xsl
                                    # Filename for XSL style-sheet
VERBOSE_TYPE           NORMAL        # QUIET,NORMAL or FULL
```

```
NNODES                 1                # Number of nodes (for clusters)
NODE_INDEX             0                # Node index (for clusters)

NTHREADS               0                # Number of simultaneous threads for
                                       # the SMP version of SWarp
                                       # 0 = automatic
```

### 8.3.3 SWARP image chi2 configuration file for T0006 Deep

Main difference with Wide parameters:

- BACK_SIZE: 128 (Deep), 32 (Wide) ;
- BACK_FILTERSIZE: 3 (Deep), 7 (Wide)

```
# Default configuration file for SWarp 2.17.6
# EB 2009-04-09
#
# Last modified for CFHTLS-T0006 chi2 (Megacam):
# YG 2009-07-13


#------------------------------------ Output -----------------------------------

IMAGEOUT_NAME          CFHTLS_D-85_gri_221531-174356_T0006.fits
                                      # Output filename
WEIGHTOUT_NAME         CFHTLS_D-85_gri_221531-174356_T0006_weight.fits
                                      # Output weight-map filename

HEADER_ONLY            N               # Only a header as an output file (Y/N)?
HEADER_SUFFIX          .head           # Filename extension for additional headers

#-------------------------------- Input Weights --------------------------------

WEIGHT_TYPE            MAP_WEIGHT      # BACKGROUND,MAP_RMS,MAP_VARIANCE
                                      # or MAP_WEIGHT
WEIGHT_SUFFIX          _weight.fits    # Suffix to use for weight-maps
WEIGHT_IMAGE                           # Weightmap filename if suffix not used
                                      # (all or for each weight-map)
WEIGHT_THRESH                          # Bad pixel weight-threshold

#-------------------------------- Co-addition ----------------------------------

COMBINE                Y               # Combine resampled images (Y/N)?
COMBINE_TYPE           CHI2            # MEDIAN,AVERAGE,MIN,MAX,WEIGHTED,CHI2
                                      # or SUM
BLANK_BADPIXELS        N               # Set to 0 pixels having a weight of 0

#--------------------------------- Astrometry ----------------------------------

CELESTIAL_TYPE         NATIVE          # NATIVE, PIXEL, EQUATORIAL,
                                      # GALACTIC,ECLIPTIC, or SUPERGALACTIC
PROJECTION_TYPE        TAN             # Any WCS projection code or NONE
PROJECTION_ERR         0.001           # Maximum projection error (in output
                                      # pixels), or 0 for no approximation
CENTER_TYPE            MANUAL          # MANUAL, ALL or MOST
CENTER            22:15:31,-17:43:56   # Coordinates of the image center
PIXELSCALE_TYPE        MANUAL          # MANUAL,FIT,MIN,MAX or MEDIAN
PIXEL_SCALE            0.186           # Pixel scale
IMAGE_SIZE             19354,19354     # Image size (0 = AUTOMATIC)

#--------------------------------- Resampling ----------------------------------
```

```
RESAMPLE               Y                # Resample input images (Y/N)?
RESAMPLE_DIR           .                # Directory path for resampled images
RESAMPLE_SUFFIX        .resamp.fits     # filename extension for resampled images

RESAMPLING_TYPE        LANCZOS3         # NEAREST,BILINEAR,LANCZOS2,LANCZOS3
                                       # or LANCZOS4 (1 per axis)
OVERSAMPLING           0                # Oversampling in each dimension
                                       # (0 = automatic)
INTERPOLATE            Y                # Interpolate bad input pixels (Y/N)?
                                       # (all or for each image)

FSCALASTRO_TYPE        VARIABLE         # NONE,FIXED, or VARIABLE
FSCALE_KEYWORD         FLXSCALE         # FITS keyword for the multiplicative
                                       # factor applied to each input image
FSCALE_DEFAULT         1.0              # Default FSCALE value if not in header

GAIN_KEYWORD           GAIN             # FITS keyword for effect. gain (e-/ADU)
GAIN_DEFAULT           0.0              # Default gain if no FITS keyword found
                                       # 0 = infinity (all or for each image)
SATLEV_KEYWORD         SATURATE         # FITS keyword for saturation level (ADU)
SATLEV_DEFAULT         50000.0          # Default saturation if no FITS keyword

#-------------------------- Background subtraction ---------------------------

SUBTRACT_BACK          Y                # Subtraction sky background (Y/N)?
                                       # (all or for each image)

BACK_TYPE              AUTO             # AUTO or MANUAL
                                       # (all or for each image)
BACK_DEFAULT           0.0              # Default background value in MANUAL
                                       # (all or for each image)
BACK_SIZE              64               # Background mesh size (pixels)
                                       # (all or for each image)
BACK_FILTERSIZE        3                # Background map filter range (meshes)
                                       # (all or for each image)
BACK_FILTTHRESH        0.0              # Threshold above which the background-
                                       # map filter operates

#----------------------------- Memory management -----------------------------

VMEM_DIR               .                # Directory path for swap files
VMEM_MAX               2047             # Maximum amount of virtual memory (MB)
MEM_MAX                4096             # Maximum amount of usable RAM (MB)
COMBINE_BUFSIZE        1024             # RAM dedicated to co-addition(MB)

#------------------------------ Miscellaneous ---------------------------------

DELETE_TMPFILES        Y                # Delete temporary resampled FITS files
                                       # (Y/N)?
COPY_KEYWORDS          OBJECT,FILTER
                                       # List of FITS keywords to propagate
                                       # from the input to the output headers
WRITE_FILEINFO         Y                # Write information about each input
                                       # file in the output image header?
WRITE_XML              Y                # Write XML file (Y/N)?
XML_NAME               CFHTLS_D-85_gri_221531-174356_T0006_SWarp_chi2.xml
```

```
                               # Filename for XML output
XSL_URL                 http://releasix.iap.fr/xsl/swarp.xsl
                               # Filename for XSL style-sheet
VERBOSE_TYPE            NORMAL          # QUIET,NORMAL or FULL
NNODES                  1               # Number of nodes (for clusters)
NODE_INDEX              0               # Node index (for clusters)

NTHREADS                0               # Number of simultaneous threads for
                               # the SMP version of SWarp
                               # 0 = automatic
```

### 8.3.4 SExtractor .ldac catalogue configuration file for T0006 Deep

```
# Default configuration file for SExtractor 2.8.6
# EB 2009-04-09
#
# Last modified for CFHTLS-T0006 (Megacam):
# YG 2009-07-16

#-------------------------------- Catalog ------------------------------------

CATALOG_NAME     CFHTLS_D-85_y_100028+021230_T0006.ldac
  # name of the output catalog
CATALOG_TYPE     FITS_LDAC # NONE,ASCII,ASCII_HEAD, ASCII_SKYCAT,
# ASCII_VOTABLE, FITS_1.0 or FITS_LDAC
PARAMETERS_NAME  /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-auto.param
  # name of the file containing catalog contents

#------------------------------- Extraction ----------------------------------

DETECT_TYPE      CCD            # CCD (linear) or PHOTO (with gamma correction)
DETECT_MINAREA   3 # minimum number of pixels above threshold
THRESH_TYPE      RELATIVE # threshold type: RELATIVE (in sigmas)
                               # or ABSOLUTE (in ADUs)
DETECT_THRESH    1.0          # <sigmas> or <threshold>,<ZP> in mag.arcsec-2
ANALYSIS_THRESH  1.0 # <sigmas> or <threshold>,<ZP> in mag.arcsec-2

FILTER           Y              # apply filter for detection (Y or N)?
FILTER_NAME      /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-auto.conv
  # name of the file containing the filter
FILTER_THRESH                   # Threshold[s] for retina filtering

DEBLEND_NTHRESH  32             # Number of deblending sub-thresholds
DEBLEND_MINCONT  0.002 # Minimum contrast parameter for deblending

CLEAN            Y              # Clean spurious detections? (Y or N)?
CLEAN_PARAM      1.0            # Cleaning efficiency

MASK_TYPE        CORRECT        # type of detection MASKing: can be one of
                               # NONE, BLANK or CORRECT

#-------------------------------- WEIGHTing ----------------------------------

WEIGHT_TYPE      MAP_WEIGHT     # type of WEIGHTing: NONE, BACKGROUND,
                               # MAP_RMS, MAP_VAR or MAP_WEIGHT
WEIGHT_IMAGE     CFHTLS_D-85_y_100028+021230_T0006_weight.fits
  # weight-map filename
WEIGHT_GAIN      Y              # modulate gain (E/ADU) with weights? (Y/N)
WEIGHT_THRESH     # weight threshold[s] for bad pixels

#-------------------------------- FLAGging -----------------------------------

FLAG_IMAGE       flag.fits
  # filename for an input FLAG-image
FLAG_TYPE        OR             # flag pixel combination: OR, AND, MIN, MAX
                               # or MOST
```

```
#------------------------------ Photometry -----------------------------------

PHOT_APERTURES   16.,22. # MAG_APER aperture diameter(s) in pixels
PHOT_AUTOPARAMS  2.5, 3.5       # MAG_AUTO parameters: <Kron_fact>,<min_radius>
PHOT_PETROPARAMS 2.0, 3.5       # MAG_PETRO parameters: <Petrosian_fact>,
                               # <min_radius>
PHOT_AUTOAPERS   0.0,0.0        # <estimation>,<measurement> minimum apertures
                               # for MAG_AUTO and MAG_PETRO
PHOT_FLUXFRAC    0.2,0.5,0.8    # flux fraction[s] used for FLUX_RADIUS

SATUR_LEVEL      50000.0        # level (in ADUs) at which arises saturation
SATUR_KEY        TOTO       # keyword for saturation level (in ADUs)

MAG_ZEROPOINT    30.0 # magnitude zero-point
MAG_GAMMA        4.0            # gamma of emulsion (for photographic scans)
GAIN             0.0            # detector gain in e-/ADU
GAIN_KEY         GAIN           # keyword for detector gain in e-/ADU
PIXEL_SCALE      0              # size of pixel in arcsec (0=use FITS WCS info)

#------------------------- Star/Galaxy Separation ----------------------------

SEEING_FWHM      0.9 # stellar FWHM in arcsec
STARNNW_NAME     /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-auto.nnw
  # Neural-Network_Weight table filename

#------------------------------ Background -----------------------------------

BACK_TYPE        AUTO           # AUTO or MANUAL
BACK_VALUE       0.0            # Default background value in MANUAL mode
BACK_SIZE        128    # Background mesh: <size> or <width>,<height>
BACK_FILTERSIZE  3              # Background filter: <size> or <width>,<height>

BACKPHOTO_TYPE   GLOBAL         # can be GLOBAL or LOCAL
BACKPHOTO_THICK  24             # thickness of the background LOCAL annulus
BACK_FILTTHRESH  0.0            # Threshold above which the background-
                               # map filter operates

#------------------------------ Check Image ----------------------------------

CHECKIMAGE_TYPE  MINIBACKGROUND # can be NONE, BACKGROUND, BACKGROUND_RMS,
                               # MINIBACKGROUND, MINIBACK_RMS, -BACKGROUND,
                               # FILTERED, OBJECTS, -OBJECTS, SEGMENTATION,
                               # or APERTURES
CHECKIMAGE_NAME  CFHTLS_D-85_y_100028+021230_T0006_mbkg.fits
  # Filename for the check-image

#--------------------- Memory (change with caution!) -------------------------

MEMORY_OBJSTACK  3000           # number of objects in stack
MEMORY_PIXSTACK  300000         # number of pixels in stack
MEMORY_BUFSIZE   1024           # number of lines in buffer

#------------------------------- ASSOCiation ---------------------------------

ASSOC_NAME       sky.list       # name of the ASCII file to ASSOCiate
```

```
ASSOC_DATA       2,3,4          # columns of the data to replicate (0=all)
ASSOC_PARAMS     2,3,4          # columns of xpos,ypos[,mag]
ASSOC_RADIUS     2.0            # cross-matching radius (pixels)
ASSOC_TYPE       NEAREST        # ASSOCiation method: FIRST, NEAREST, MEAN,
                               # MAG_MEAN, SUM, MAG_SUM, MIN or MAX
ASSOCSELEC_TYPE  MATCHED        # ASSOC selection type: ALL, MATCHED or -MATCHED

#----------------------------- Miscellaneous ---------------------------------

VERBOSE_TYPE     NORMAL         # can be QUIET, NORMAL or FULL
WRITE_XML        Y  # Write XML file (Y/N)?
XML_NAME         CFHTLS_D-85_y_100028+021230_T0006_SExtr.xml
  # Filename for XML output
XSL_URL          http://releasix.iap.fr/xsl/sextractor.xsl
# Filename for XSL style-sheet
NTHREADS          0             # Number of simultaneous threads for
                               # the SMP version of SExtractor
                               # 0 = automatic

FITS_UNSIGNED    N              # Treat FITS integer values as unsigned (Y/N)?
INTERP_MAXXLAG   16             # Max. lag along X for 0-weight interpolation
INTERP_MAXYLAG   16             # Max. lag along Y for 0-weight interpolation
INTERP_TYPE      ALL            # Interpolation type: NONE, VAR_ONLY or ALL

#--------------------------- Experimental Stuff -----------------------------

PSF_NAME         default.psf    # File containing the PSF model
PSF_NMAX         9              # Max.number of PSFs fitted simultaneously
PSFDISPLAY_TYPE  SPLIT          # Catalog type for PSF-fitting: SPLIT or VECTOR
PATTERN_TYPE     RINGS-HARMONIC # can RINGS-QUADPOLE, RINGS-OCTOPOLE,
                               # RINGS-HARMONICS or GAUSS-LAGUERRE
SOM_NAME         default.som    # File containing Self-Organizing Map weights
```

### 8.3.5 SExtractor .cat DUAL MODE catalogue configuration file for T0006 Deep

```
# Default configuration file for SExtractor 2.8.6
# EB 2009-04-09
#
# Last modified for CFHTLS-T0006 chi2 (Megacam):
# YG 2009-07-17

#-------------------------------- Catalog ------------------------------------

CATALOG_NAME     CFHTLS_D-25_g_022559-042940_T0006.cat
  # name of the output catalog
CATALOG_TYPE     ASCII_HEAD # NONE,ASCII,ASCII_HEAD, ASCII_SKYCAT,
# ASCII_VOTABLE, FITS_1.0 or FITS_LDAC
PARAMETERS_NAME
/data/fcix5/raid1/youpi-INPUT/CFHTLS/T0006-Wide/SExtrConfig/config/sextr-dp.chi2.T0006
  # name of the file containing catalog contents

#------------------------------- Extraction ----------------------------------

DETECT_TYPE      CCD            # CCD (linear) or PHOTO (with gamma correction)
DETECT_MINAREA   3 # minimum number of pixels above threshold
THRESH_TYPE      ABSOLUTE # threshold type: RELATIVE (in sigmas)
                               # or ABSOLUTE (in ADUs)
DETECT_THRESH    0.4          # <sigmas> or <threshold>,<ZP> in mag.arcsec-2
ANALYSIS_THRESH  0.4 # <sigmas> or <threshold>,<ZP> in mag.arcsec-2

FILTER           Y              # apply filter for detection (Y or N)?
FILTER_NAME      /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-autochi2.conv
  # name of the file containing the filter
FILTER_THRESH                   # Threshold[s] for retina filtering

DEBLEND_NTHRESH  32             # Number of deblending sub-thresholds
DEBLEND_MINCONT  0.002 # Minimum contrast parameter for deblending

CLEAN            Y              # Clean spurious detections? (Y or N)?
CLEAN_PARAM      1.0            # Cleaning efficiency

MASK_TYPE        CORRECT        # type of detection MASKing: can be one of
                               # NONE, BLANK or CORRECT

#-------------------------------- WEIGHTing ----------------------------------

WEIGHT_TYPE      MAP_WEIGHT,MAP_WEIGHT
          # type of WEIGHTing: NONE, BACKGROUND,
                               # MAP_RMS, MAP_VAR or MAP_WEIGHT
WEIGHT_IMAGE     CFHTLS_D-25_gri_022559-042940_T0006_weight.fits,
                CFHTLS_D-25_g_022559-042940_T0006_weight.fits
  # weight-map filename
WEIGHT_GAIN      Y              # modulate gain (E/ADU) with weights? (Y/N)
WEIGHT_THRESH     # weight threshold[s] for bad pixels

#-------------------------------- FLAGging -----------------------------------

FLAG_IMAGE       flag.fits
```

```
  # filename for an input FLAG-image
FLAG_TYPE        OR             # flag pixel combination: OR, AND, MIN, MAX
                               # or MOST

#------------------------------ Photometry ---------------------------------

PHOT_APERTURES   10.,12.,14.,16.,18.,20.,22.,24.,26.,28.,30.,32.,34.,36.,38.,
                40.,42.,44.,46.,48.,50.,52.,54.,56.,58.,60.
  # MAG_APER aperture diameter(s) in pixels
PHOT_AUTOPARAMS  2.5, 3.5       # MAG_AUTO parameters: <Kron_fact>,<min_radius>
PHOT_PETROPARAMS 2.0, 3.5       # MAG_PETRO parameters: <Petrosian_fact>,
                               # <min_radius>
PHOT_AUTOAPERS   16.0,16.0      # <estimation>,<measurement> minimum apertures
                               # for MAG_AUTO and MAG_PETRO
PHOT_FLUXFRAC    0.2,0.5,0.8    # flux fraction[s] used for FLUX_RADIUS

SATUR_LEVEL      50000.0        # level (in ADUs) at which arises saturation
SATUR_KEY        TOTO       # keyword for saturation level (in ADUs)

MAG_ZEROPOINT    30.0 # magnitude zero-point
MAG_GAMMA        4.0            # gamma of emulsion (for photographic scans)
GAIN             0.0            # detector gain in e-/ADU
GAIN_KEY         GAIN           # keyword for detector gain in e-/ADU
PIXEL_SCALE      0              # size of pixel in arcsec (0=use FITS WCS info)

#------------------------- Star/Galaxy Separation ----------------------------

SEEING_FWHM      0.9 # stellar FWHM in arcsec
STARNNW_NAME     /data/fcix5/raid1/youpi-INPUT/CFHTLS/config/default-autochi2.nnw
  # Neural-Network_Weight table filename

#------------------------------ Background -----------------------------------

BACK_TYPE        AUTO           # AUTO or MANUAL
BACK_VALUE       0.0            # Default background value in MANUAL mode
BACK_SIZE        256    # Background mesh: <size> or <width>,<height>
BACK_FILTERSIZE  9              # Background filter: <size> or <width>,<height>

BACKPHOTO_TYPE   LOCAL          # can be GLOBAL or LOCAL
BACKPHOTO_THICK  30             # thickness of the background LOCAL annulus
BACK_FILTTHRESH  0.0            # Threshold above which the background-
                               # map filter operates

#------------------------------ Check Image ----------------------------------

CHECKIMAGE_TYPE  MINIBACKGROUND # can be NONE, BACKGROUND, BACKGROUND_RMS,
                               # MINIBACKGROUND, MINIBACK_RMS, -BACKGROUND,
                               # FILTERED, OBJECTS, -OBJECTS, SEGMENTATION,
                               # or APERTURES
CHECKIMAGE_NAME  CFHTLS_D-25_g_022559-042940_T0006_mbkg_chi2.fits
  # Filename for the check-image

#--------------------- Memory (change with caution!) -------------------------

MEMORY_OBJSTACK  5000           # number of objects in stack
MEMORY_PIXSTACK  1000000        # number of pixels in stack
```

```
MEMORY_BUFSIZE   1024           # number of lines in buffer

#------------------------------ ASSOCiation ---------------------------------

ASSOC_NAME       sky.list       # name of the ASCII file to ASSOCiate
ASSOC_DATA       2,3,4          # columns of the data to replicate (0=all)
ASSOC_PARAMS     2,3,4          # columns of xpos,ypos[,mag]
ASSOC_RADIUS     2.0            # cross-matching radius (pixels)
ASSOC_TYPE       NEAREST        # ASSOCiation method: FIRST, NEAREST, MEAN,
                               # MAG_MEAN, SUM, MAG_SUM, MIN or MAX
ASSOCSELEC_TYPE  MATCHED        # ASSOC selection type: ALL, MATCHED or -MATCHED

#---------------------------- Miscellaneous ---------------------------------

VERBOSE_TYPE     NORMAL         # can be QUIET, NORMAL or FULL
WRITE_XML        Y  # Write XML file (Y/N)?
XML_NAME         CFHTLS_D-25_g_022559-042940_T0006_SExtr_chi2.xml
  # Filename for XML output
XSL_URL          http://releasix.iap.fr/xsl/sextractor.xsl
# Filename for XSL style-sheet
NTHREADS          0             # Number of simultaneous threads for
                               # the SMP version of SExtractor
                               # 0 = automatic

FITS_UNSIGNED    N              # Treat FITS integer values as unsigned (Y/N)?
INTERP_MAXXLAG   16             # Max. lag along X for 0-weight interpolation
INTERP_MAXYLAG   16             # Max. lag along Y for 0-weight interpolation
INTERP_TYPE      ALL            # Interpolation type: NONE, VAR_ONLY or ALL

#--------------------------- Experimental Stuff -----------------------------

PSF_NAME         default.psf    # File containing the PSF model
PSF_NMAX         9              # Max.number of PSFs fitted simultaneously
PSFDISPLAY_TYPE  SPLIT          # Catalog type for PSF-fitting: SPLIT or VECTOR
PATTERN_TYPE     RINGS-HARMONIC # can RINGS-QUADPOLE, RINGS-OCTOPOLE,
                               # RINGS-HARMONICS or GAUSS-LAGUERRE
SOM_NAME         default.som    # File containing Self-Organizing Map weights
```

## 8.4 Supplementary documents and references

- T0006 :
  - Release pages : http://terapix.iap.fr/rubrique.php?id_rubrique=259
  - T0006 synoptic table: http://terapix.iap.fr/cplt/table_syn_T0006.html
- TERAPIX home page http://terapix.iap.fr/
- Official CFHTLS web page : http://www.cfht.hawaii.edu/Science/CFHTLS/
- MegaCam:
  - Boulade et al 2003: http://adsabs.harvard.edu/abs/2003SPIE.4841...72B
  - Boulade et al 2000: http://adsabs.harvard.edu/abs/2000SPIE.4008..657B
  - CFHT pages : http://www.cfht.hawaii.edu/Instruments/Imaging/MegaPrime/
- CADC access to CFHTLS data products http://www.cadc.hia.nrc.gc.ca/cfht/cfhtls/ (restricted access to T0006)
- Youpi:
  - Home page http://youpi.terapix.fr
  - Pipeline description: Monnerville & Sémah 2009 http://www.adass2009.jp/demos_bof/#1
- SCAMP:
  - Bertin 2006 : http://adsabs.harvard.edu/cgi-bin/nph-bib_query?bibcode=2006ASPC..351..112B&data_type=
  - http://astromatic.iap.fr/software/scamp
- SWARP : http://astromatic.iap.fr/software/swarp
- SExtractor : http://astromatic.iap.fr/software/sextractor
- Weightwatcher : http://adsabs.harvard.edu/abs/2008ASPC..394..619M
- ELIXIR :
  - Magnier & Cuillandre 2004: http://adsabs.harvard.edu/abs/2004PASP..116..449M
  - ELIXIR page : http://www.cfht.hawaii.edu/Instruments/Elixir/
- MegaCam-SDSS color transformation equations: Regnault et al 2009; arXiv:0908.3808
- Schlegel et al dust map : http://adsabs.harvard.edu/abs/1998ApJ...500..525S
- SDSS Data Release R6 : http://www.sdss.org
- Stellar Locus Regression : High et al 2009; arXiv:0903.5302
- 2MASS catalogue; explanatory supplement: http://www.ipac.caltech.edu/2mass/releases/allsky/doc/explsup.html