WFAU - Science archives & connecting data

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Introduction

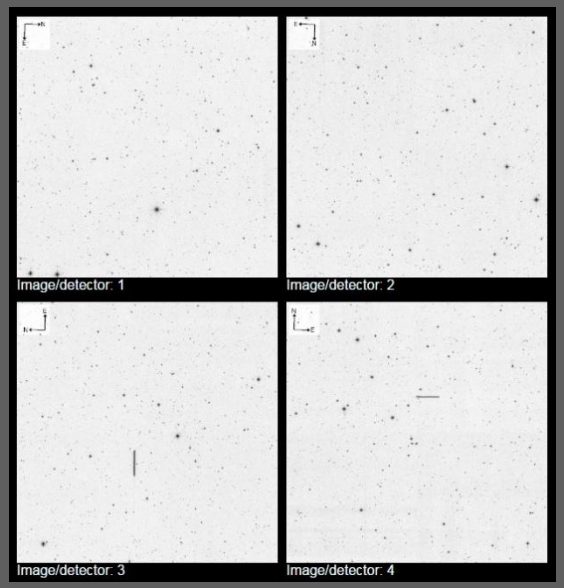
- WFAU has a track record of processing and archiving astronomical data and surveys
- From the SuperCOSMOS Science Archive, 6DFGS spectroscopic archive
- Collaboration with CASU (nightly processing)
- WFCAM Science Archive (UKIRT - telescope)
- VISTA Science Archive
- OmegaCam Science Archive (VST - telescope)

Strengths

- Experience of handling large data volumes
- Database design
- Ensure high data quality
- Provide science ready products
- Add value, integrate other datasets
- Dedicated interface and, incorporating standards, published through Virtual Observatory (VO)

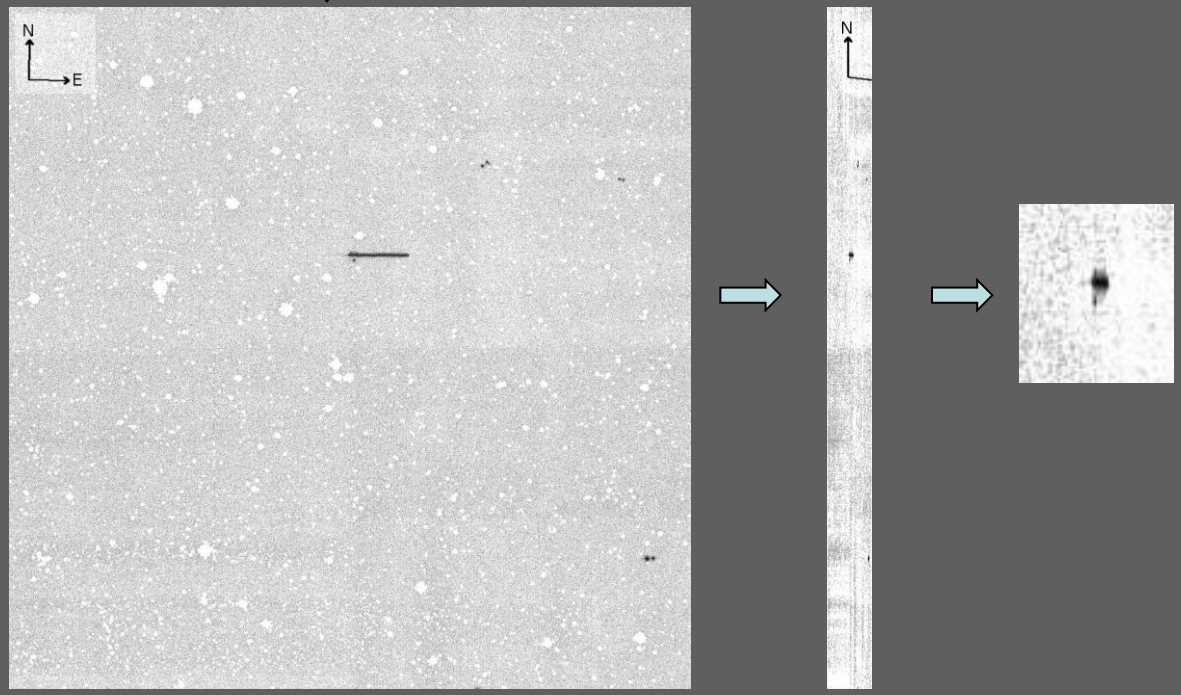
Current SSA related work – WSA LM

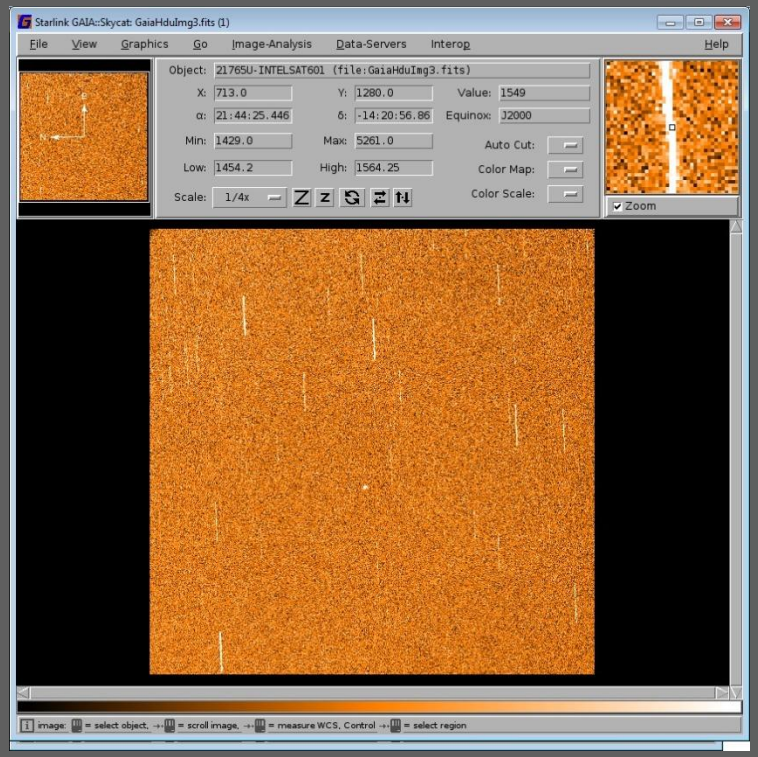
- Contract with Lockheed Martin (joint operators of UKIRT)
  - Short exposure WFCAM observations
  - Sidereal or non-sidereal tracked
  - 1000-5000 frames a night

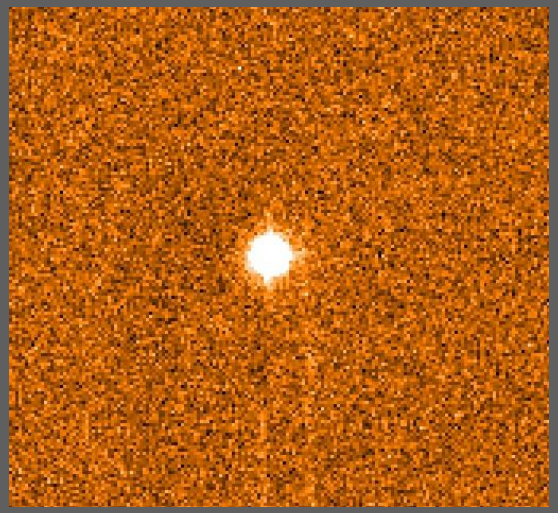


Sidereal

- Reduced frame (normal)
- Masked (remove stars)
- Scrunched E-W
- Detect and characterise objects

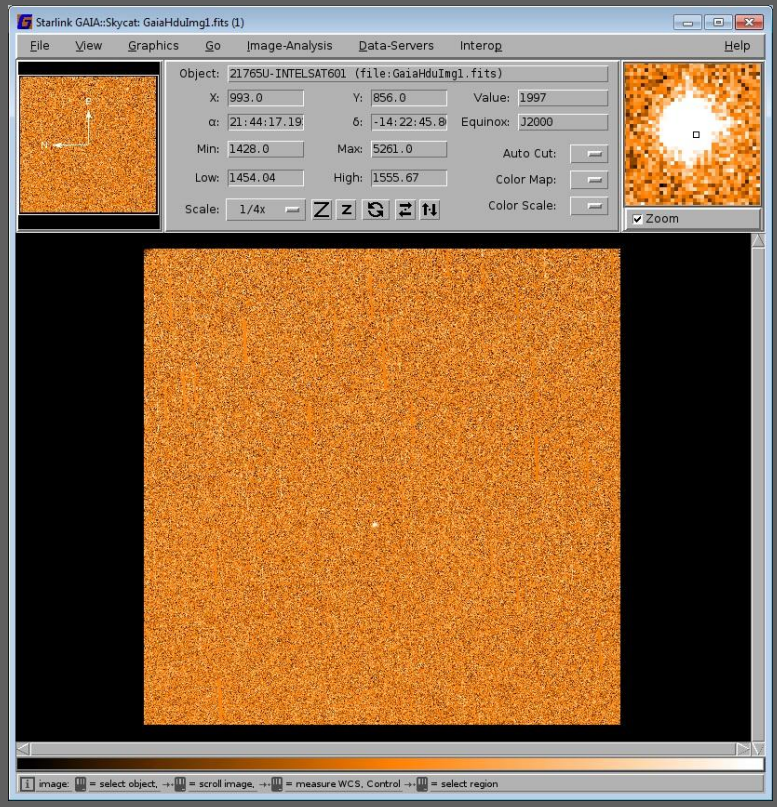






Non-Sidereal Rate - NSR

- Reduced frame (normal)
- Masked (remove star trails)
- Point-like object detection



Current SSA related work – LM WSA

- Install and operate WFCAM archive at Palo Alto
- Ingest all processed frames and their meta-data into database
- Ingest object detection catalogues into DB tables
- Link images, objects and light-curves
- Web based UI for querying data
- Develop specific access methods and presentation of results

Current SSA related work – LM WSA

TABLE **u13alm01.SatelliteDetection**

Contains the individual satellite trail detections in each normal image for

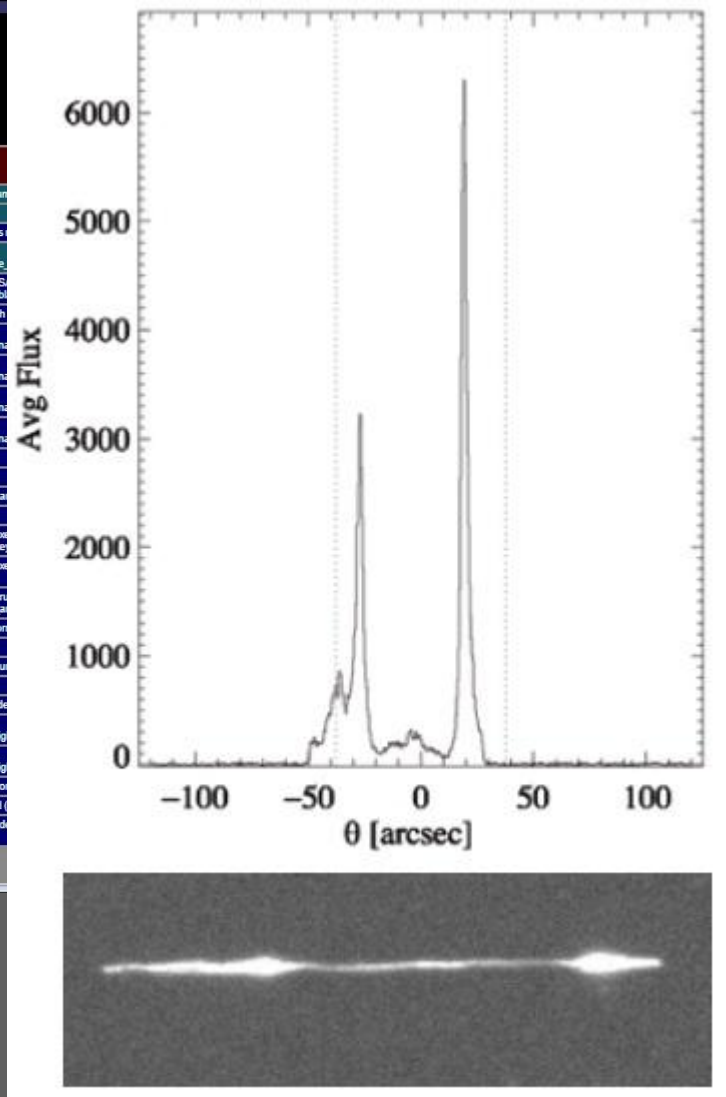
programme U13ALM01

This table contains the individual detections of satellite trails originating from multiframe images taken on UKIRT-WFCAM

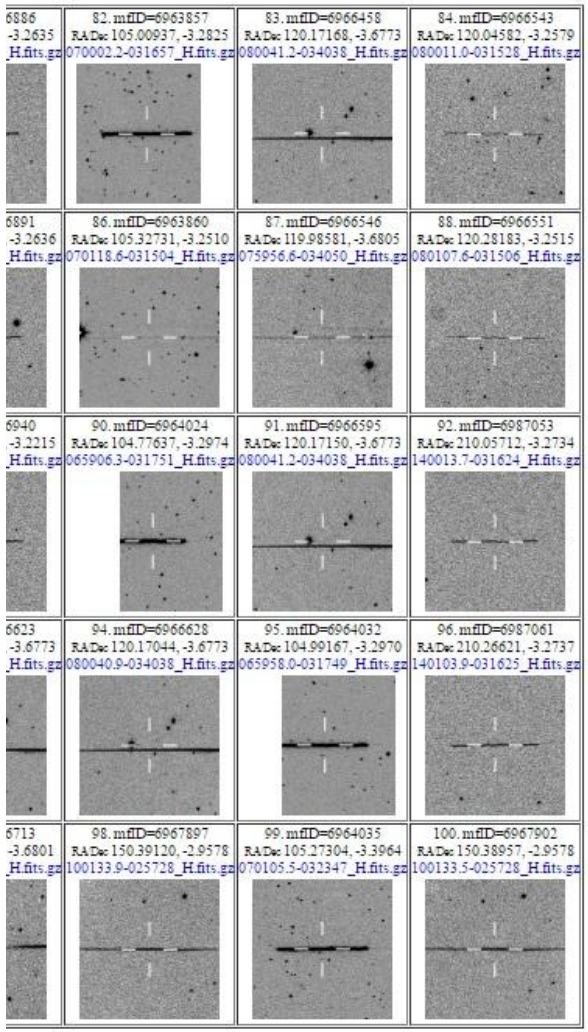
Required constraints:

- **Primary key** is (multiframeID,extNum,seqNum)

Name	Type	Length	Unit	Description
multiframeID	bigint	8		the UID of the relevant normal multifram
extNum	tinyint	1		the extension number of this frame
cuEventID	int	4		UID of curation event giving rise to this
seqNum	int	4		the running number of this detection {catalogue TType keyword: Sequence_
filterID	tinyint	1		UID of combined filter (assigned in WS 1=Z,2=Y,3=J,4=H,5=K,6=H+2,7=Br,8=bl
mjd	float	8	day	The mean Modified Julian Day of each
x	real	4	pixels	X coordinate of detection {catalogue TType keyword: X_coordina
xErr	real	4	pixels	Error in X coordinate {catalogue TType keyword: X_coordin
y	real	4	pixels	Y coordinate of detection {catalogue TType keyword: Y_coordina
yErr	real	4	pixels	Error in Y coordinate {catalogue TType keyword: Y_coordina
ra	float	8	Degrees	Celestial Right Ascension
dec	float	8	Degrees	Celestial Declination
hourAngle	float	8	hours	Local Hour angle (hours W of meridea
nPix	int	4	pixels	No. of pixels above threshold
ellDash	real	4		1-b/a, where a/b=semi-major/minor axe scrunched image {catalogue TType ke
ell	real	4		1-b/a, where a/b=semi-major/minor axe image
paDash	real	4	degrees	ellipse fit orientation to x axis in the scru {catalogue TType keyword: Position_a
pa	real	4	degrees	ellipse fit orientation to x axis in the nor
flux	real	4	ADU	Instrumental isophotal flux counts
fluxErr	real	4	ADU	Error in instrumental isophotal flux cou
mag	real	4	mag	Calibrated isophotal magnitude
magErr	real	4	mag	Error in calibrated isophotal magnitude
pHeight	real	4	ADU	Highest pixel value above sky {catalogue TType keyword: Peak_heig
pHeightErr	real	4	ADU	Error in peak height {catalogue TType keyword: Peak_heig
ppErrBits **	int	4		additional WFAU post-processing erro
deprecated **	tinyint	1		Code for a current (=0) or deprecated (
trailID **	bigint	8		Unique identifier for this detection, or d detection
Total length		**123**		



u13alm01 MFID:
page 5 of Summary 1 2 3 4 5



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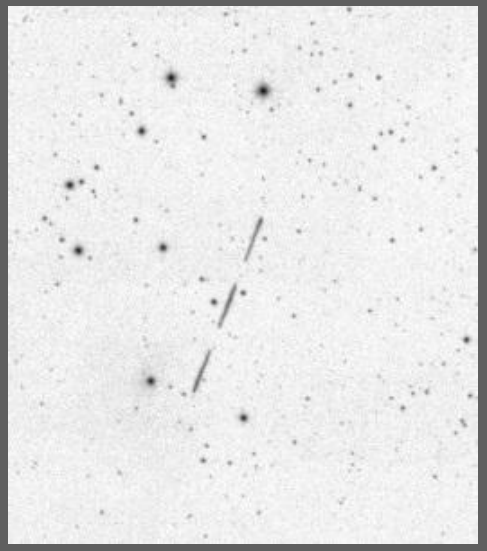
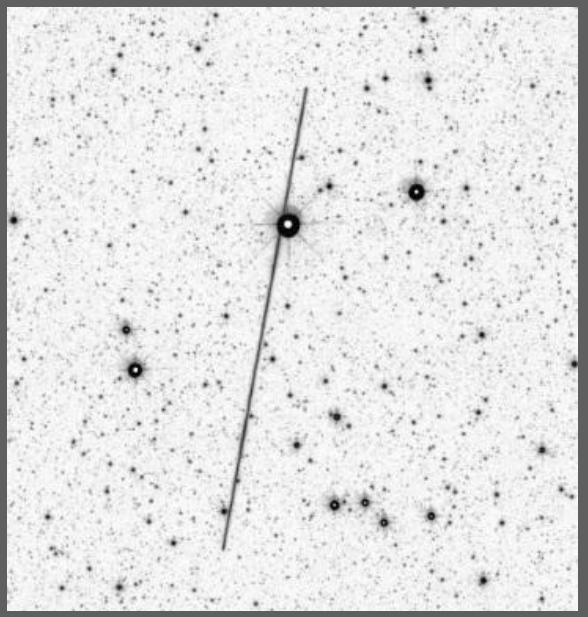
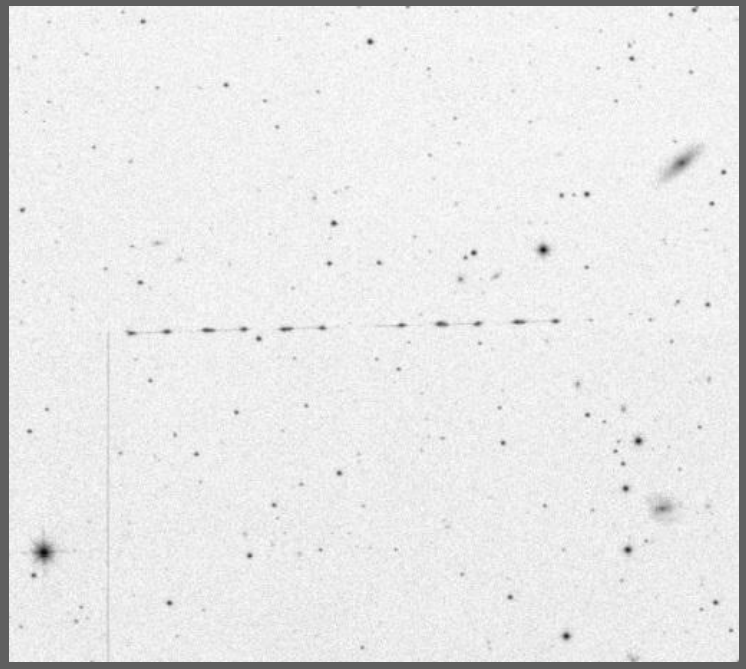
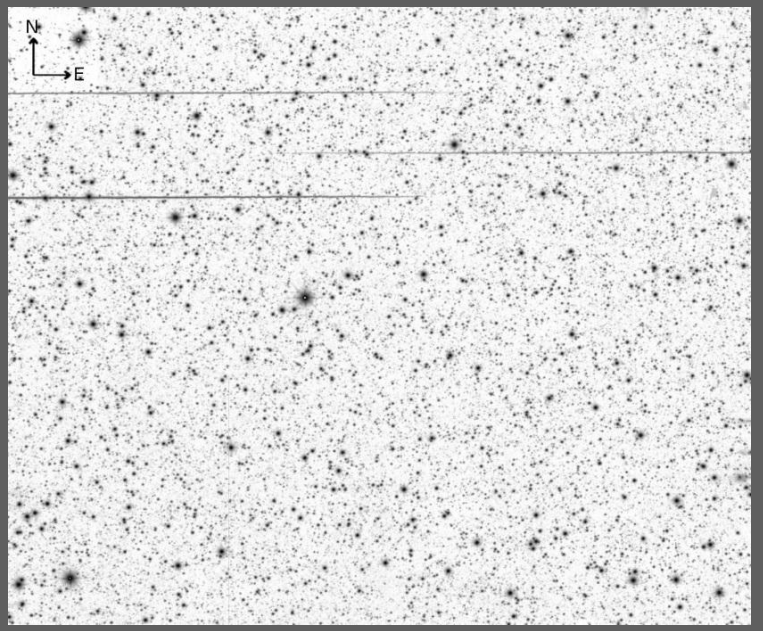
Prior WFCAM observations

- Downloaded over 40 million TLEs from space-track.org, 2005-2015
- Calculated predicted position of a given satellite for each WFCAM observation (normals)
- Only used closest TLE with published date +/- 7 days
- Ran against 4 million observations (in practice 16 million)
- Over 50,000 matches < 6 arcmin





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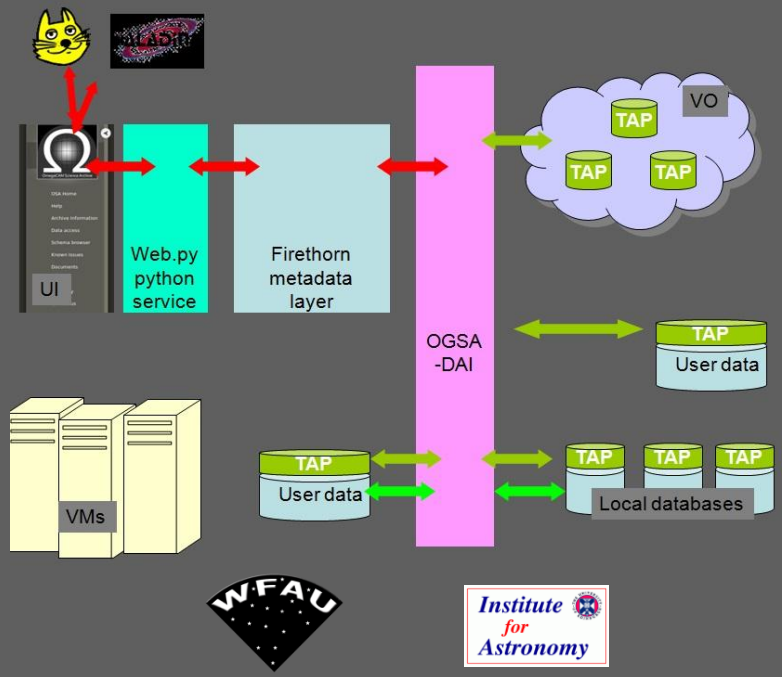
Future areas of involvement

- Data integration and exchange, (drawing on experience with VO), distributed queries, authentication
- Facilitate and enhance user access to data



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