CASU processing for VST

VST ← V-ST-

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- experience from near-infrared processing for all WFCAM & VISTA data
- optical mosaic camera processing experience
  - MegaCam, Subaru, INT WFC, ESO WFI ........
VST data flow

- raw data transfers (Rice-compressed MEFs ?)
- ingest & verification → raw data archive
- off-line tape backups
- update calibration files as necessary
- parallel nightly processing → astrometric & photometric calibration
- check derived QC info & sample of images
- processing web page updates
- ingest to post-processing database → checks FITS headers etc.
- band-merged science products
CASU mantra

- MEFs as container -> simplifies bookkeeping
- use lossless Rice-compression -> (x 2-4 less space)
- FITS images and catalogue binary tables (CFITSIO)
- FITS headers record processing details
  - derived QC parameters
  - WCS astrometric calibration
  - photometric calibration
  - table/image fluxes in ADU, x,y positions
  - versioning and software details
- modular software -> C & perl/python scripts
- minimise external software dependencies
VST processing schema
Issues/features

- strategy to deal with gaps
  - ignore; dither for deeper stacks; offset exposures
- data rate \( \sim 10\% \) of VISTA
- non-linearity; fringing in i,z bands; charge bleeding
  saturation \( \rightarrow \) “spikes”
- optical surfaces \( \rightarrow \) scattered light; bright star halos;
  \( \rightarrow \) illumination correction
- photometric calibration (Halpha - tie to r’ ?)
- effects of astrometric distortion
- master calibration images - update frequency ?
- hardware, software & CPU requirements
- delivery of data products to ESO
Data products

- calibrated images & catalogues for single exposures
- confidence maps (weight, exposure, bad pixels)
- QC information for each detector/exposure
- [deep stacked images, tiles and catalogues if needed]
- homogeneous band-merged catalogues
- federation with 2MASS PSC
- database of all derived information, QC, logs ..... 
- assorted analysis assessment plots (CMDs), spatial distribution .....
Innovative software solutions

- nebuliser
  - removes complex background variations
  - enhanced object detection & parameterisation
- despiker
  - removes diffraction spikes, charge bleeding artefacts, and saturated stellar cores
- mosaicer
  - CASU tiling software developed for VISTA
- psf’ers
  - automatically generates detector-level PSFs
  - and performs PSF photometry

[examples of these, web pages and QC DB as part of talk]