





# **VISTA Science Archive**

WFAU work for the VVV Nick Cross, Rob Blake, Ross Collins, Nigel Hambly, Mike Read, Eckhard Sutorius, Mark Holliman

### **Current GPS release**

- UKIDSS DR7: 671M sources (1300 □°)
- Meta-data tables

 Multiframe, MultiframeDetector, CurrentAstrometry, MultiframeEsoKeys, +

- Detection table
- Source table
- Neighbour tables

SourceNeighbours, 2MASS, GLIMPSE (hrc, mca), 2XMM

### **Current VVV release**

- VMCv20110718: 420M sources (492 
   o)
  - -2.4 billion tile detections
  - 4.5 billion pawprint detections
  - 1.0 billion synoptic sources
  - Neighbour tables, self, GPS (DR4), 2MASS, IRAS, Glimpse, SSA.

# VVVv20110718

- Curation tables ✓
- Metadata tables
- Detection tables + TilePawPrint tables ×
  - Ready and will copy over in coming days.
- Synoptic Source table ✓
- Neighbour tables
- Deep stacks and tiles ×
- Multi-epoch matching + Variability table ×
  - Will add in later

# Table design

 Unique catalogue from deep frames (Source) is linked to individual epoch detections (Detection) through BestMatch.

Statistics of multi-epoch data stored in Variability.
Information from framesets (magnitude limits and fits to the rms are in VarFrameSetInfo.
If a photometric recalibration occurs, the BestMatch table is not changed.



### **Correlated Filters**

- Two additional tables
  - SynopticMergeLog
  - SynopticSource
- SynopticSource has similar attributes as Source, but is linked like Detection
- SynopticMergeLog like MergeLog, but with a time attribute.
- For VVV, 40 minute band-merging criterion



### **Best Match tables**

- VVV releases will have 2 BM tables
  - vvvSourceXSynopticSourceBestMatch
  - vvvSourceXDetectionBestMatch
- Team wants SynopticSource for colour information (vvvSource will have deep data)
- BUT most epochs will be in 1 filter, so a SynopticSource will be full of defaults.

# **Tiles and Pawprints**

- Main products based on tiles
  - Pawprint data also available in vvvDetection
- vvvTileSet and vvvTilePawPrints match tile detections to the constituent pawprint ones.
- Pawprints have better astrometry and better photometry for nebulae





# **Quality Control**

- New deprecation codes for VMC
   50 Exclude from deep stacks
  - 53 Detections to be put into neighbours, but not included in other processing.
- Earlier releases found that many real variables are missed due to being flagged as deblended – changed.
- Very dense regions are susceptible to problems with astrometry / photometry – normal methods don't work as well.

# **New Quality Flags**

- Bit 7, av Conf<80</li>
- Bit 12, tile detection overlaps detector 16
- GPS, Bit 17: photometric calibration probably subject to systematic error
- Bit 23, tile detection in lower exposure "ears"
- Bit 24, tile detection overlaps deprecated detector.

### **Speed Enhancements**

- Hardware:
  - "Cluster" with infiniband linking servers
  - New disks with faster I/O
  - Separate VVV main database server
  - Separate VVV release database server
  - Several new curation servers with multi-cores and lots of memory.
- Transfer and Ingestion speed ups whole of VISTA data (up to P86) re-transferred and re-ingested in 2.5 months.
  - Parallelisation of processing
  - Smaller batches sent for ingest
  - Automation of ingestion of batches

# **Speed Enhancements**

- Parallel processing of deep tiles (when filtering and mosaicing)
- Optimising usage of memory and database connections.
- BUT most efficient way is to produce large ingest file - dangerous, can lose days of work.
- Several ideas for future improvements, e.g. splitting Detection by semester.

### **Enhancements to User Interface**

- New #userTable facility: allows you to upload a table (FITS, VO, ASCII, CSV) to join into a query.
- Increased limits on cross ID and MultiGetImage.

### New development work

### Top Priority

- Improving parallel processing and appending within all curation tasks.
- Improving I/O performance by reconfiguring paths for ingestion to main server
- Improvements to overall efficiency.
- Any bug fixes
- Lower priority work
  - Variability table enhancements.

# **ESO-SAF** release

- Will have data from specified complete pointings only
- Will be in FITS file format
- Deep tiles + cats
- Source tables
- Multi-epoch tables.
- Already done for VMC

# VDFS Science Archives WFAU Staff resources:

#### **Presently:**

- Development:
- Operations:
- QC/Interface:
- Hardware:

1.1 FTE (NJC, RSC, ETWS) 1.0 FTE (ETWS,RPB) 1.0 FTE (MAR) 1.0 FTE (RPB, MSH)

# Using the VSA





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# WSA / VSA

- Data Overview
- Schema Browser + Glossary
- SQL cookbook
- Monitor page
- Release history
- Known Issues
- Publications

Hambly et al. (2008), Cross et al. (2009), Cross et al. (2011), in prep.

### **Archive Listing**

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### Freeform SQL Examples

- Selecting variables
- Viewing light curves
- Using X-match tables
- Using user generated tables
  - MAR enhancements
- Use COUNT\_BIG(\*) necessary for tables with > 2G rows

### **Selecting variables**



# Light curves

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# X-matching

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Submitted query: select v.sourceID,s.objID,s.sCorMagB,s.sCorMagR1,s.sCorMagI,yAperMag3,jAperMag3,ksAperMag3 from vmcSource as v,SSA..Source as s,vmcSourceXSSASource as x where v.sourceID=x.masterObjID and x.slaveObjID=s.objID and x.distanceMins<0.016 and x.distanceMins in (select min(distanceMins) from vmcSourceXSSASource where masterObjID=x.masterObjID) and ksAperMag3<19. and ksAperMag3>0.

•••••• 356449 rows returned so far •••••• 1321253 rows returned so far ••••• OK

	sourceID	objID	sCorMagB	sCorMagR1	sCorMagI	yAperMag3	jAperMag3	ksAperMag3
1	558355174715	281612416870968	+19.538000	+18.597000	+19.082000	+19.163385	+18.615970	+18.213762
2	558354898759	281612416870176	+19.530000	+18.315000	+18.202000	+17.976978	+17.676472	+17.181646
3	558355188533	281612416870170	+19.909000	+18.952000	+18.596000	+18.050316	+17.698803	+17.146538
4	558354899093	281612416869732	+19.928000	+18.256000	+18.331000	+17.794147	+17.473537	+16.940170
5	558354899393	281612416869708	+20.300000	+19.395000	+18.708000	+18.274940	+18.001583	+17.516218
6	558355174303	281612416868771	+20.532000	+18.832000	+18.452000	+18.663208	+17.924574	+17.232874
7	558354609263	281612416867941	+18.788000	+18.144000	+18.182000	+18.140232	+17.904743	+17.437902
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### **Enhanced Queries**

