VPHAS Requirements for Data Products and Quality Control

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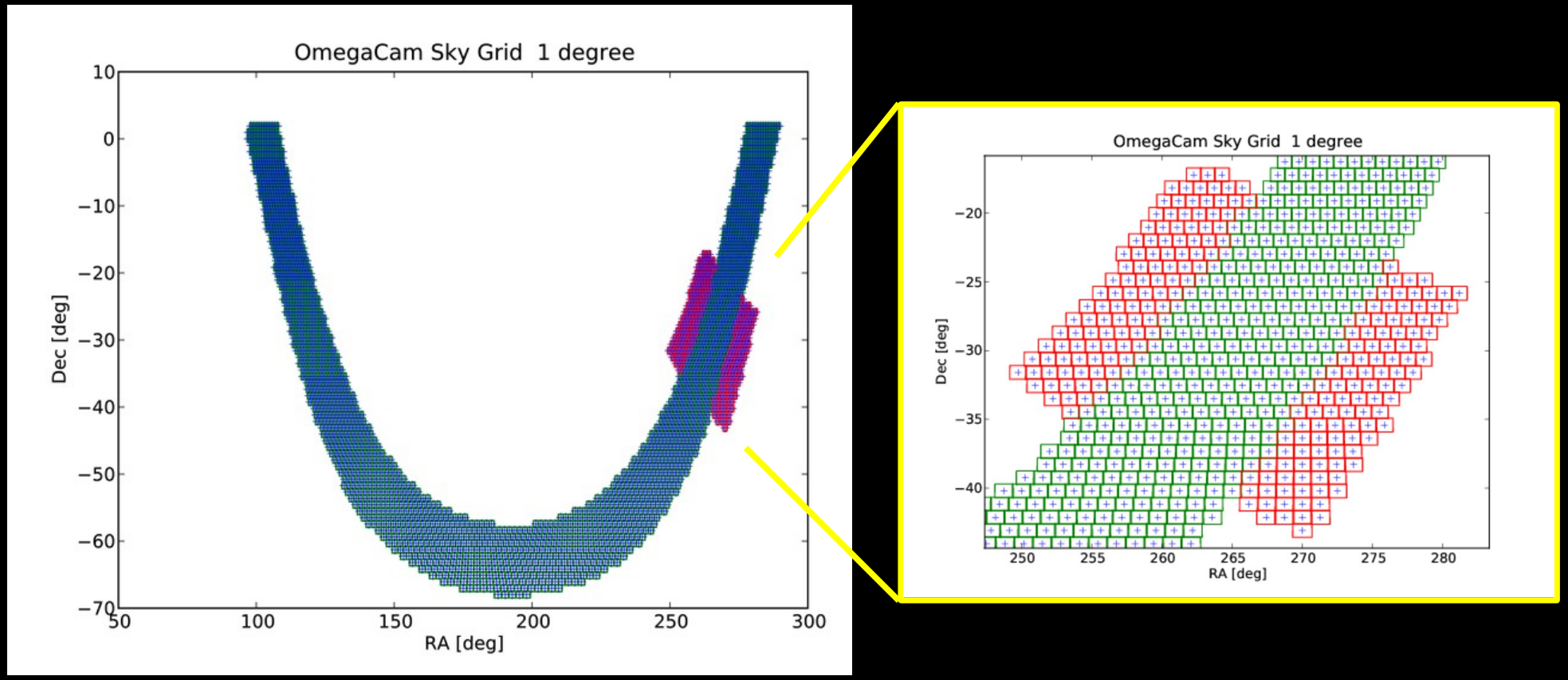
VST/OmegaCAM Data Products Meeting

ESO Garching

VST Photometric Halpha Survey



* 1800 sq.°, |b| < 5°, plus small overlap at celestial equator, ~2000 fields
* 200 sq.° galactic bulge, ~220 fields
* contemporaneous data taking and double pass strategy (field+offset field)
* VPHAS observing started after Christmas 2011 (Galactic plane visibility)

VPHAS – Survey Area

Hα Filter

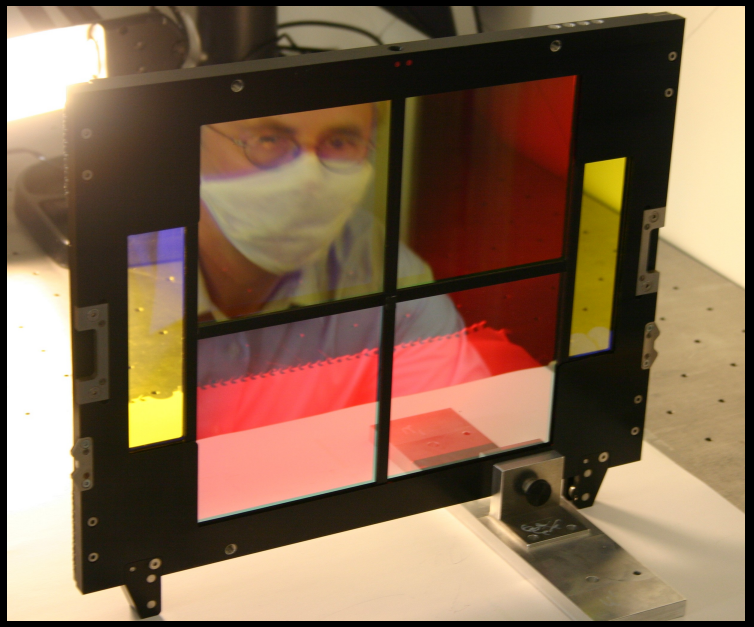
* Segmented
* λ ~ 6588 ± 8 Å
* FWHM ~ 102 ± 2 Å

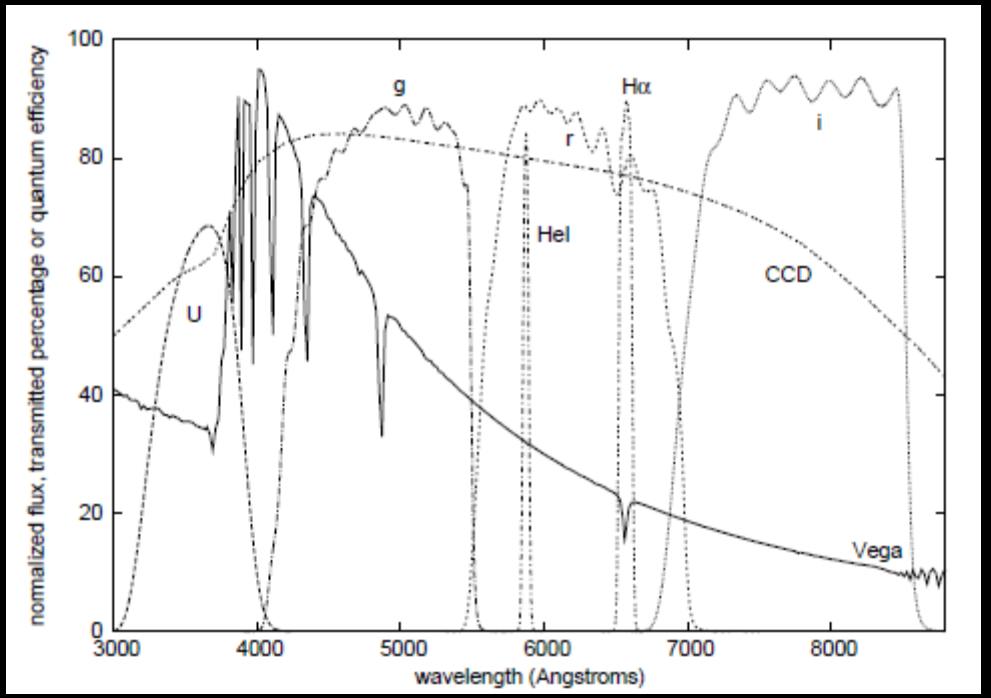
Exposure times

* Hα 120 s
* u 180 s
* g, r, i 30, 25, 25 s

10σ Limiting magnitudes (AB)

* between 21 and 22 mag for a single exposure





VPHAS – Filters

Original Strategy

- Sequences of u, g, r, i, Ha to minimize time difference
- Field/Offset Field in one OB
- Hα filter has additional offset to better deal with filter segmentation

P88

Surprises: OmegaCAM can not handle filter change re-focus
in an OB without image analysis (--> high overheads)

- Split into two blocks: u,g,r and r,i,Ha
- 3 Fields/Offset Fields in one OB
- All 6 positions taken in one filter – then new OB/filter

+ fewer filter changes easier on filter changer and time
- all filters no longer (nearly) contemporaneous
+ red block can be observed at slightly brighter moon
- more complex book keeping, long linked OBs (concats) near 1h

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Surprise: Even higher overheads

- Split into two blocks: u,g,r and r,i,Ha
- Only 2 Fields/Offset Fields in one OB to keep concat times down
- All 4 positions taken in one filter – then new OB/filter

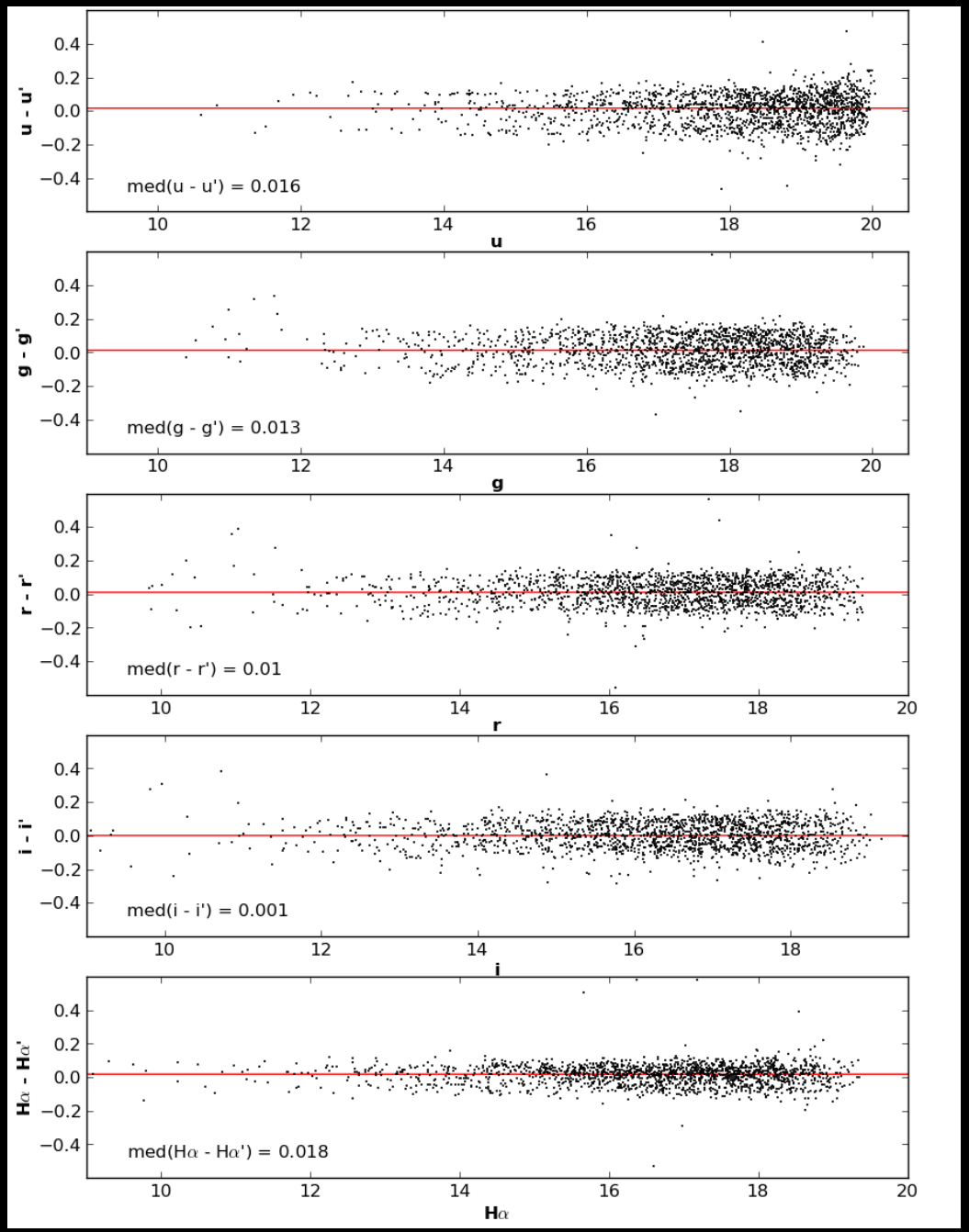
+ fewer filter changes easier on filter changer
- all filters no longer (nearly) contemporaneous
+ red block can be observed at slightly brighter moon
- more complex book keeping, concats not so long but less efficient
- higher overheads lead to slower survey progress

Data Reduction by CASU:

- Bias
- Flatfield
- CCD Gain correction
- Fringe correction for i band data
  Note: To construct fringe frames sparsely populated non-VPHAS data is needed
- And more (eg. crosstalk)
- Astrometry based on 2MASS
- Photometry / Morphology

Currently missing:

- stray light/illumination correction
  => absolutely necessary for sensible photometry

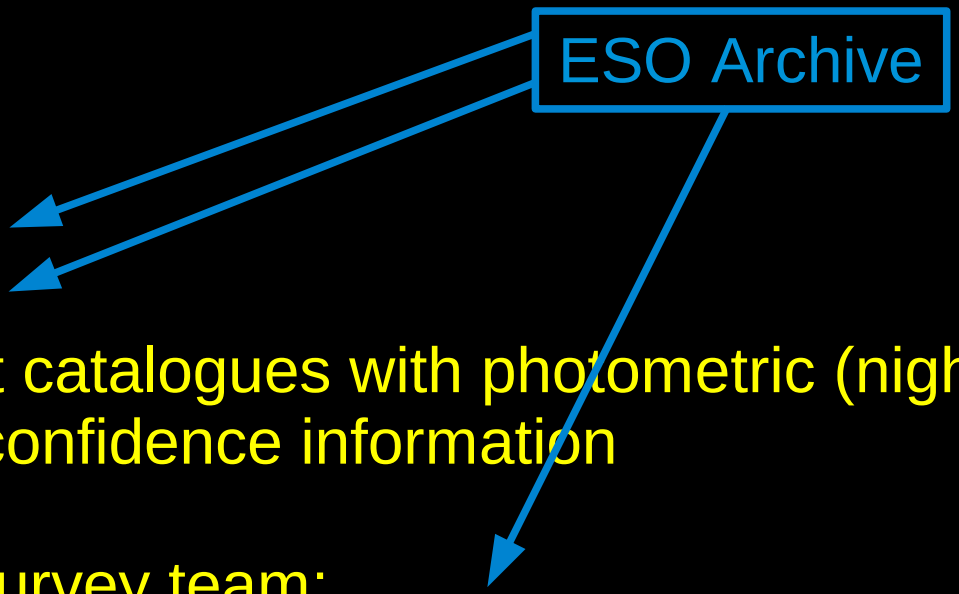


VPHAS Test Data

- Several test data sets taken in September 2011
- Data from two pointings offset by 13 arcmin of a SDSS field containing a CV
- Plot shows the difference of the measured magnitudes of the two pointings vs. magnitude of the source
- Note that the scatter does not decrease for bright objects as expected
- Note that this is independent of filter used
  => stray light/illumination

VPHAS – Test Data

Data Products:



Provided by CASU:
- Reduced images
- Confidence maps
- Frame based object catalogues with photometric (nightly calibration), morphological and confidence information

Created by VPHAS survey team:
- band merged object catalogues of field+offset field data
  red OB: 2 r, 2 i, 3 Ha
  blue OB: 2 u, 2g, 2 r
- Global calibration (eventually)

=> Everything we need is provided by CASU

VPHAS – Survey Data Products

Quality Control:

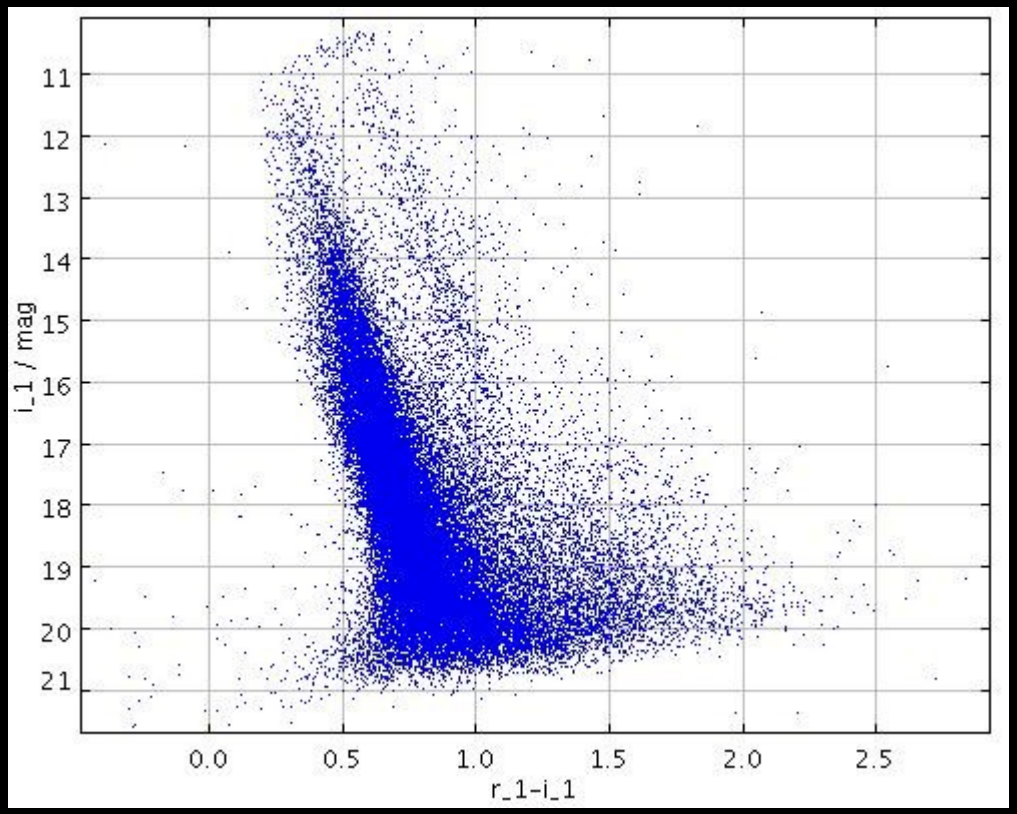
Provided by CASU:

- Frame based quality control information (FWHM, ellipticity, ...)
- Night based quality control information (zeropoint, ...)

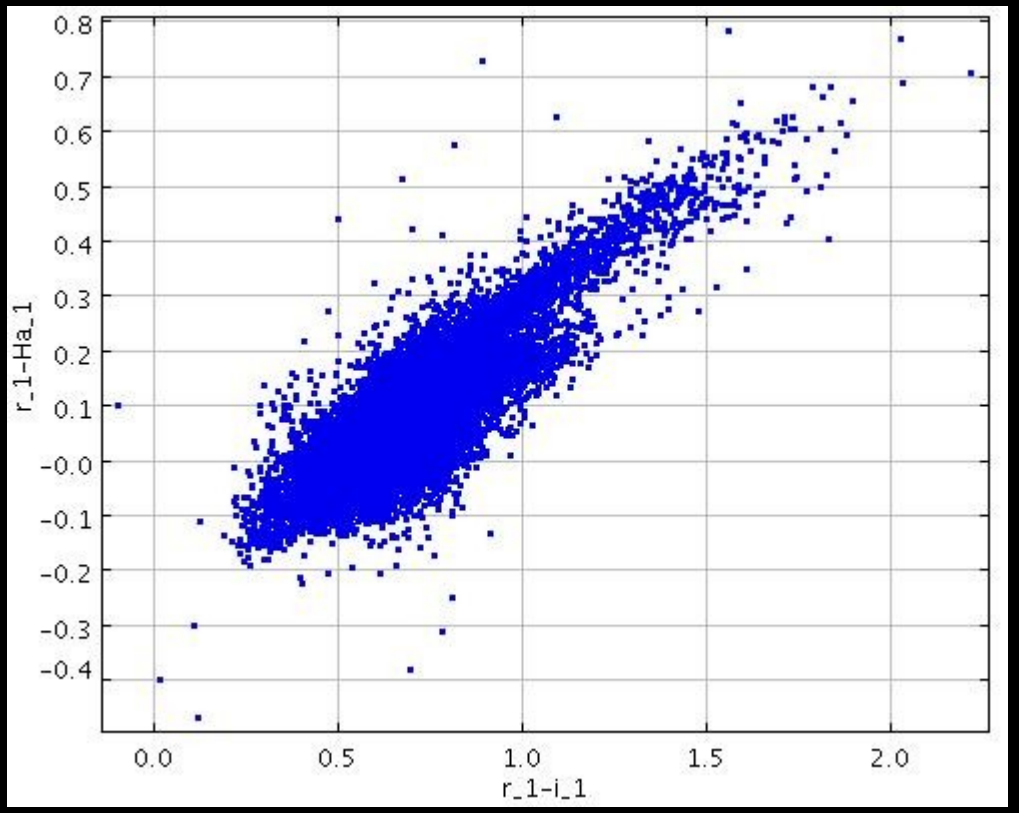
By VPHAS team:

- Based on CASU quality control information
- Based on colour-magnitude and colour-colour diagrams created from band-merged catalogues
- Based on object selection (ie. working with the data)

VPHAS Field 0004



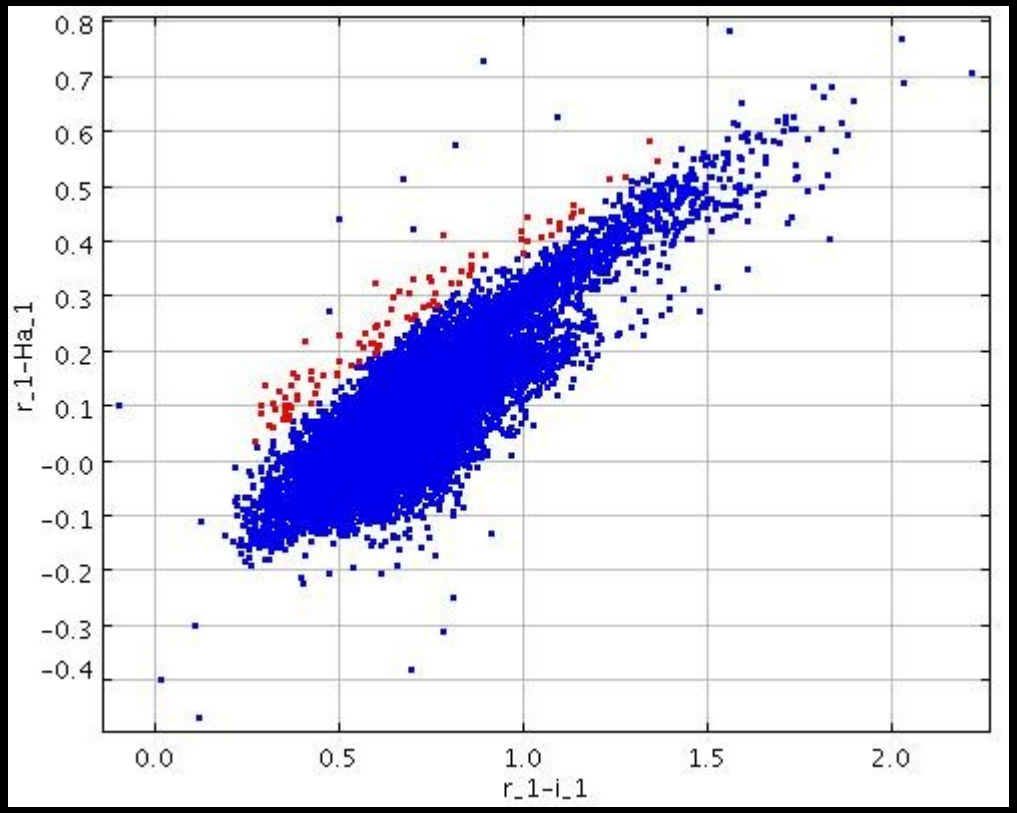
i vs. r-i

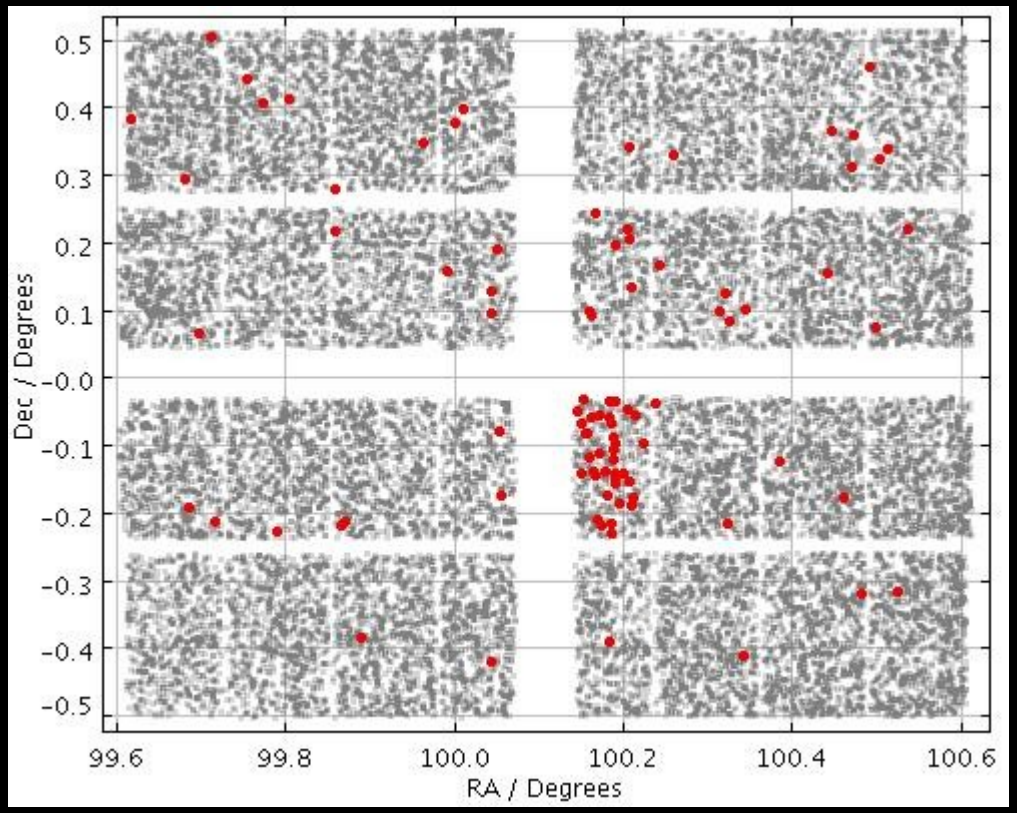


r-Hα vs. r-i

VPHAS – Quality Control

VPHAS Field 0004





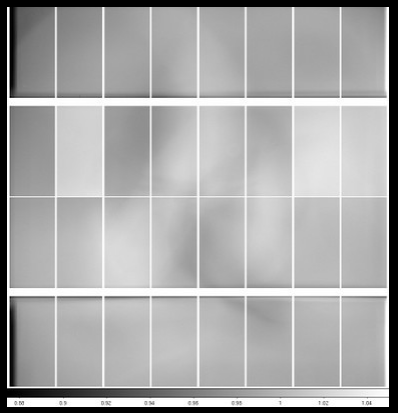
r-Hα vs. r-i

Position on sky/CCDs

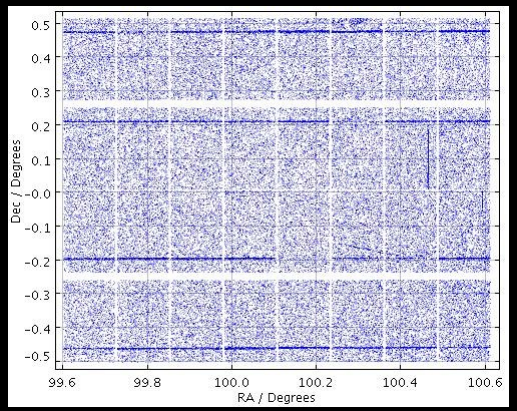
VPHAS – Quality Control

Issues:

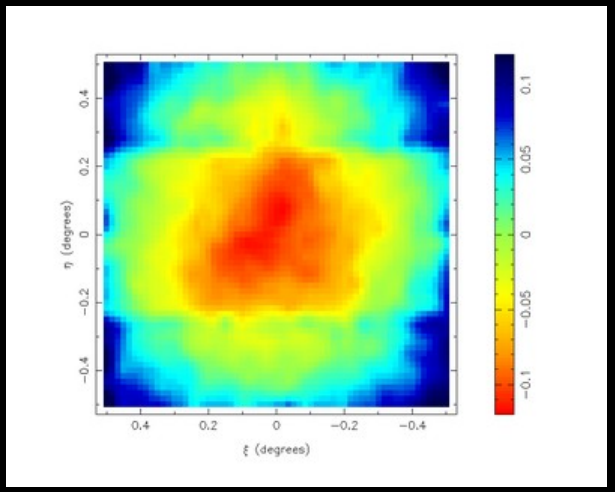
- CCD Gain variation
- Pickup Noise
- Illumination correction
- stray light
- filter positioning accuracy



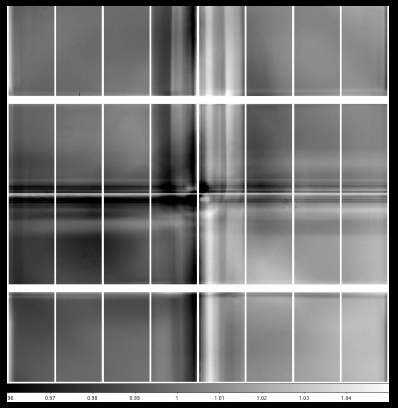
Source: CASU, i flat ratio



i source distribution



Source: CASU, r scattered light



Source: CASU, Ha flat ratio

VPHAS – Quality Control

The End