

VST/OmegaCAM Data Products Meeting

ESO Garching Quality Control: Closing the loop with Paranal

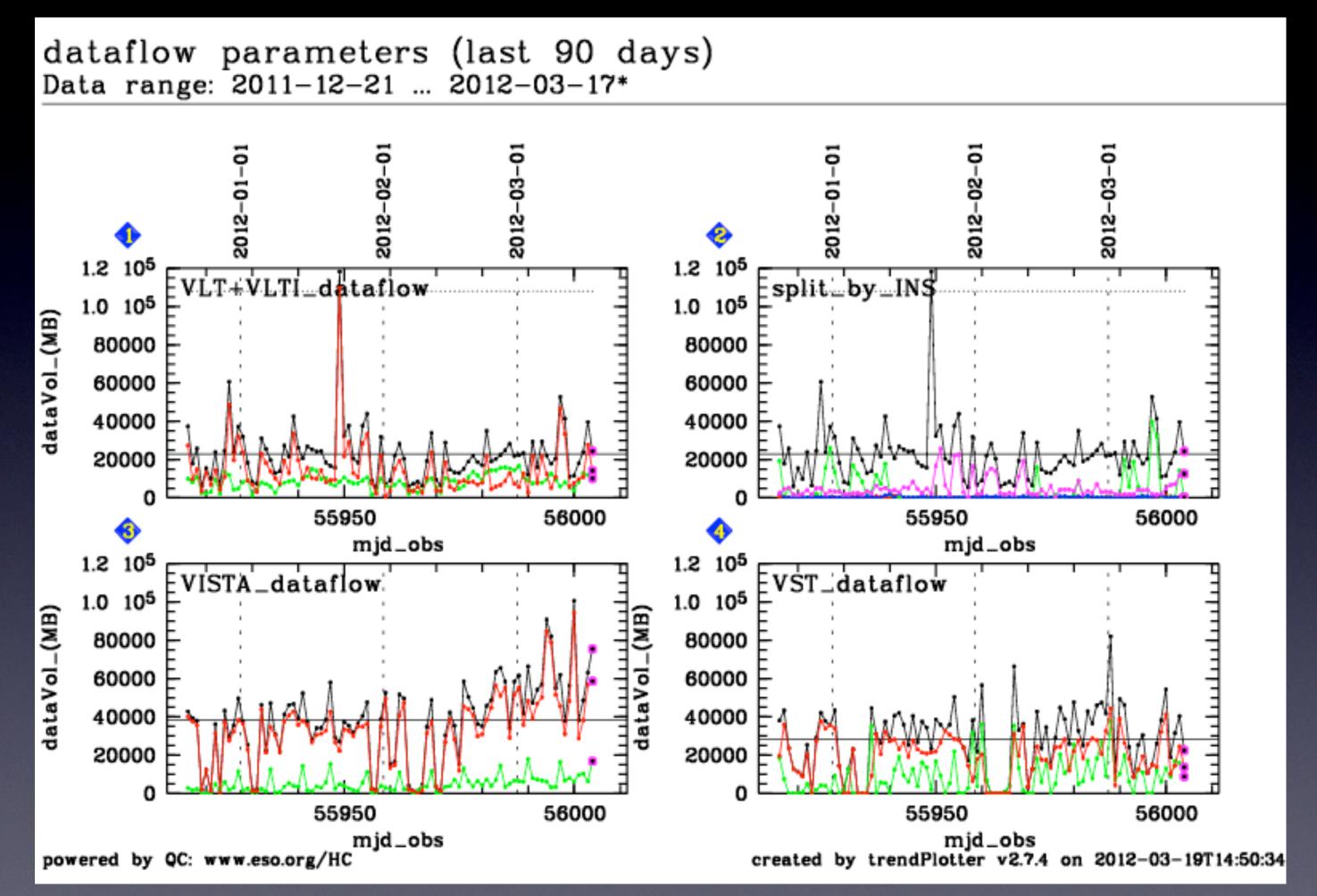
Mark Neeser
(Quality Control Group & ESO Survey Team)

Garching Quality Control: Closing the loop with Paranal

Quality control goals:

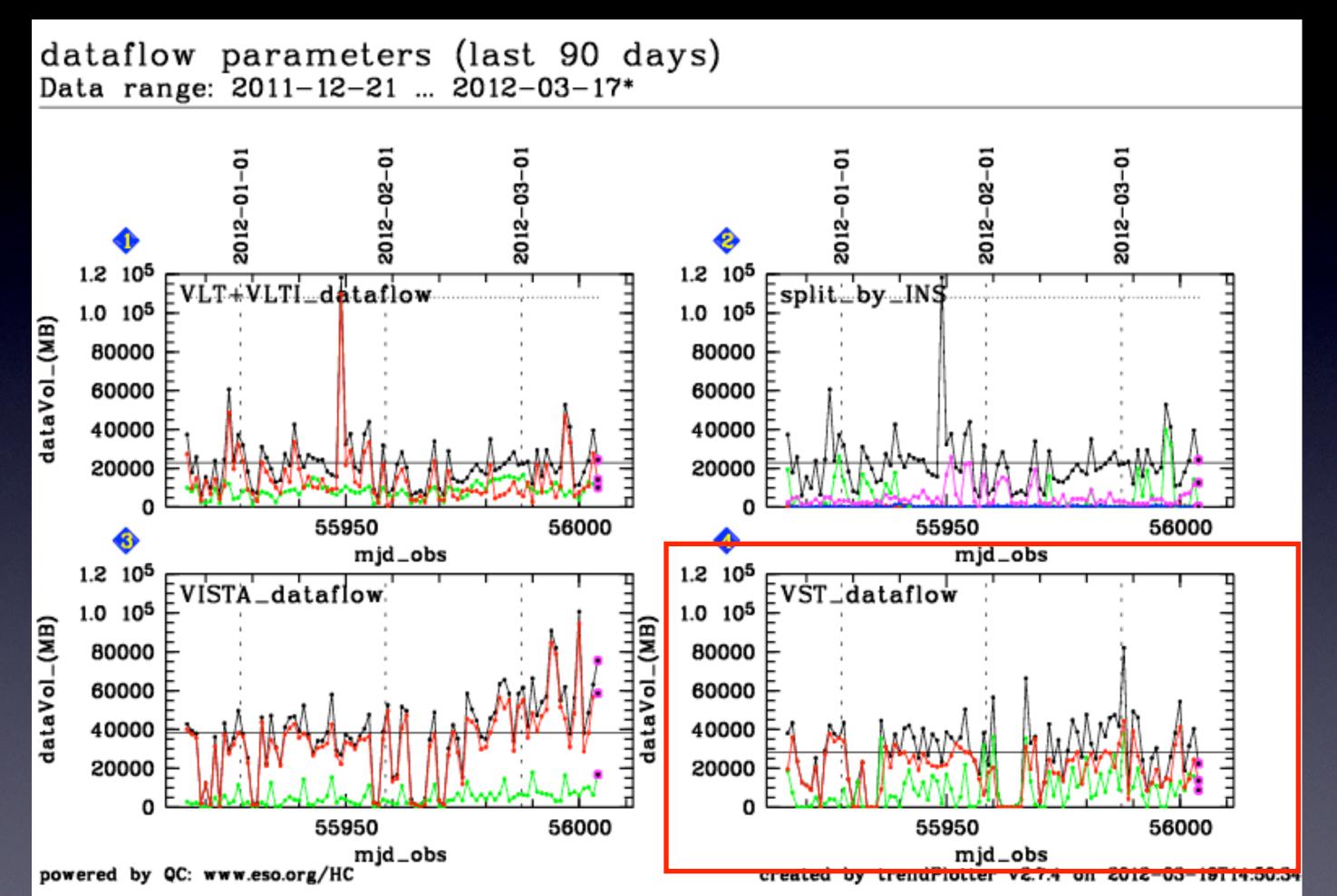
- ensure that the instrument is operating nominally
- for each night ensure that calibration data is complete for all science observing blocks executed
- pipeline process all calibrations, check their quality (certify), and store products in the archive
- pipeline process > 10% of science data & confirm the quality
- and do this with 0.40 FTE's (will become 0.20 FTE's from July 2012)

VST/OmegaCAM data rate exceeds that of all I4VLT/VLTI instruments combined and is comparable to that of VISTA/VIRCAM ~30 GB/night (average compressed)



total
science only
calibration only

VST/OmegaCAM data rate exceeds that of all I4VLT/VLTI instruments combined and is comparable to that of VISTA/VIRCAM ~30 GB/night (average compressed)

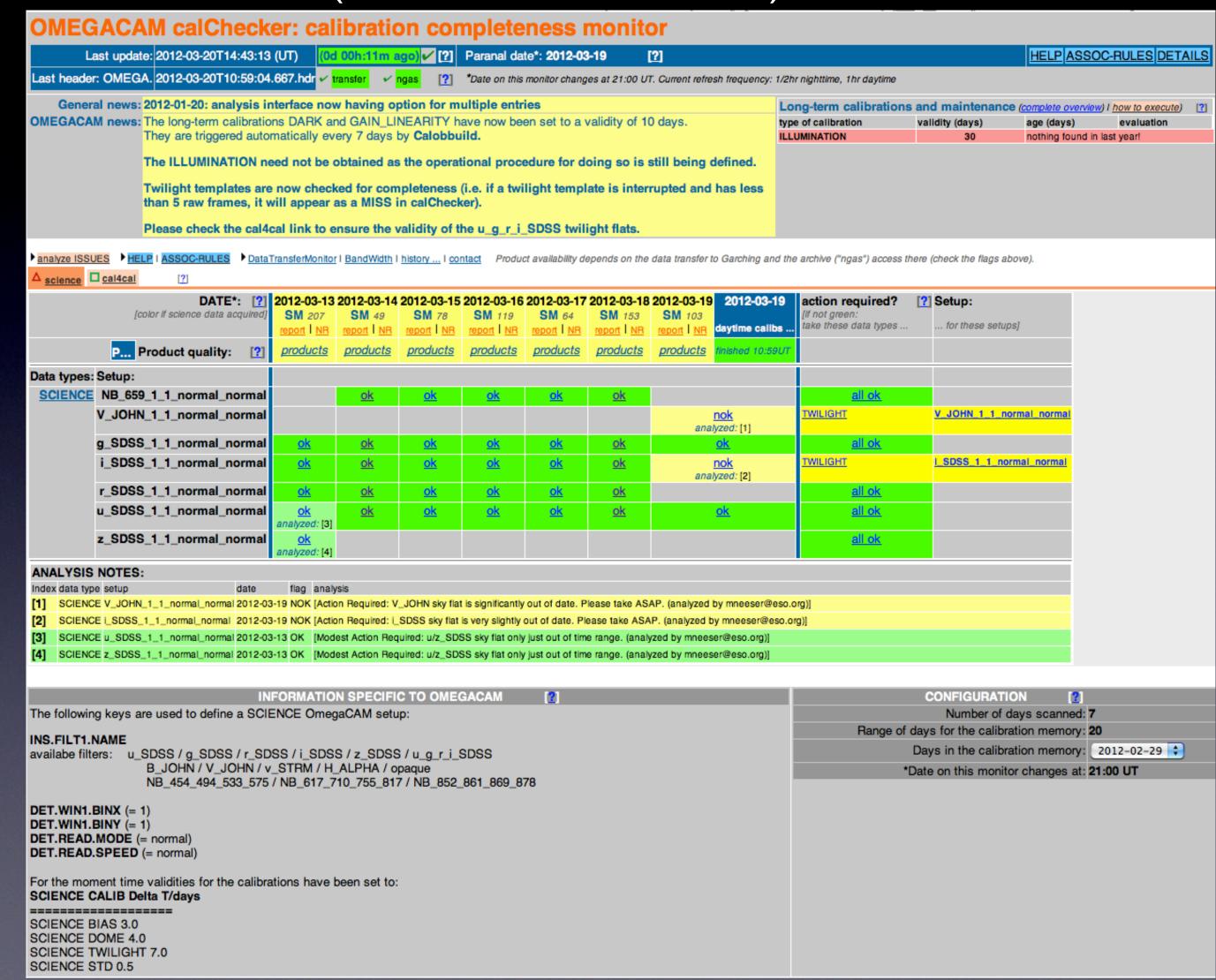


total
science only
calibration only

Quality Control workflow

- via a close interaction with Paranal Science Operations and User Support
- as automated as possible via incremental and automatic processing 24/7:
- headers are used to match calibration data and define dependencies
- check for new calibration data once per hour and pipeline process them
- ancillary scripts evaluate pipeline products for QC and create images and plots of crucial parameters (currently, 1090 / 32 parameters).
- scores are calculated => all QC parameters are compared to configured thresholds and graded as OK/NOK (currently, 1090 parameters monitored)
- all this information is accessible on the web

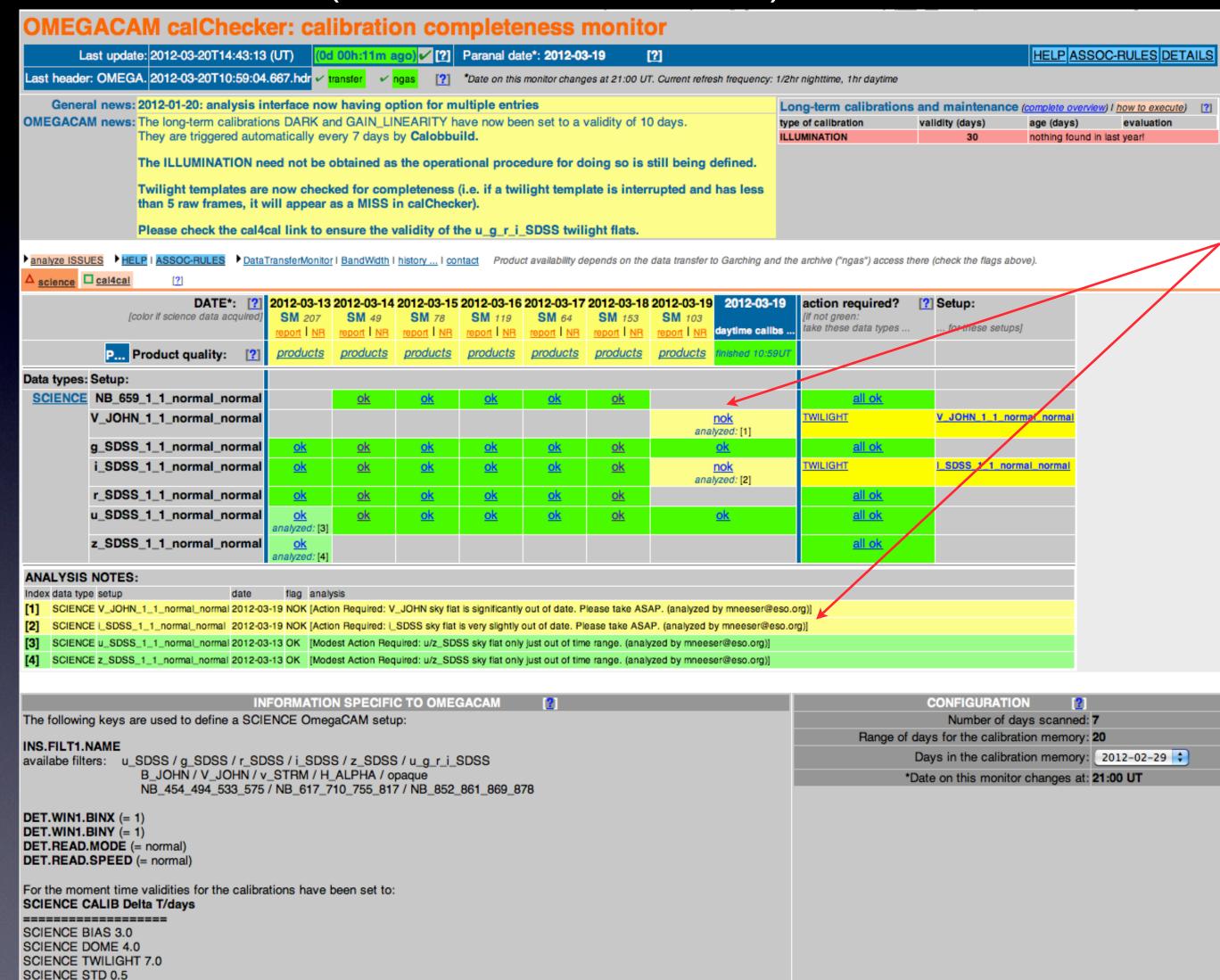
I. CalChecker (Calibration Checker)



Real-time feed-back to Paranal that all science data have adequate calibrations (updated every 30 minutes).

LIVE version: calChecker OmegaCAM

I. CalChecker (Calibration Checker)

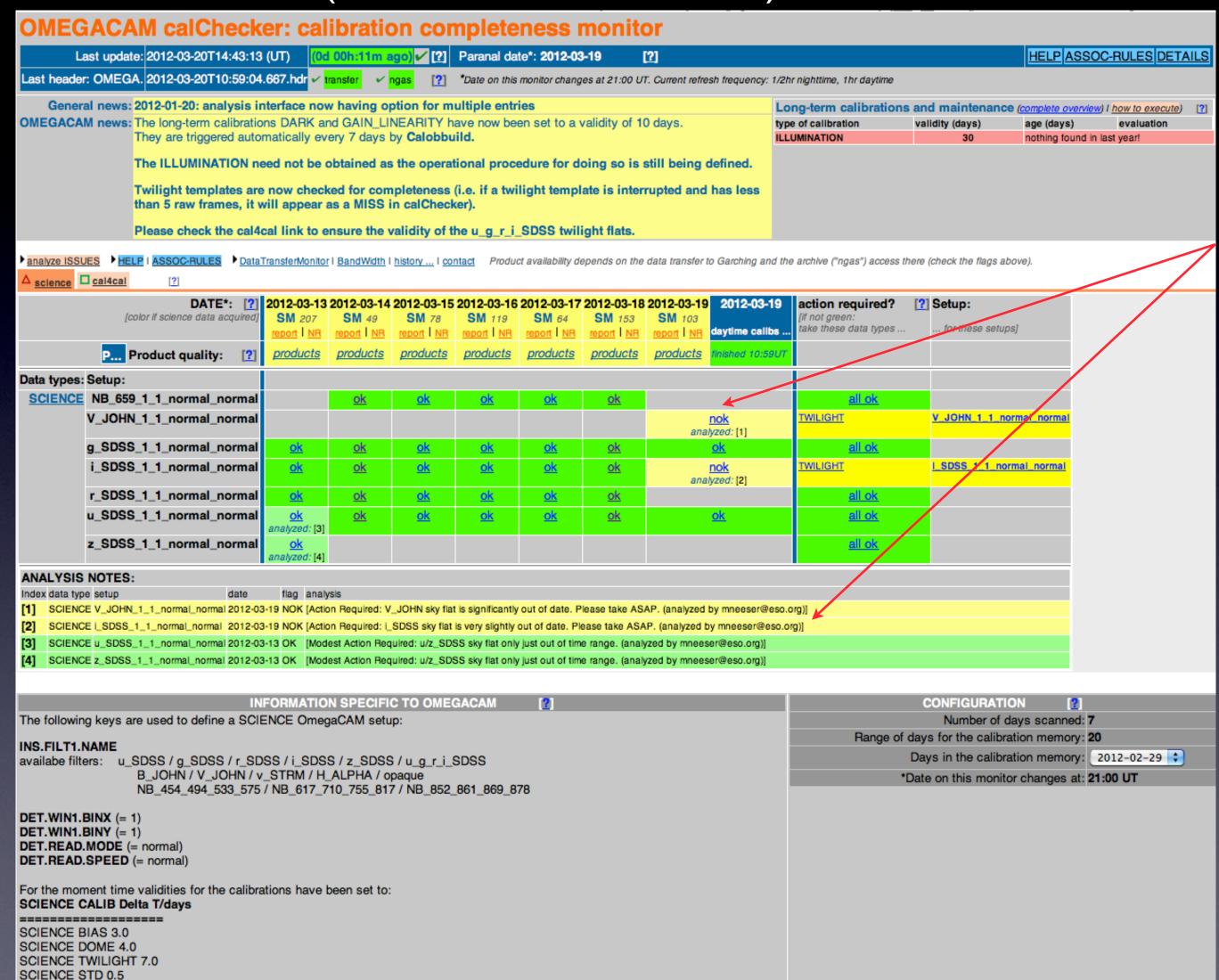


Real-time feed-back to Paranal that all science data have adequate calibrations (updated every 30 minutes).

When not, Paranal is informed and can act.

LIVE version: calChecker OmegaCAM

I. CalChecker (Calibration Checker)



Real-time feed-back to Paranal that all science data have adequate calibrations (updated every 30 minutes).

When not, Paranal is informed and can act.

Also includes long-term calibrations (darks, shutter test, linearity-gain, etc.)

And, ugri_SDSS flats for polar field (cal4cal).

LIVE version: calChecker OmegaCAM

1. CalChecker (Ca close window This is the detailed calChecker report about the calibrations for all science OBs for the - OB comments are truncated after 40 characters. Point your mouse on the comment field to **OMEGACAM** calChecker: calibratio indicated date. read the full comment, or check the nightlog ('NR'). All science data with PROG_ID starting with 60. or 060. are ignored. - If there are multiple comments for the same OB in the same night, only the last comment is - This report flags calibrations that are formally missing (marked in yellow or red). In displayed. Last update: 2012-03-20T14:43:13 (UT) exceptional cases, this formal result may be overridden by the analysis of the QC scientist - The table is sortable. (as indicated in the ANALYSIS notes). Then this analysis result, as displayed on the main Press Shift key for multiple column sorting. Last header: OMEGA. 2012-03-20T10:59:04.667.hdr transfer calChecker interface, is the final word. Default sorting is by DATA_TYPE, SETUP and RAW_FILE. Restore default sorting with the browser refresh button. General news: 2012-01-20: analysis interface now having opt OMEGACAM news: The long-term calibrations DARK and GA N_LIN bottom | report | NR They are triggered automatically every 7 days by OBs: 607051 610866 611711 611737 611922 611945 612117 61205 61218 612491 612105 612108 631084 631084 631081 631111 631114 631117 631120 631103 631084 631087 631090 631093 631090 631093 631090 631093 631090 631000 631126 631129 The ILLUMINATION need not be obtained as **♦ OBS ID ♦ GRD ♦ OB Comm.** (first) RAW FILE DATA TYPE ▲ SETUP CALIBRATIONS PROG ID MODE Twilight templates are now checked for comp 2012-03-19 177.A-3016(C) 612117 OMEGA.2012-03-20T00:48:57.221.fits SCIENCE g SDSS 1 1 normal normal WILIGHT: -1.07 STD: -0.05 than 5 raw frames, it will appear as a MISS in 177.A-3016(C) OMEGA.2012-03-20T01:10:42.254.fits g_SDSS_1_1_normal_normal 2012-03-19 611922 n/a SCIENCE TD: -0.07 Please check the cal4cal link to ensure the va 2012-03-19 OMEGA.2012-03-20T06:46:59.046.fits 177.A-3016(C) 612936 n/a SCIENCE g_SDSS_1_1_normal_normal TD: -0.10 VILIGHT: -1.32 2012-03-19 177.A-3016(C) SM 612962 OMEGA.2012-03-20T07:12:23.230.fits SCIENCE g_SDSS_1_1_normal_normal ILIGHT: -1.33 TD: -0.12 n/a Panalyze ISSUES → HELP | ASSOC-RULES → DataTransferMonitor | BandWidth | I OMEGA.2012-03-20T07:47:09.542.fits g SDSS 1 1 normal normal 2012-03-19 177.A-3016(C) 612715 n/a SCIENCE TD: -0.14 △ science □ cal4cal 2012-03-19 SCIENCE 088.A-4008(G) 607051 n/a OMEGA.2012-03-20T08:10:23.426.fits i_SDSS_1_1_normal_normal WILIGHT: -7.37 TD: -0.16 611737 OMEGA.2012-03-20T00:25:09.887.fits SCIENCE u_SDSS_1_1_normal_normal TD: -0.04 2012-03-19 177.A-3016(C) n/a DME: 0.39 ILIGHT: -4.06 DATE*: [?] 2012-03-13 2012-03-14 2 2012-03-19 177.A-3016(C) 611945 n/a OMEGA.2012-03-20T01:33:22.037.fits SCIENCE u SDSS 1 1 normal normal TD: -0.09 [color if science data acquired SM 49 2012-03-19 177.A-3016(C) 612205 n/a OMEGA.2012-03-20T01:58:49.303.fits SCIENCE u_SDSS_1_1_normal_normal ILIGHT: -4.12 TD: 0.09 612218 2012-03-19 177.A-3016(C) SM OMEGA.2012-03-20T02:23:50.177.fits SCIENCE u_SDSS_1_1_normal_normal OME: 0.31 ILIGHT: -4.14 TD: 0.08 n/a P... Product quality: products products 177.A-3016(C) SCIENCE 2012-03-19 611711 n/a OMEGA.2012-03-20T02:48:10.373.fits u_SDSS_1_1_normal_normal ILIGHT: -4.16 TD: 0.06 Data types: Setup: 2012-03-19 177.A-3016(C) 612478 OMEGA.2012-03-20T03:12:44.057.fits SCIENCE u_SDSS_1_1_normal_normal ME: 0.28 ILIGHT: -4.17 TD: 0.04 OMEGA.2012-03-20T03:35:18.210.fits SCIENCE NB_659_1_1_normal_normal 2012-03-19 177.A-3016(C) SM 612725 n/a SCIENCE u_SDSS_1_1_normal_normal ME: 0.26 ILIGHT: -4.19 TD: 0.03 177.A-3016(C) OMEGA.2012-03-20T03:57:47.294.fits 2012-03-19 SM 612738 n/a SCIENCE u_SDSS_1_1_normal_normal BIAS: 0.28 DME: 0.24 /ILIGHT: -4.21 TD: 0.01 V_JOHN_1_1_normal_normal 2012-03-19 177.A-3016(C) 612491 OMEGA.2012-03-20T04:46:31.464.fits SCIENCE u_SDSS_1_1_normal_normal ILIGHT: -4.24 STD: -0.02 DME: 0.21 g_SDSS_1_1_normal_normal <u>ok</u> 2012-03-19 177.A-3011(C) SM 631081 n/a OMEGA.2012-03-20T05:27:58.028.fits SCIENCE u_SDSS_1_1_normal_normal TD: -0.05 2012-03-19 177.A-3011(C) SM 631084 n/a OMEGA.2012-03-20T05:32:11.710.fits SCIENCE u_SDSS_1_1_normal_normal VILIGHT: -4.27 TD: -0.05 i_SDSS_1_1_normal_normal BIAS: 0.22 OME: 0.18 <u>ok</u> 631087 OMEGA.2012-03-20T05:36:17.123.fits SCIENCE 2012-03-19 177.A-3011(C) n/a u_SDSS_1_1_normal_normal TD: -0.05 r_SDSS_1_1_normal_normal <u>ok</u> 177.A-3011(C) OMEGA.2012-03-20T05:40:21.336.fits u_SDSS_1_1_normal_normal 2012-03-19 631090 n/a SCIENCE DME: 0.18 ILIGHT: -4.27 TD: -0.06 OMEGA.2012-03-20T05:44:31.189.fits u_SDSS_1_1_normal_normal <u>ok</u> 2012-03-19 631093 n/a SCIENCE u_SDSS_1_1_normal_normal VILIGHT: -4.27 177.A-3011(C) OME: 0.17 TD: -0.06 2012-03-19 177.A-3011(C) SM 631096 OMEGA.2012-03-20T05:48:36.002.fits SCIENCE u_SDSS_1_1_normal_normal ILIGHT: -4.28 TD: -0.06 n/a z_SDSS_1_1_normal_normal 177.A-3011(C) 2012-03-19 631099 n/a OMEGA.2012-03-20T05:52:39.033.fits SCIENCE u_SDSS_1_1_normal_normal /ILIGHT: -4.28 TD: -0.06 177.A-3011(C) SCIENCE 2012-03-19 631102 n/a OMEGA.2012-03-20T05:56:42.875.fits u_SDSS_1_1_normal_normal DME: 0.17 ILIGHT: -4.28 TD: -0.07 ANALYSIS NOTES: 631105 OMEGA.2012-03-20T06:05:09.070.fits SCIENCE u_SDSS_1_1_normal_normal 2012-03-19 177.A-3011(C) n/a DME: 0.16 ILIGHT: -4.29 TD: -0.07 Index data type setup flag analysis 2012-03-19 177.A-3011(C) 631108 n/a OMEGA.2012-03-20T06:09:15.403.fits SCIENCE u SDSS 1 1 normal normal TD: -0.07 SCIENCE V_JOHN_1_1_normal_normal 2012-03-19 NOK [Action Required: V 2012-03-19 177.A-3011(C) 631111 OMEGA.2012-03-20T06:13:17.226.fits SCIENCE u_SDSS_1_1_normal_normal ILIGHT: -4.29 TD: -0.08 SCIENCE | SDSS_1_1_normal_normal | 2012-03-19 NOK [Action Required: | S 2012-03-19 631114 177.A-3011(C) SM OMEGA.2012-03-20T06:17:16.018.fits SCIENCE u_SDSS_1_1_normal_normal OME: 0.15 VILIGHT: -4.30 TD: -0.08 n/a SCIENCE u_SDSS_1_1_normal_normal 2012-03-13 OK [Modest Action Requ 177.A-3011(C) SCIENCE 2012-03-19 631117 n/a OMEGA.2012-03-20T06:21:25.470.fits u_SDSS_1_1_normal_normal /ILIGHT: -4.30 TD: -0.08 SCIENCE z_SDSS_1_1_normal_normal 2012-03-13 OK [Modest Action Requ 2012-03-19 177.A-3011(C) 631120 OMEGA.2012-03-20T06:25:33.173.fits SCIENCE u_SDSS_1_1_normal_normal DME: 0.15 ILIGHT: -4.30 TD: -0.09 2012-03-19 177.A-3011(C) SM 631123 n/a OMEGA.2012-03-20T06:29:38.386.fits SCIENCE u_SDSS_1_1_normal_normal ILIGHT: -4.31 TD: -0.09 177.A-3011(C) SM 631126 n/a OMEGA.2012-03-20T06:33:41.618.fits SCIENCE u_SDSS_1_1_normal_normal 2012-03-19 BIAS: 0.17 OME: 0.14 /ILIGHT: -4.31 TD: -0.09 INFORMATION SPECIFIC 631129 OMEGA.2012-03-20T06:37:44.941.fits SCIENCE TD: -0.10 2012-03-19 177.A-3011(C) n/a u_SDSS_1_1_normal_normal The following keys are used to define a SCIENCE OmegaCAM setup 2012-03-19 088.A-4005(A) SM 610866 OMEGA.2012-03-20T08:37:31.532.fits SCIENCE WILIGHT: -16.39 TD: 0.02 V_JOHN_1_1_normal_normal INS.FILT1.NAME SETUP PROG_ID MODE OBS_ID OB Comm. (first) RAW FILE DATA TYPE CALIBRATIONS availabe filters: u_SDSS / g_SDSS / r_SDSS / i_SDSS / z_SDSS B JOHN / V_JOHN / v_STRM / H_ALPHA / op. NB_454_494_533_575 / NB_617_710_755_817 / NB_852_861_869_878 DET.WIN1.BINX (= 1) DET.WIN1.BINY (= 1) LIVE version: DET.READ.MODE (= normal) DET.READ.SPEED (= normal) calChecker OmegaCAM

Calibration report for all OMEGACAM science files, for date 2012-03-19

For the moment time validities for the calibrations have been set to:

SCIENCE CALIB Delta T/days ______ SCIENCE BIAS 3.0 SCIENCE DOME 4.0 SCIENCE TWILIGHT 7.0

SCIENCE STD 0.5

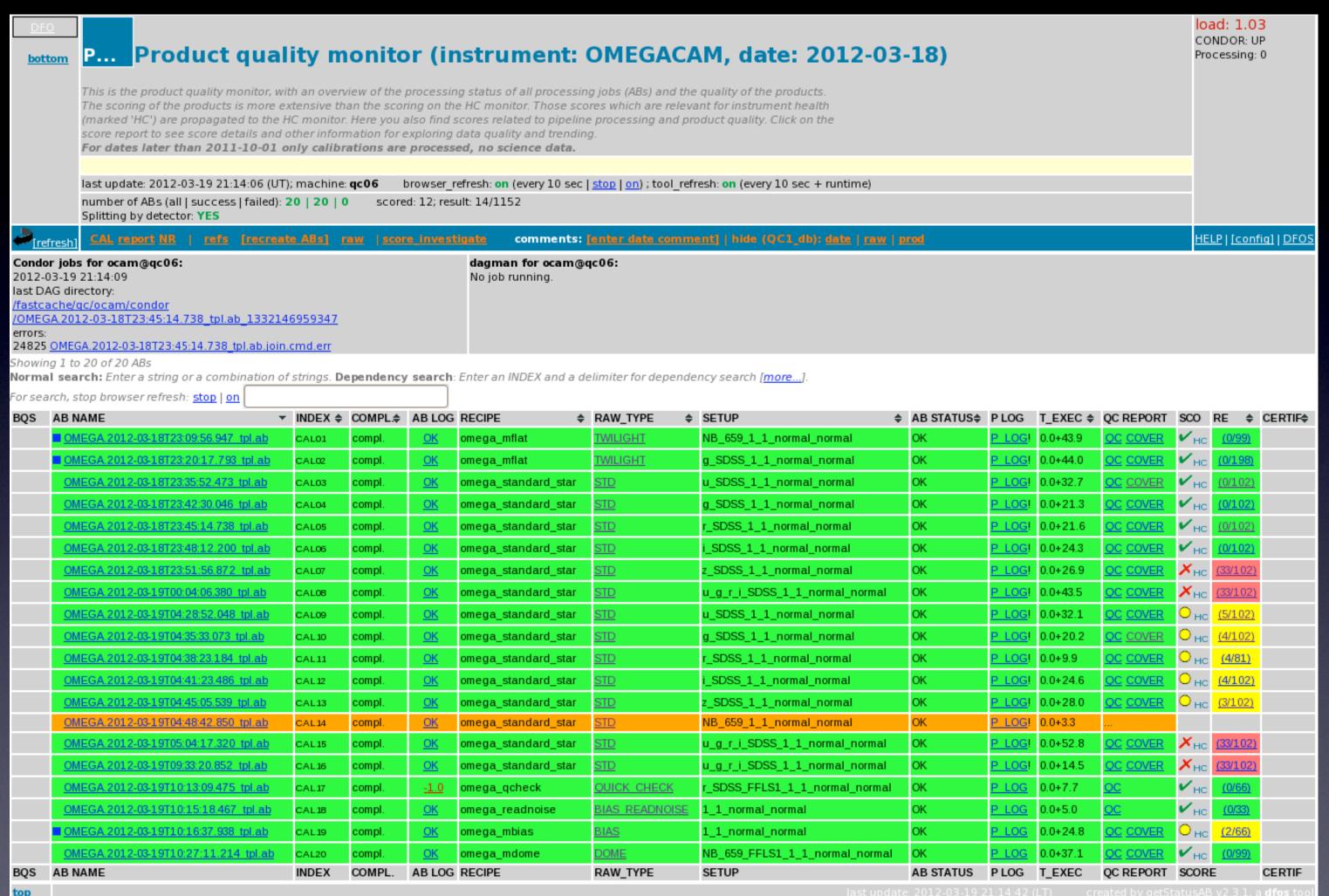
VST Data Products Meeting March 21, 2012

Quality Control workflow continued

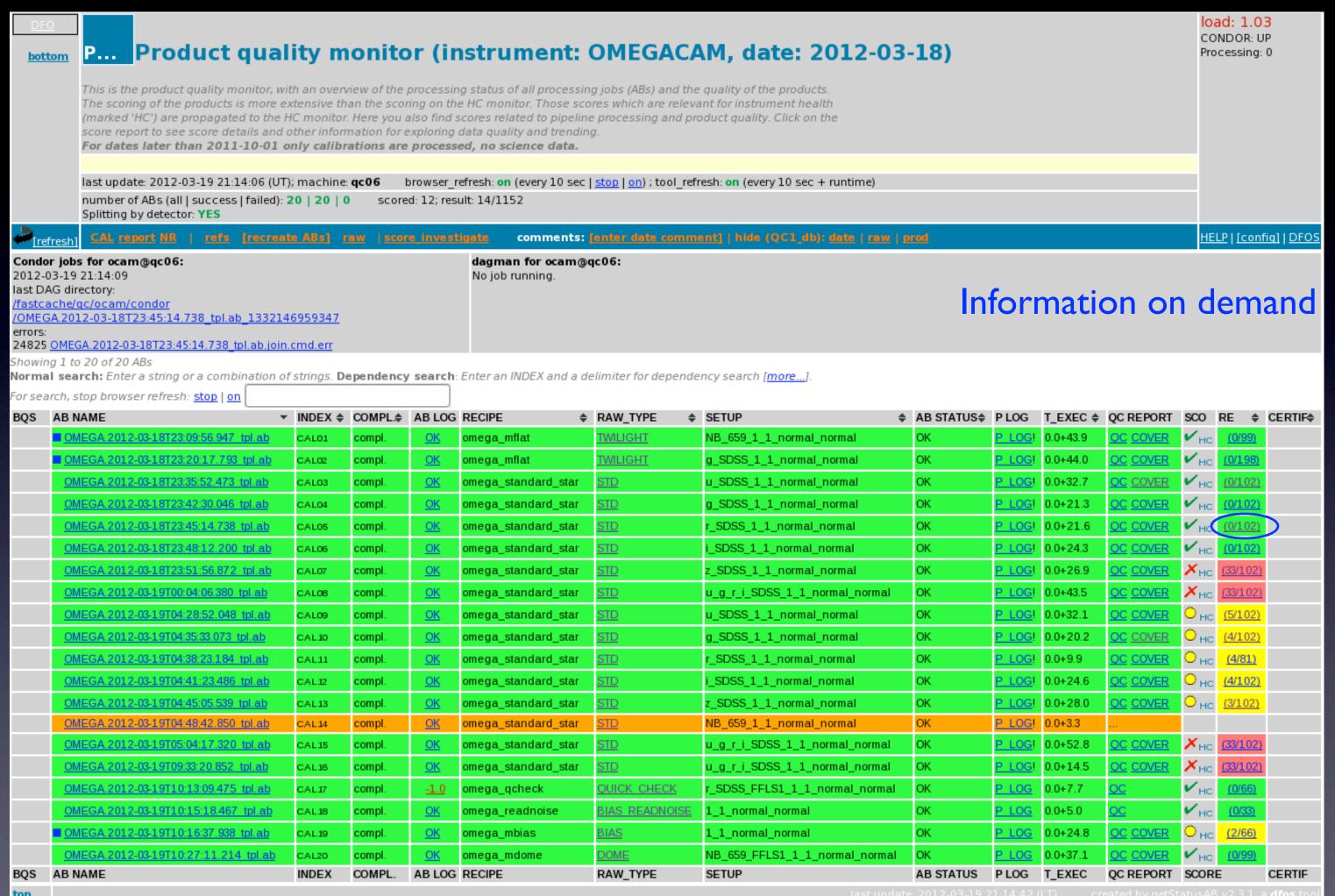
Quality Control review and certification:

- done off-line on the results of the automated data matching and data processing
- all red scores are reviewed
- all monitored QC parameters are put in a data base, most of which are plotted (published as Health Check plots)
- any issues (mostly red scores) are analyzed and if necessary communicated to SciOps/USD.
- calibrations are then rejected or certified
- all results are published on the web
- certified calibration products are ingested into the archive

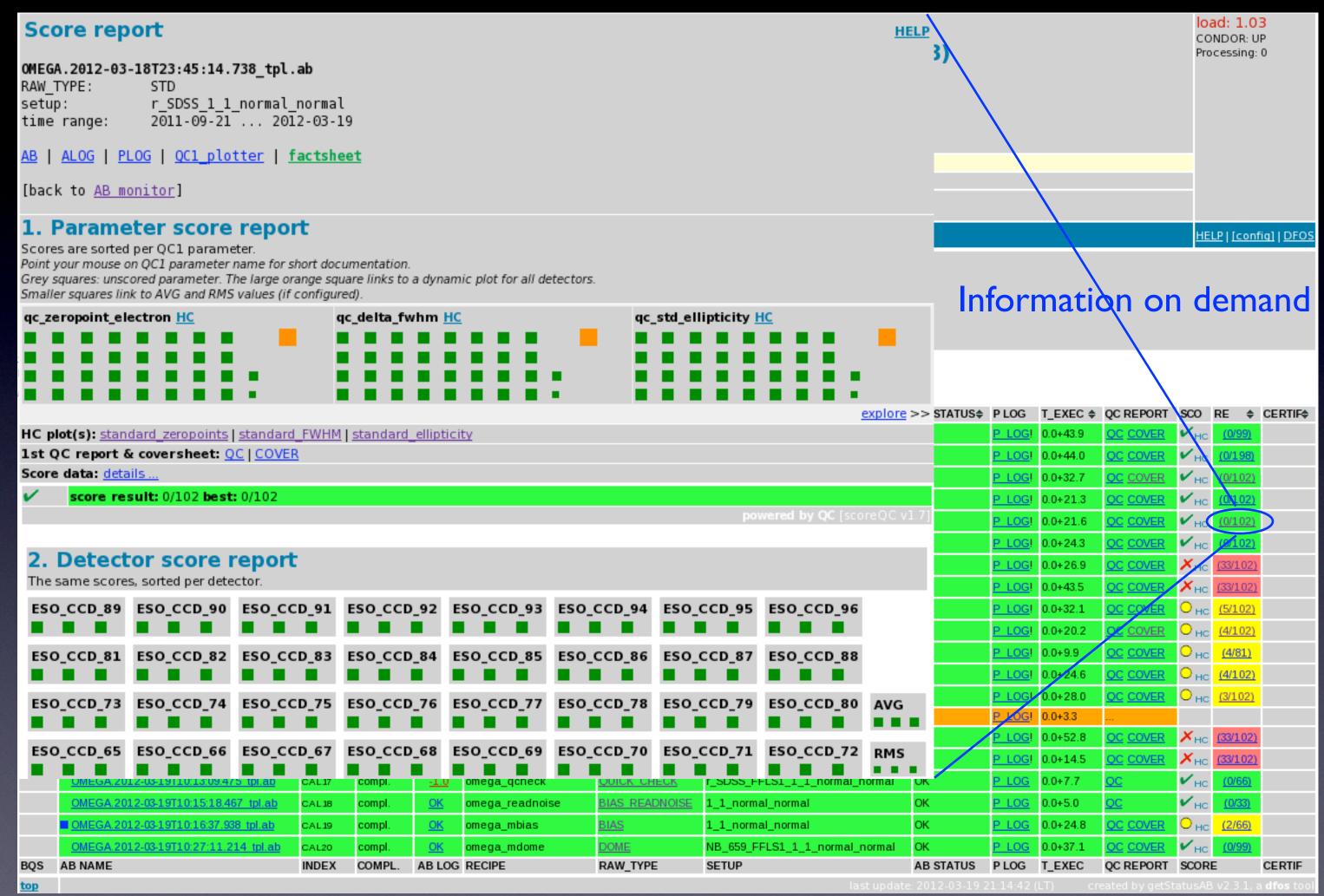
II.AB Monitor (Processing & QC Reports)



II.AB Monitor (Processing & QC Reports)



II.AB Monitor (Processing & QC Reports)



II.AB Monitor (Pro **Score report** 333 USNO stars detected (ellipticity > 0.20) Standard Star Field (_0000.fits) Standard Field 4x Zoom [768,1536 --> 1280,2560] Target Name: STD,ZEROPOINT OMEGA.2012-03-18T23:45:14.738_tpl.ab 4000 Obs ID: 595899 RAW TYPE: STD exp_time: 75.0 sec setup: r_SDSS_1_1_normal_normal/ 2011-09-21 ... 2012-03-19 time range: number of USNO stars found: 333 3500 <u> AB | ALOG | PLOG | QC1 plotter | **facts**heet</u> bright/faint USNO stars: 13.289/20.654 [back to AB monitor] ZPT: $24.726 \pm 0.002 \text{ (ref: } 25.681 \pm 0.004)$ 3000 EXT: $0.101 \pm 0.0000 \text{ (ref: } 0.101 \pm 0.0000)$ 1. Parameter score report Scores are sorted per QC1 parameter. median blogd: 0.0004 ± 0.0076 ADU/sec Point your mouse on QC1 parameter name for sh<mark>ort documentatic</mark> median FWHM: 1.434 ± 0.085 arcsec 2500 Grey squares: unscored parameter. The large or ange square links : Smaller squares link to AVG and RMS values (if configured). image seeing: 1.436 arcsec 600 corrected DIMM seeing: 1.789 arcsec qc_zeropoint_electron HC average airmass: 1.097 2000 median ellipticity(1-B/A): 0.0734 ± 0.059 400 1500 HC plot(s): standard_zeropoints | stan 1st QC report & coversheet: QC | COVER Score data: details .. 1000 score result: 0/102 best: 0/102 200 500 2. Detector score report The same scores, sorted per detector ESO_CCD_89 ESO_CCD_90 ESO_CCD_91 ESO_CC 1000 1500 2000 1000 2000 100 200 1500 x-axis (pixels) x-axis (pixels) x-axis (pixels) ESO_CCD_81 ESO_CCD_82 ESO_CCD_83 ESO_CCD_73 ESO_CCD_74 ESO_CCD_75 ESO_CC created 2012-03-19 09:44:14 m.neeser ESO_CCD_65 ESO_CCD_66 ESO_CCD_67 0.0 + 7.71_1_normal_normal 0.0+5.0 mega_readnoise IAS READNOISE 0.0+24.8 NB_659_FFLS1_1_1_normal_normal OME CAL20 omega_mdome 0.0+37.1 AB LOG RECIPE BQS AB NAME COMPL RAW_TYPE SETUP P LOG QC REPORT

Score report 2012-03-18 STD (r_SDSS / 1,1 / normal,normal) OMEGA.2012-03-18T23:45:14.738_tpl.ab EXT=1 (ESO_CCD_#65) OMEGA.2012-03-18T23:45:14.738_tpl.ab RAW_TYPE: STD Zeropoints colour plot for ESO CCD #65 25.8 r_SDSS_1_1_normal_normal setup: 2011-09-21 ... 2012-03-19 time range: 25.6 <u> AB | ALOG | PLOG | QC1_plotter | **facts/**leet</u> [back to AB monitor] 25.4 ndividually computed zeropoints 1. Parameter score report reference $Z_{\rm pt}$ = 25.681 \pm 0.004 Scores are sorted per QC1 parameter. current $Z_{\rm pt}$ = 24.726 \pm 0.002 Point your mouse on QC1 parameter name for sh<mark>ort documentatio</mark> Grey squares: unscored parameter. The large or ange square links zeropoint error Smaller squares link to AVG and RMS values (if configured). 25.0 qc_delta_ qc_zeropoint_electron HC 24.8 24.6 <u>–</u> 0.0 0.2 0.4 0.6 0.8 colour (r SDSS - sloanZ) HC plot(s): standard zeropoints | stand 1st QC report & coversheet: QC | COVER background (ADU/sec) Score data: details ... least -squares fit: 0.00 + -1.0964e - 07 + xscore result: 0/102 best: 0/102 0.10 background median = $0.00 \pm 0.01 \, (ADU/sec)$ background r.m.s background (ADU/sec) 0.05 2. Detector score report The same scores, sorted per detector. ESO_CCD_89 ESO_CCD_90 ESO_CCD_91 ESO_CC -0.05 ESO_CCD_81 ESO_CCD_82 ESO_CCD_83 ESO_CCD_73 ESO_CCD_74 ESO_CCD_75 ESO_CC -0.10ESO_CCD_65 ESO_CCD_66 ESO_CCD_67 -0.151000 2000 3000 5000 4000 pixel position $(\sqrt{x^2 + y^2})$ OMEGA.2012-03-19T10:15:18.467_tpl.ab created 2012-03-19 09:44:31 m.neeser CAL19 CAL20 BQS AB NAME INDEX COMPL. AB LOG RECIPE RAW_TYPE SETUP P LOG T_EXEC QC REPORT SCORE CERTIF AB STATUS

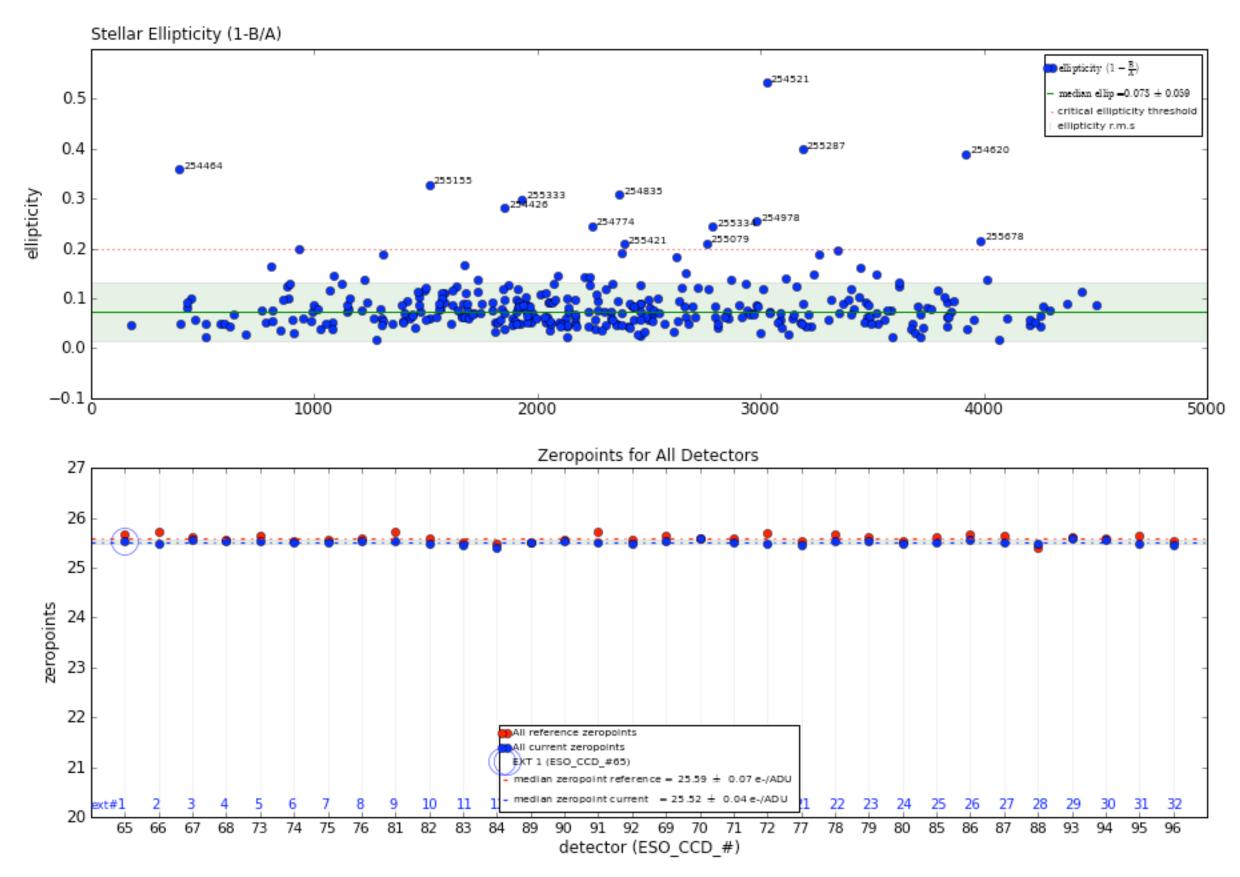
II.AB Monitor (Pro

Score report OMEGA.2012-03-18T23:45:14.738_tpl.ab RAW TYPE: STD r_SDSS_1_1_normal_normal setup: 2011-09-21 ... 2012-03-19 time range: <u> AB | ALOG | PLOG | QC1_plotter | **facts/**leet</u> [back to AB monitor] 1. Parameter score report Scores are sorted per QC1 parameter. Point your mouse on QC1 parameter name for sh<mark>ort documentatio</mark> Grey squares: unscored parameter. The large or ange square links Smaller squares link to AVG and RMS values (if configured) qc_zeropoint_electron HC qc_delta_ HC plot(s): standard zeropoints | stan 1st QC report & coversheet: QC | COVER Score data: details. score result: 0/102 best: 0/102 2. Detector score report The same scores, sorted per detector. ESO_CCD_89 ESO_CCD_90 ESO_CCD_91 ESO_CC ESO_CCD_81 ESO_CCD_82 ESO_CCD_83 ESO CCD 73 ESO CCD 74 ESO CCD 75 ESO CC ESO_CCD_65 ESO_CCD_66 ESO_CCD_67 OMEGA.2012-03-19T10:15:18.467_tpl.ab OMEGA.2012-03-19T10:27:11.214 tpl.ab CAL20 BQS AB NAME INDEX COMPL

2012-03-18 STD (r_SDSS / 1,1 / normal,normal) OMEGA.2012-03-18T23:45:14.738_tpl.ab EXT=1 (ESO_CCD_#65)

2012-03-18 STD (r_SDSS / 1,1 / normal,normal) OMEGA.2012-03-18T23:45:14.738_tpl.ab EXT=1 (ESO_CCD_#65)

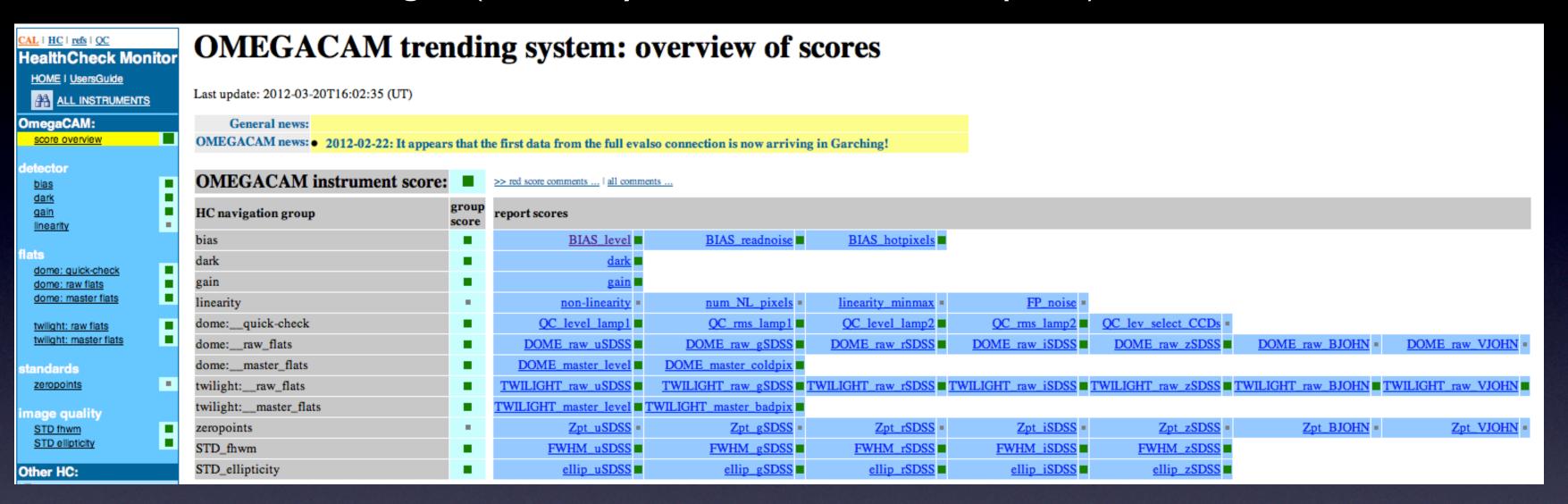
2012-03-18 STD (r_SDSS / 1,1 / normal,normal) OMEGA.2012-03-18T23:45:14.738_tpl.ab EXT=1 (ESO_CCD_#65)

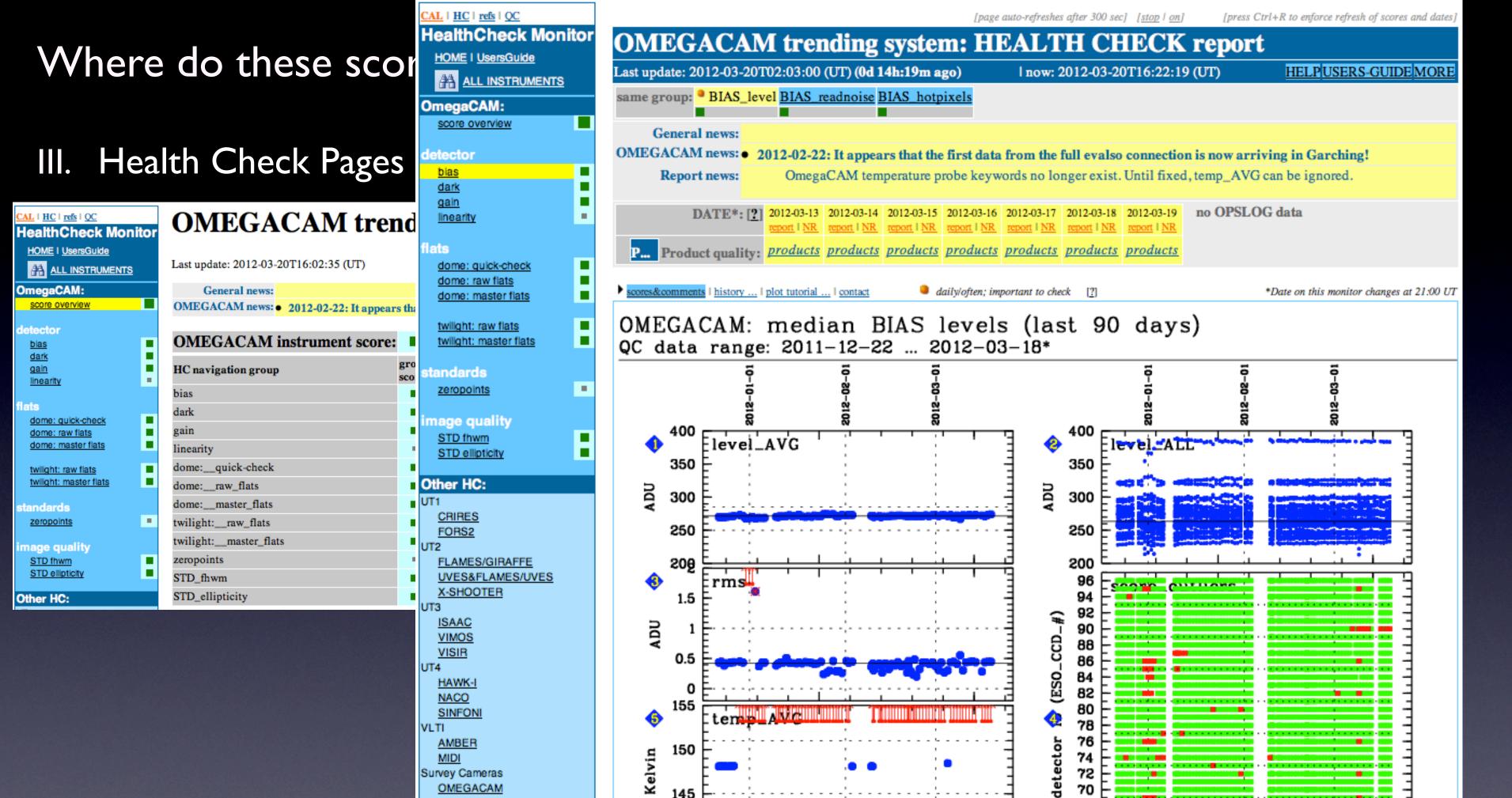


created 2012-03-19 09:44:32 m.neeser

Where do these scores fit in with the history of the instrument?

III. Health Check Pages (summary of scores & links to plots)





145

powered by QC: www.eso.org/HC MJD

55950

Survey Cameras OMEGACAM

VIRCAM

General monitoring: Image Quality

Sky Background

Extinction

56000

70

55950

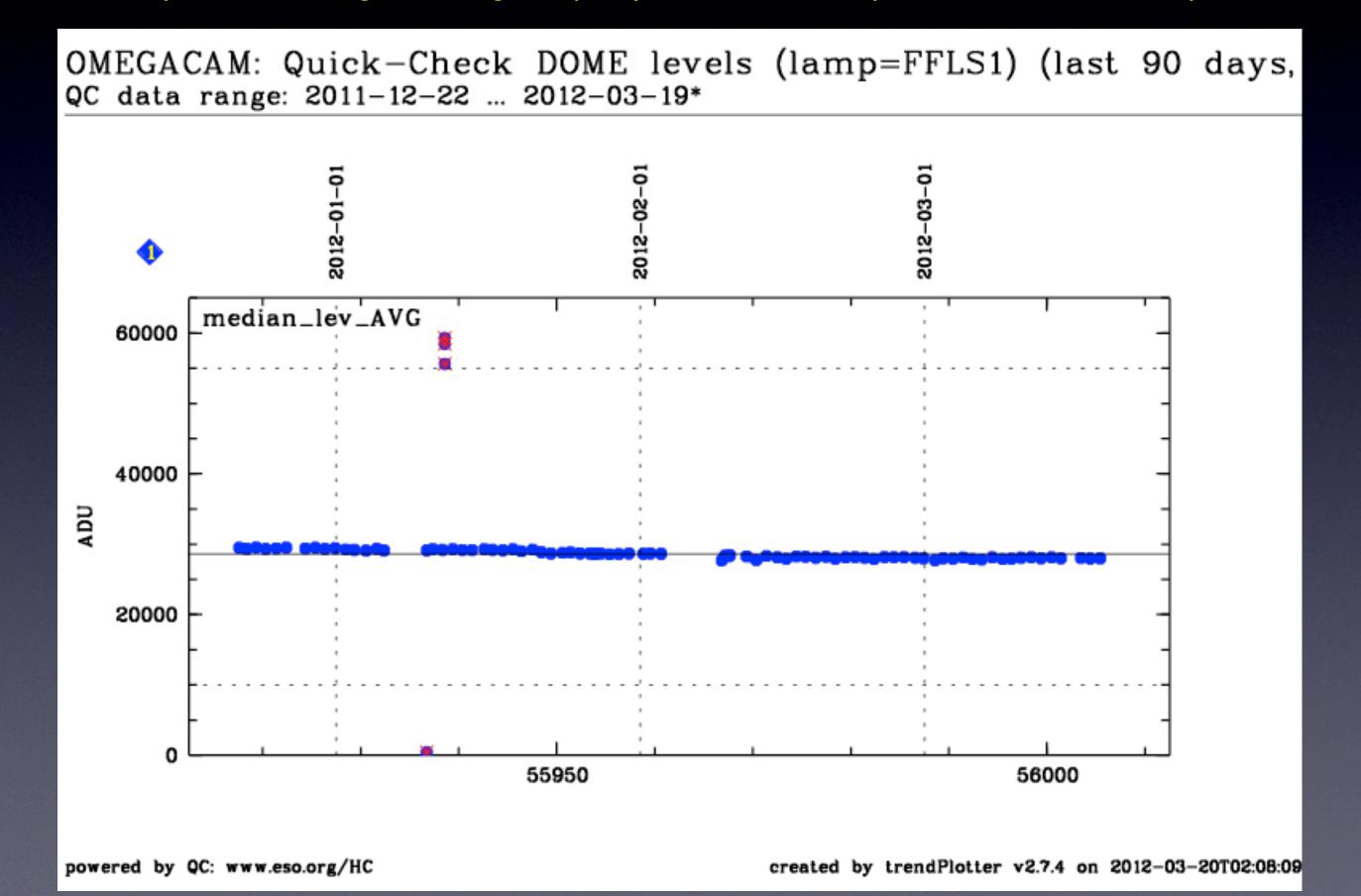
created by trendPlotter v2.7.4 on 2012-03-20T02:01:17

56000

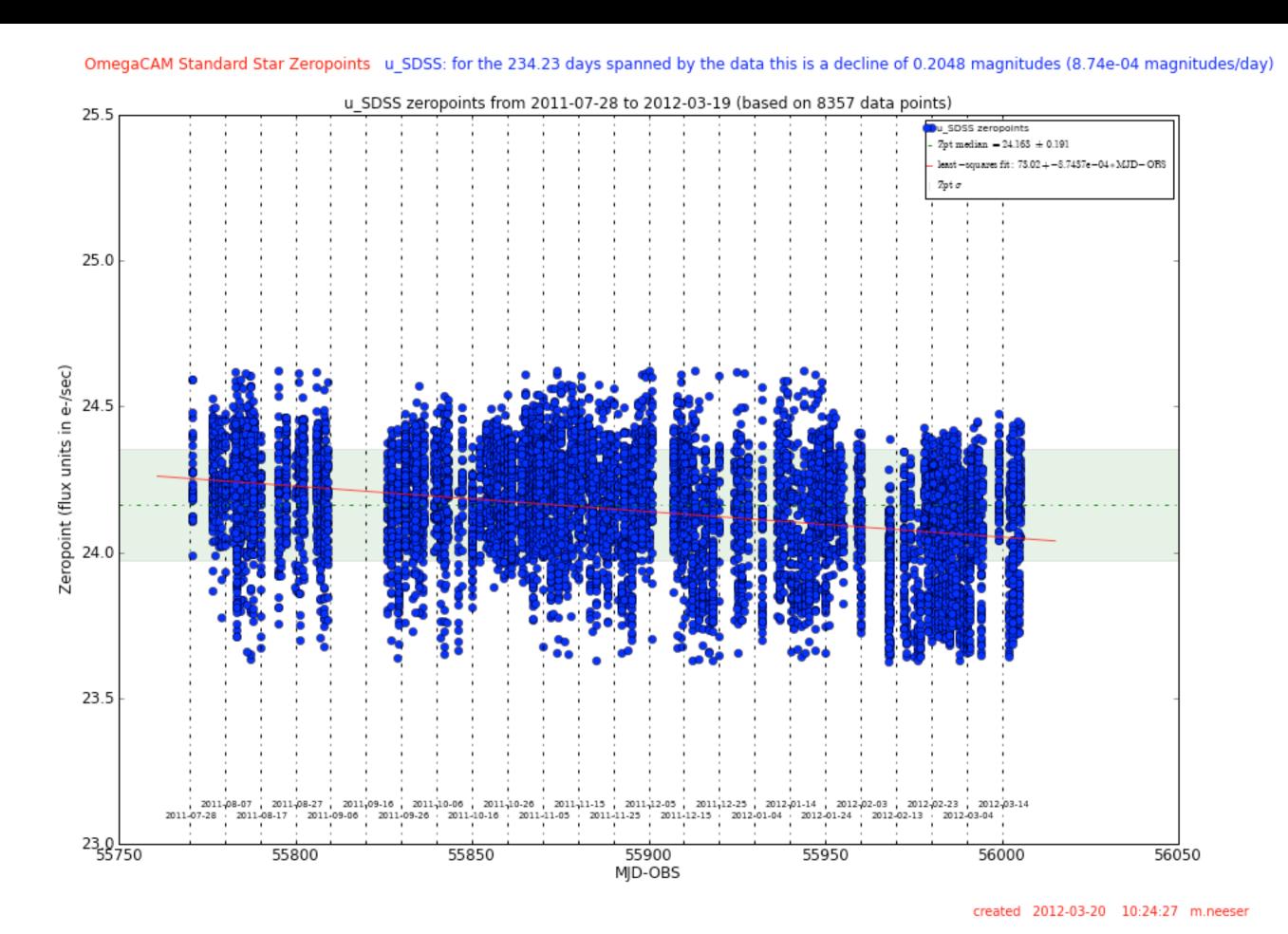
QC Issues that warrant discussion:

1. Declining efficiency
Visible in Health Check Plots of Dome Flat Quick Checks show decline in flux level of about 5% (~1k ADU in 2.5 months).

http://www.eso.org/observing/dfo/quality/OMEGACAM/reports/HEALTH/trend_report_DOME_QC_level_lamp1_HC.html

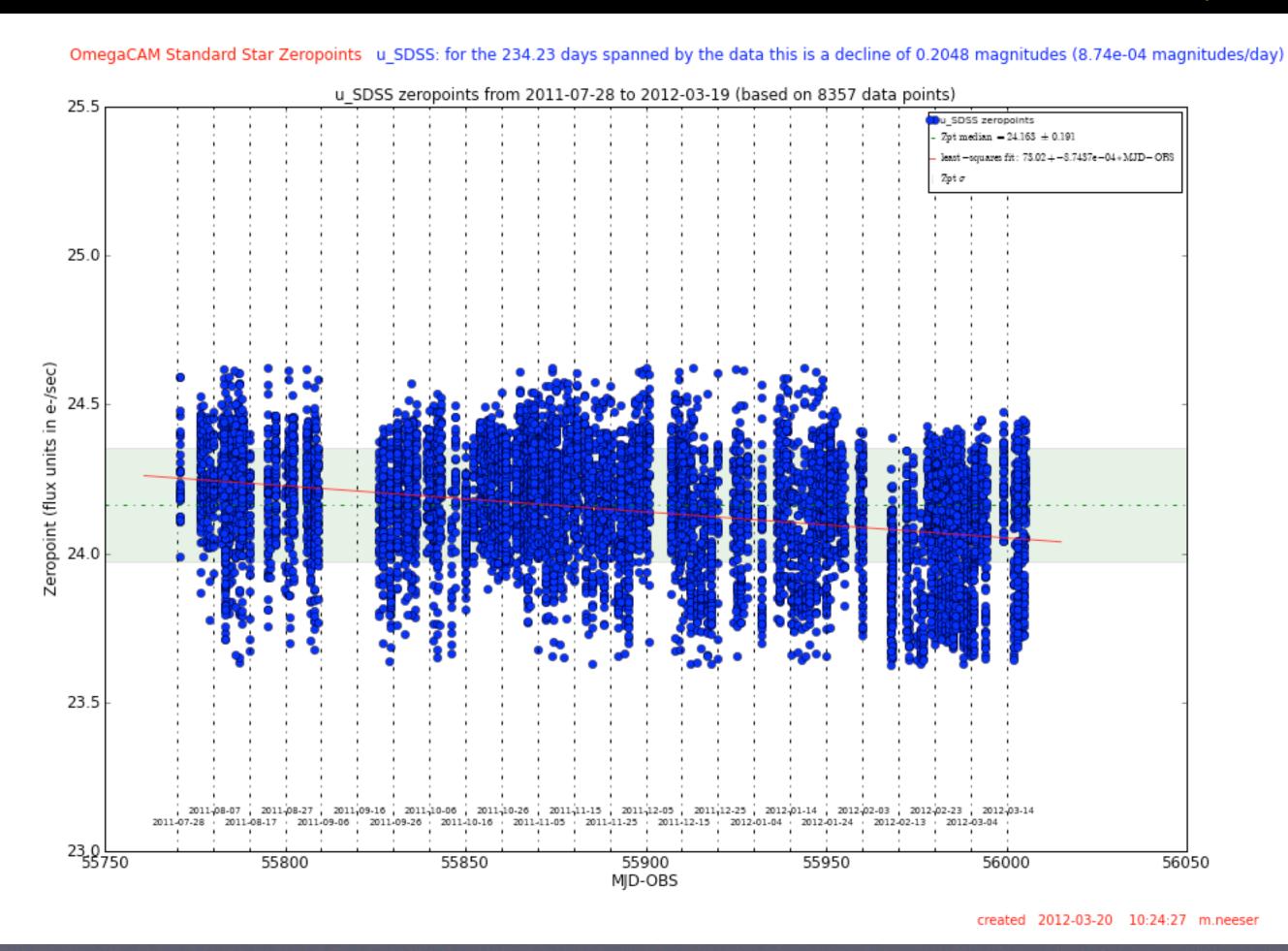


1. Decrease in efficiency also evident in standard star zeropoints



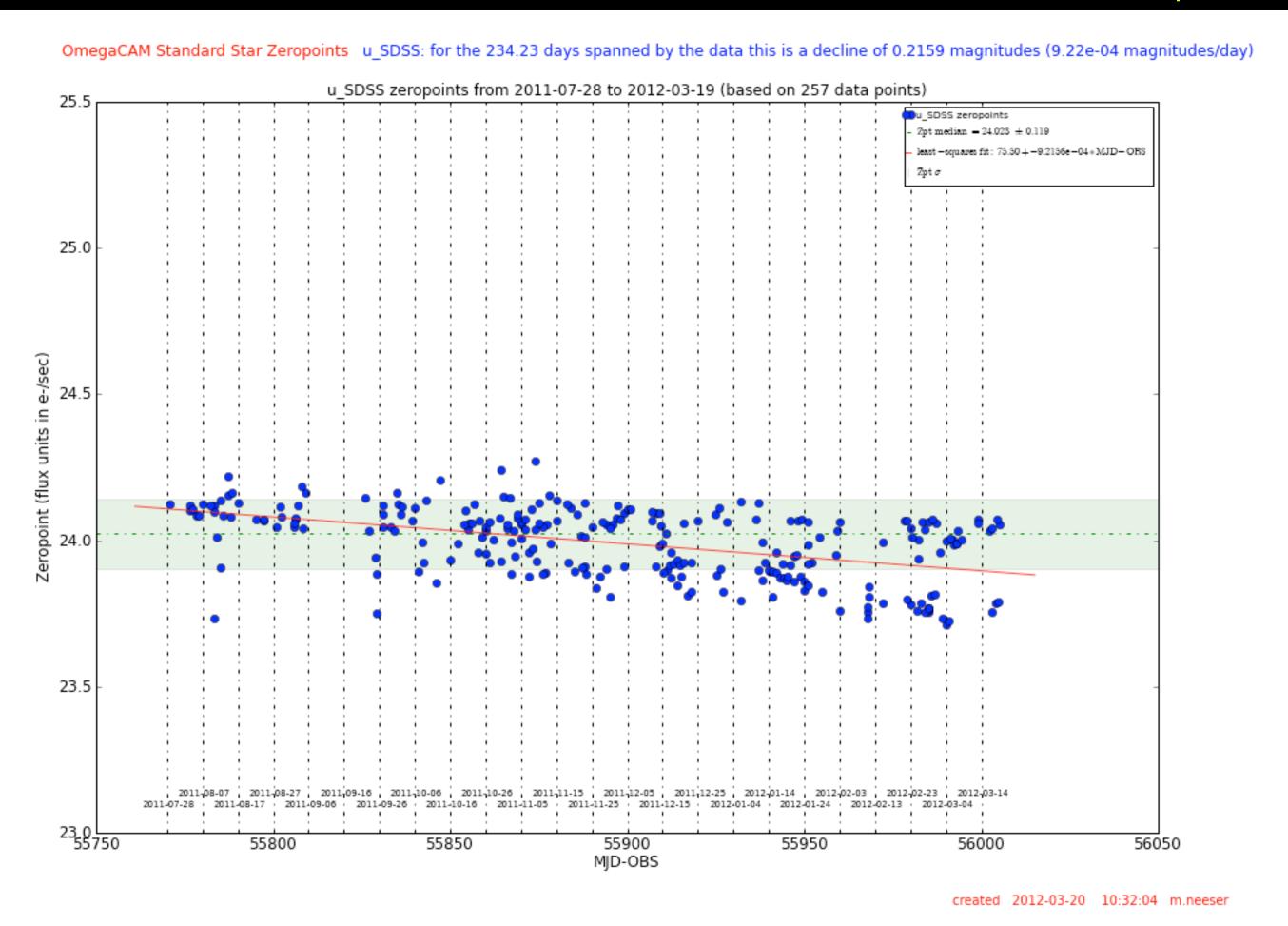
1. Decrease in efficiency also evident in standard star zeropoints

plots of average and individual detector zeropoints show similar decay



1. Decrease in efficiency also evident in standard star zeropoints

plots of average and individual detector zeropoints show similar decay



Individual detector (ESO_CCD_#76)

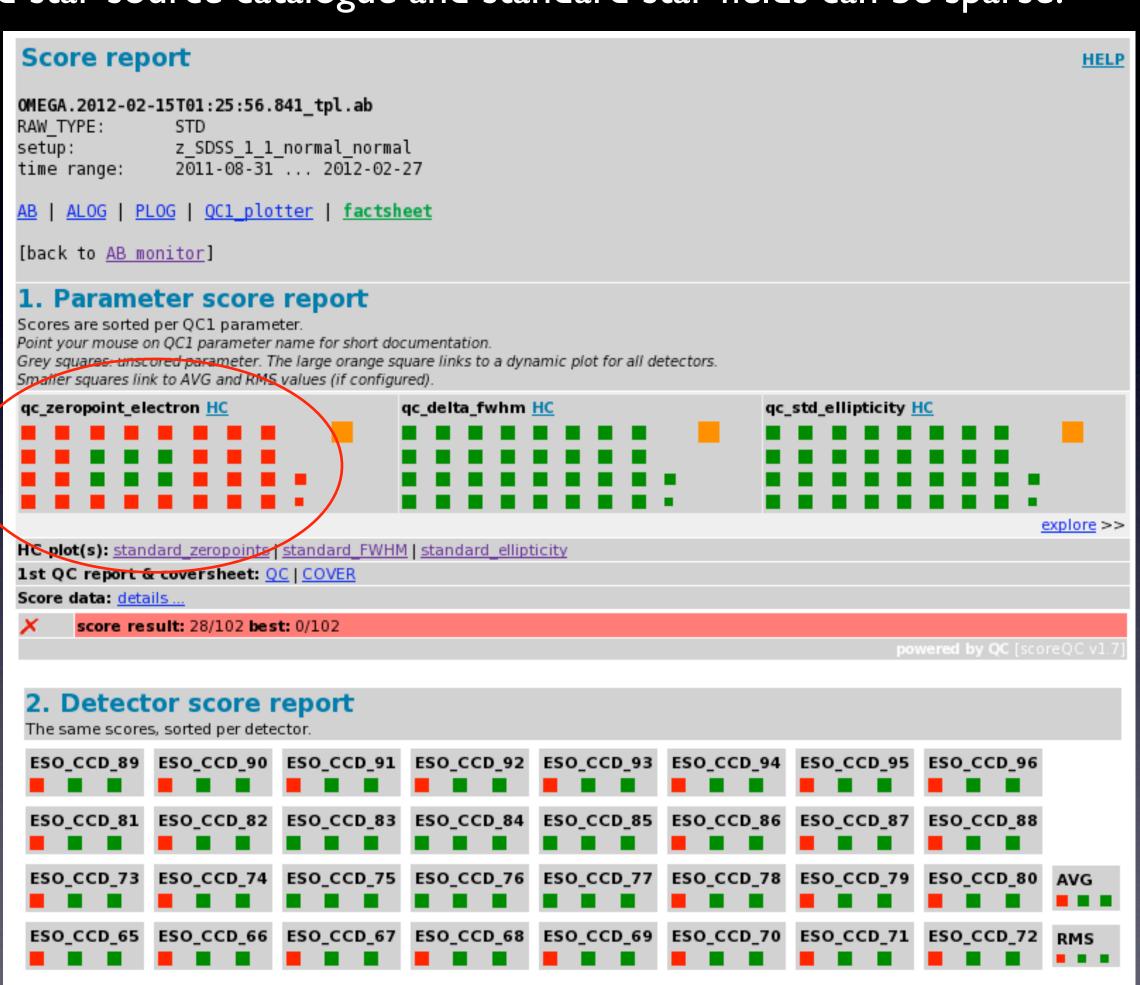
1. Decrease in efficiency as compared with FORSI

Filter	OmegaCAM ∆efficiency (mag/day)	OmegaCAM ∆efficiency (mag/year)	FORS Δefficiency (mag/year)
u_SDSS	6.02 × 10 ⁻⁴	0.220	0.132 (U-JOHN)
g_SDSS	2.72 × 10 ⁻⁴	0.099	0.108 (B-JOHN) 0.081 (V-JOHN)
r_SDSS	3.00 x 10 ⁻⁴	0.109	0.083 (R-JOHN)
i_SDSS	2.08 x 10 ⁻⁴	0.076	0.053 (I-JOHN)
z_SDSS	1.54 x 10 ⁻⁴	0.056	

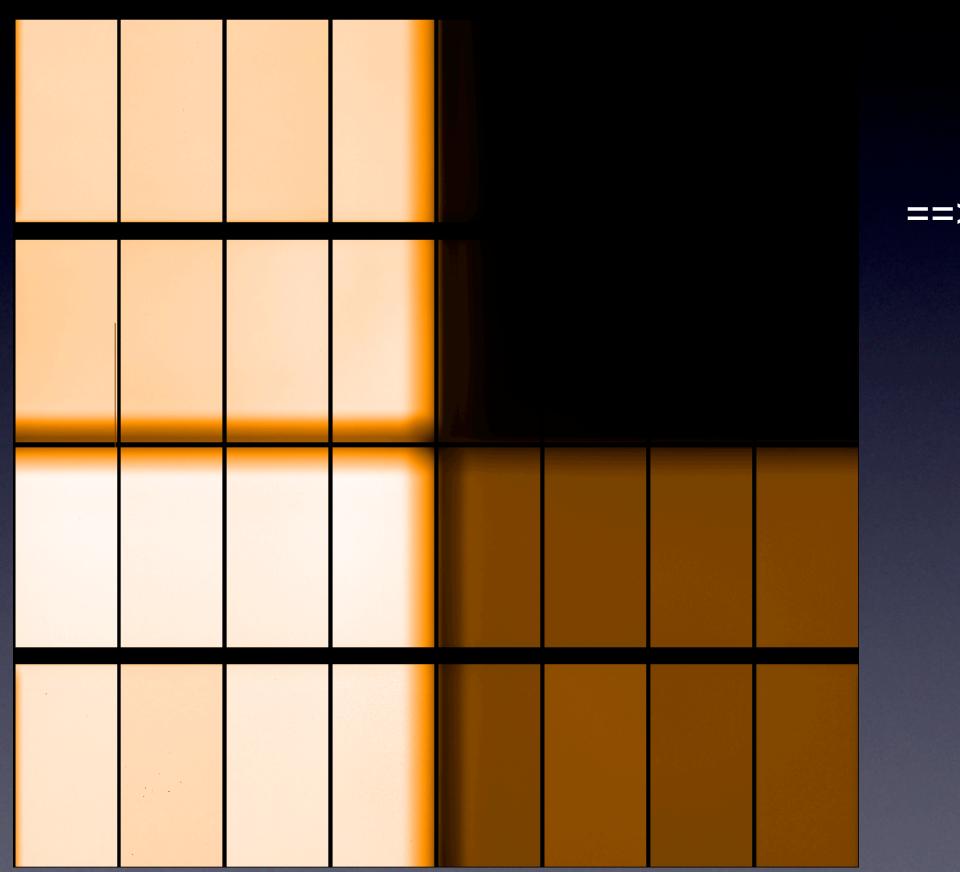
_ largest discrepancy evident in u-band

2. Overlap between secondary standard star source catalogue and standard star fields can be sparse.

- 2. Overlap between secondary standard star source catalogue and standard star fields can be sparse.
- results in very limited zeropoint coverage for many fields
- no coverage of ugri_SDSS polar field
- continued improvement via consortium delivered standard catalogue.



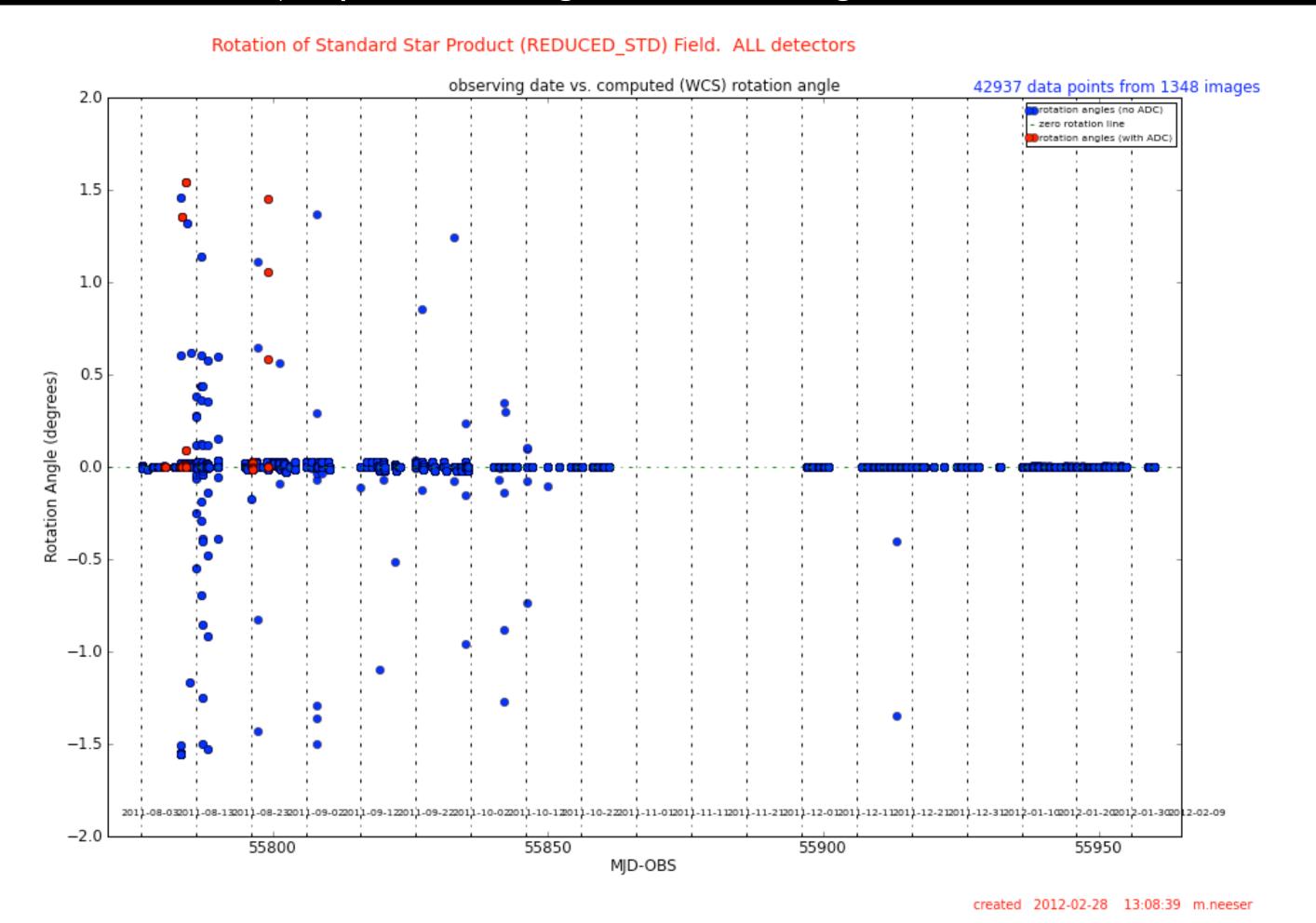
3. Polar field u_g_r_i_SDSS composite filter dome flats have essentially zero flux in u-band quadrant.



==> barely 100-200 ADU above bias level

- 4. Illumination correction:
 - preliminary document received from consortium (30 Dec. 2011)
 - converting this to an operational calibration procedure (template) and calibration plan.

5. Field rotation jumps are no longer seen in OmegaCAM data



5. Field rotation jumps are no longer seen in OmegaCAM data

