

Commissioning workshop summary (TVS / DESC-SN)

Mark Sullivan, Southampton

On behalf of the LSST:UK TVS and DESC-SN groups

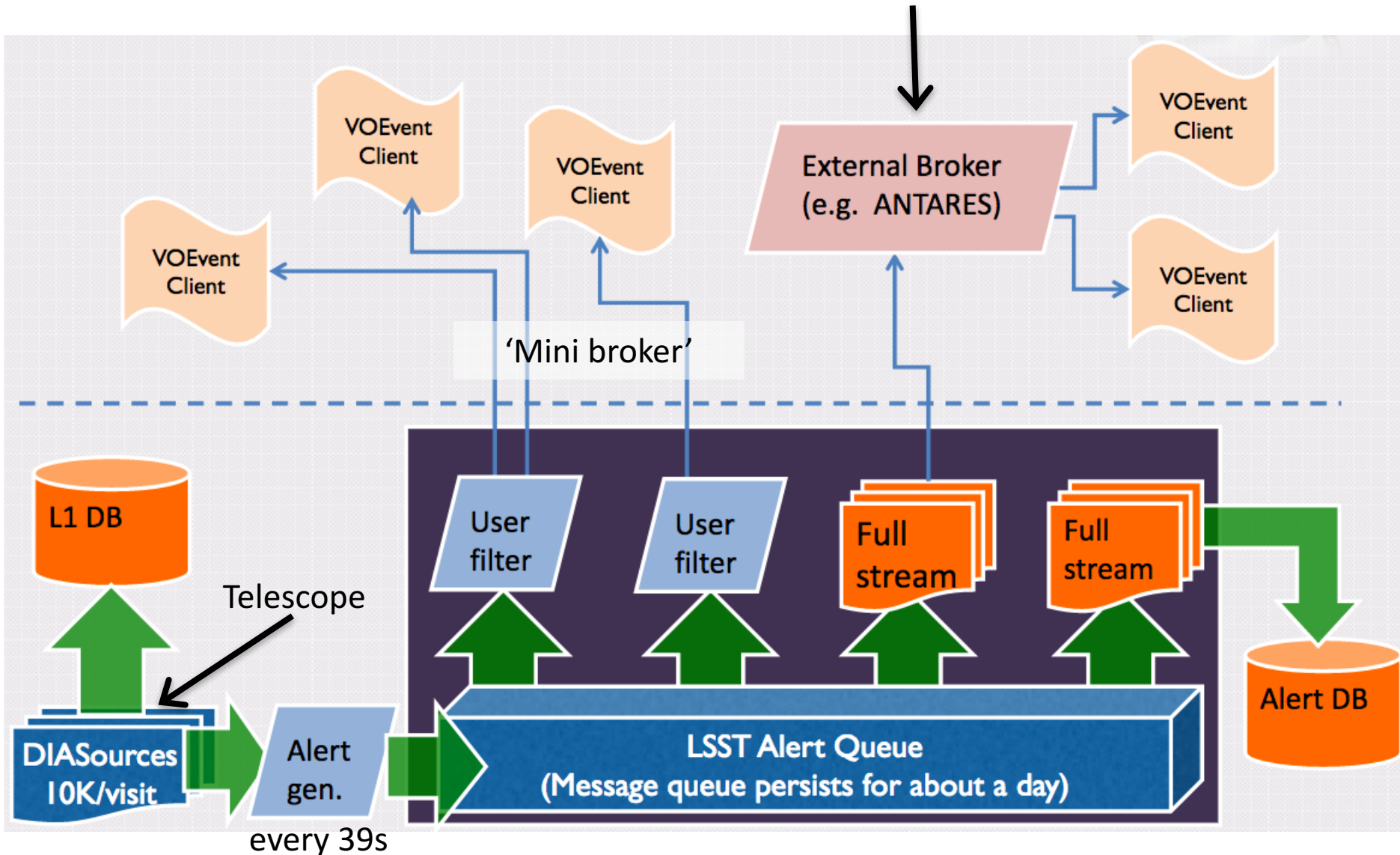
Meeting highlights relevant to commissioning

- Alert streams and ‘brokers’
- Classification and follow-up
- *Cadence*

Alert stream

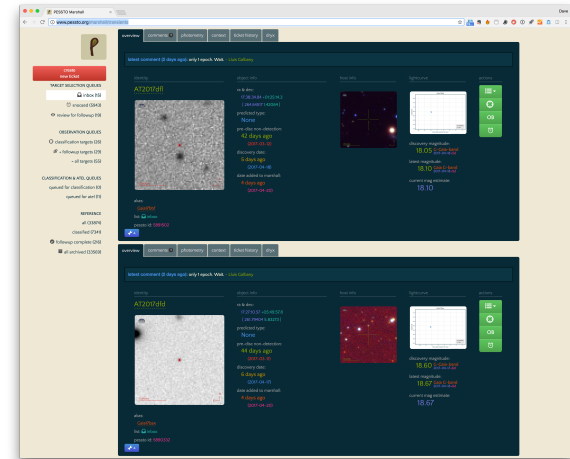
- 400-600 GB *per night*
 - *10,000 events every 39s through the night*
 - *Alert packaging includes last 12 months historical observations*
- *Most users want filtering – a subset:*
 - External value-adding systems ('brokers')
 - Limited LSST filtering services ('mini-broker')

What should this look like?



See Eric Bellm 'Level 1' talk

Spectroscopic marshalls (e.g. ePESSTO)



PESSTO Marshall Inbox

<http://www.pessto.org/marshall/transients>

overview | comments 15 | photometry | context | ticket history | dryx

Warning this object is too faint to take a classification spectrum - please consider archiving it

latest comment (2017-02-20): Observed with grism 11 and 16. Good signal. - Anders Nyholm

identity	object info	spectral classification	host info	lightcurve	actions
AT2017hm 	ra & dec: 11:33:10.57 -10:13:18.4 [173.29408 -10.22178] predicted type: SN abs peak mag: -18.86 pre-disc non-detection: 111 days ago (2017-01-03) discovery date: 104 days ago (2017-01-09) date added to marshall: 104 days ago (2017-01-09)	classification: SN Ia classification survey: pessto classification date: 2017-01-16 (98 days ago) classification phase: -2d redshift: 0.0213 distance: 92.61 Mpc		 discovery magnitude: 16.90 V-band 2017-01-09+104d latest magnitude: 18.27 ATLAS FP o-band 2017-04-12+11d current mag estimate: > 21.0	

PI: Kate Maguire
akas:
[ATLAS17agj](#)
[ASASSN-17aj](#)
[PS17bhh](#)
list: followup complete
pessto id: 2861355

2 x Atel

Comments, Photometry,
Contextual Classification, Ticket
Histories

Transient AKAs

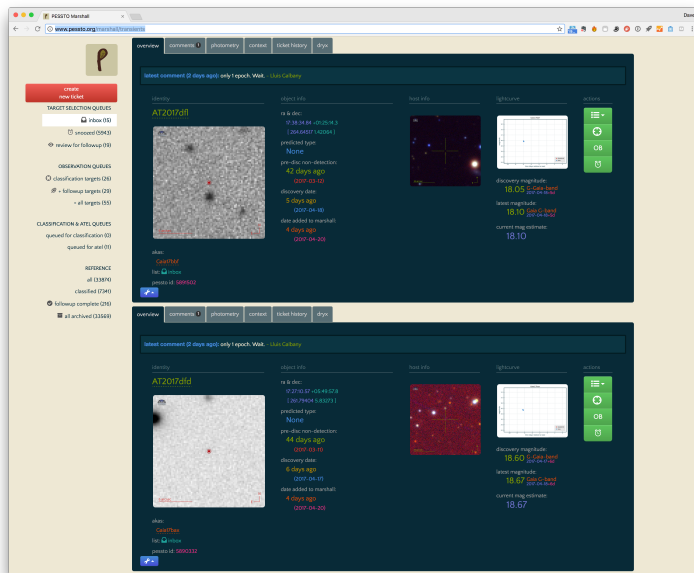
External Service Links

Workflow Actions

Object Ticket

See Stephen Smartt talk

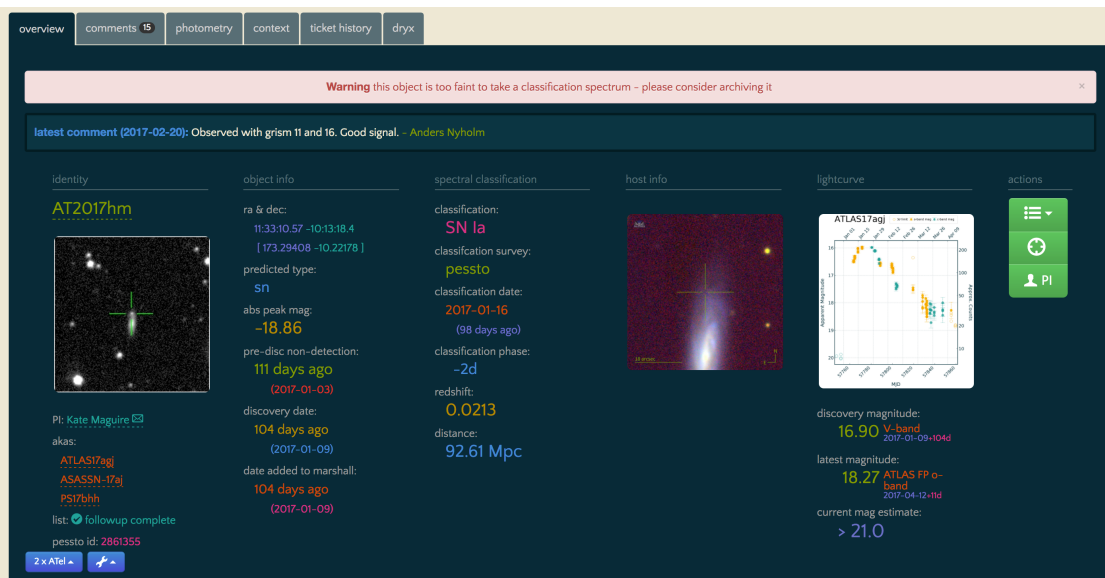
What would an LSST:UK transient broker look like during commissioning?



PESSTO Marshall Inbox

<http://www.pessto.org/marshall/transients>

- Commissioning will have a cadenced 'mini-survey'
- Different requirements for transients and variable stars
- Cross-match and contextual information
- qserv: petascale database:
 - speed stress tests
 - ingesting 1000s sources w/ multiple simultaneous users)
- Real-time transient alerts
- Link to spectroscopic follow-up resources

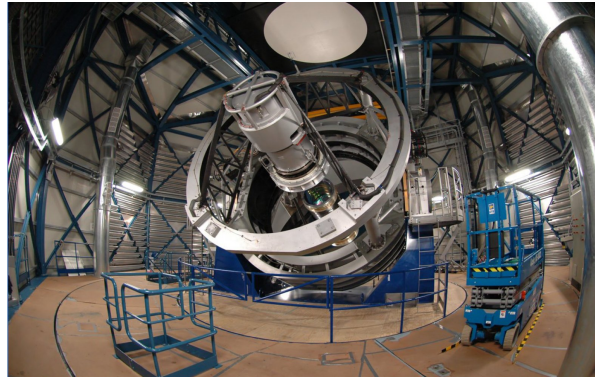


See Stephen Smartt talk

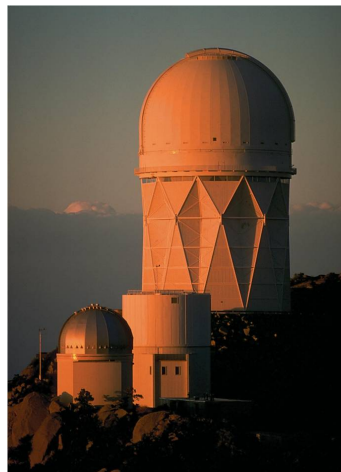
Follow-up spectroscopy

- Enables nearly all ‘astrophysics’
- Samples of 20,000+ transients easily within grasp
- Spectroscopy can provide ‘unbiased’ training samples for classification methods
- Systematics/biases in photometric-redshift cosmology difficult to quantify

4MOST: ESO VISTA telescope



WEAVE:
WHT

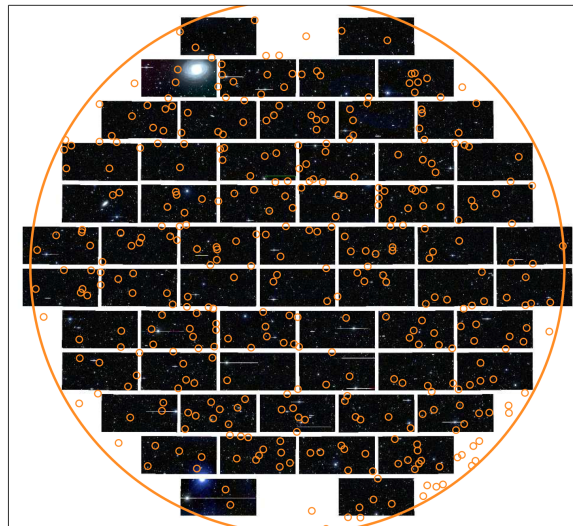


DESI: KPNO 4m

Large MOS follow-up of transients

Example: Time Domain Extragalactic Survey (TiDES)

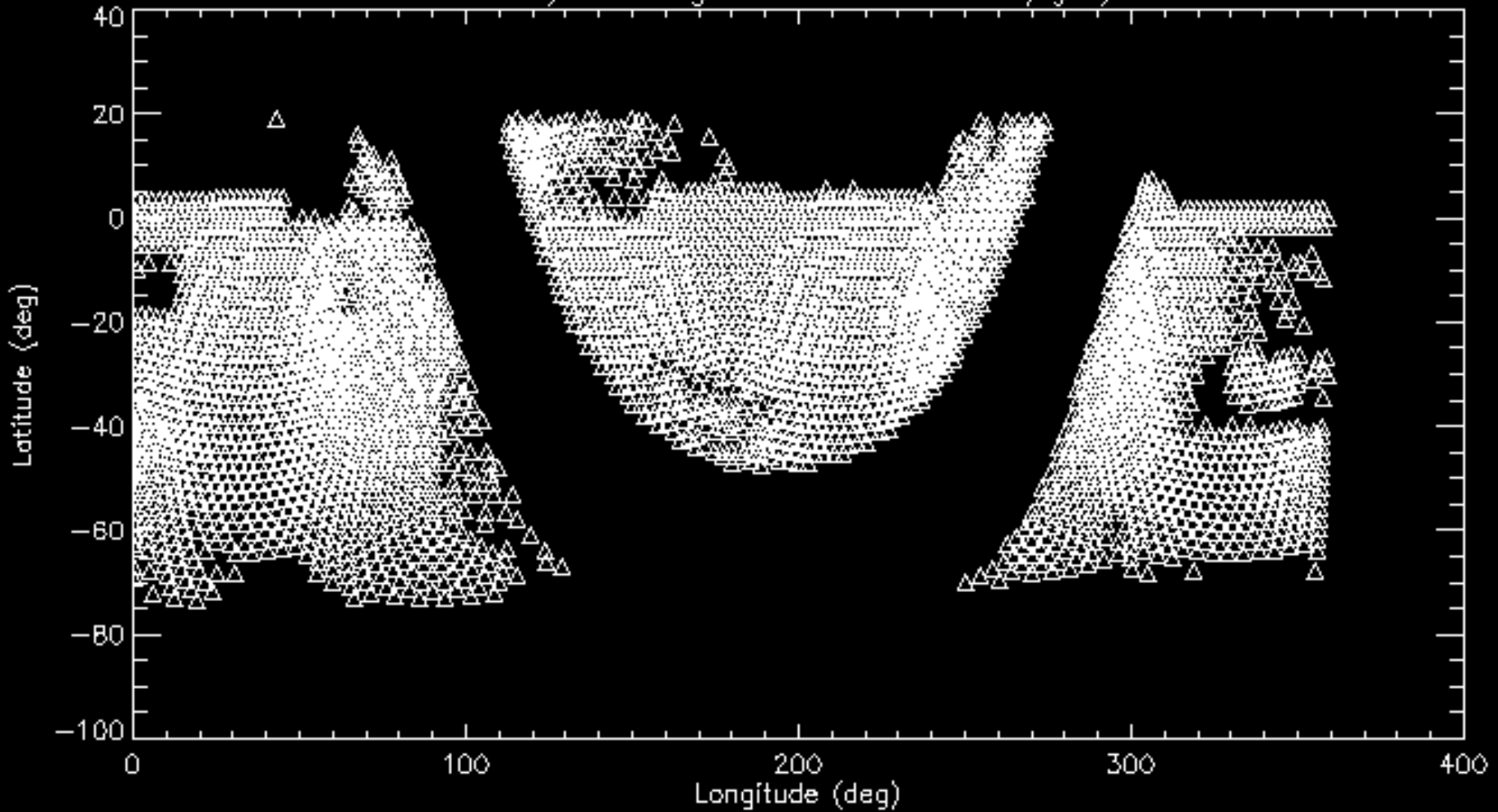
- DESC: Wherever 4MOST points, LSST will have previously discovered transients. Put fibre on host galaxy to get a redshift.
- TVS (+DESC): Do live transients or variables in same fields; schedule 1-3 days ahead



Proto-surveys during commissioning across mini-survey1 field?
e.g. AAT

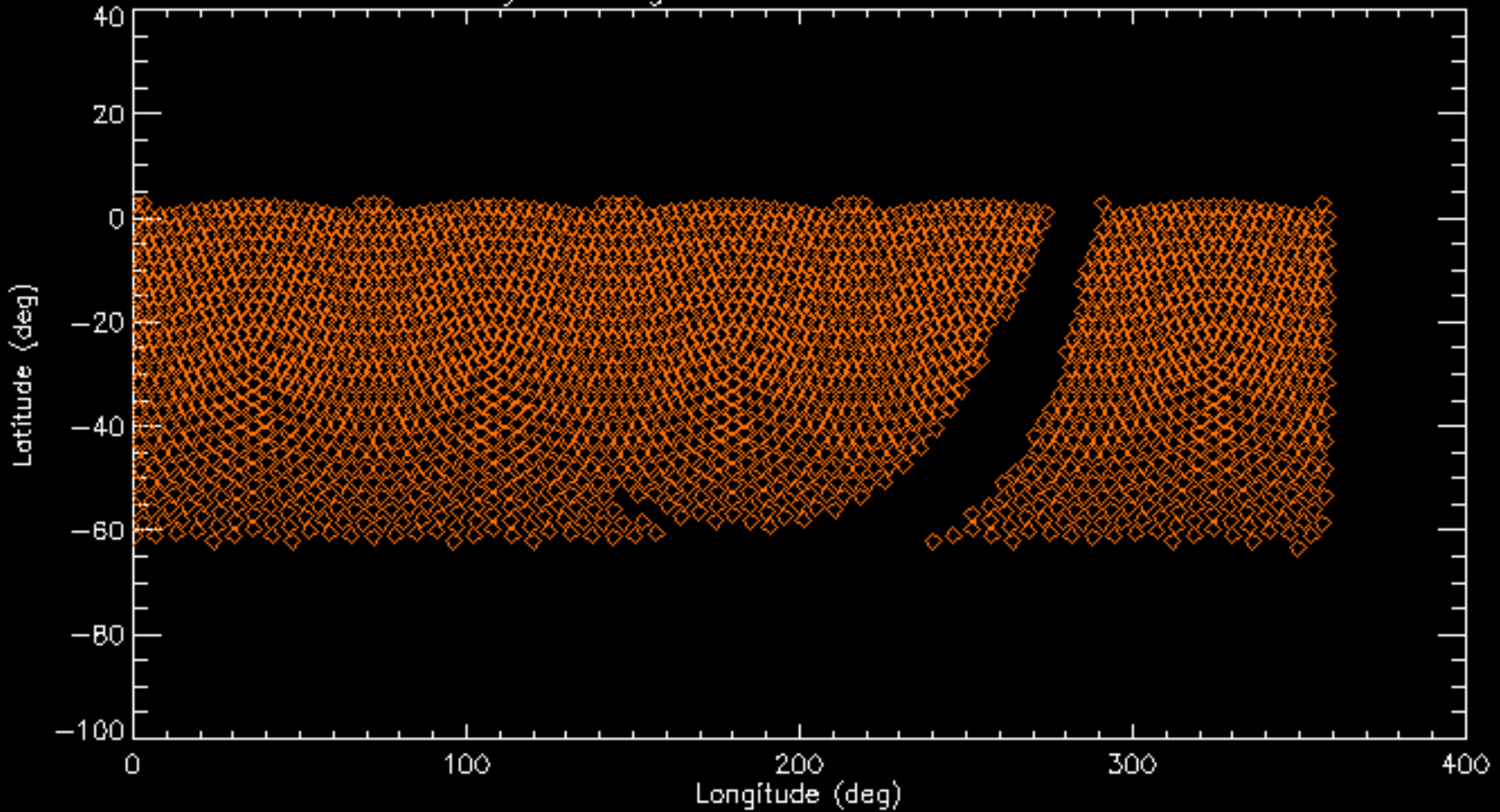
4MOST pointings

4MOST sky coverage of fields for dark/gray time



LSST pointings

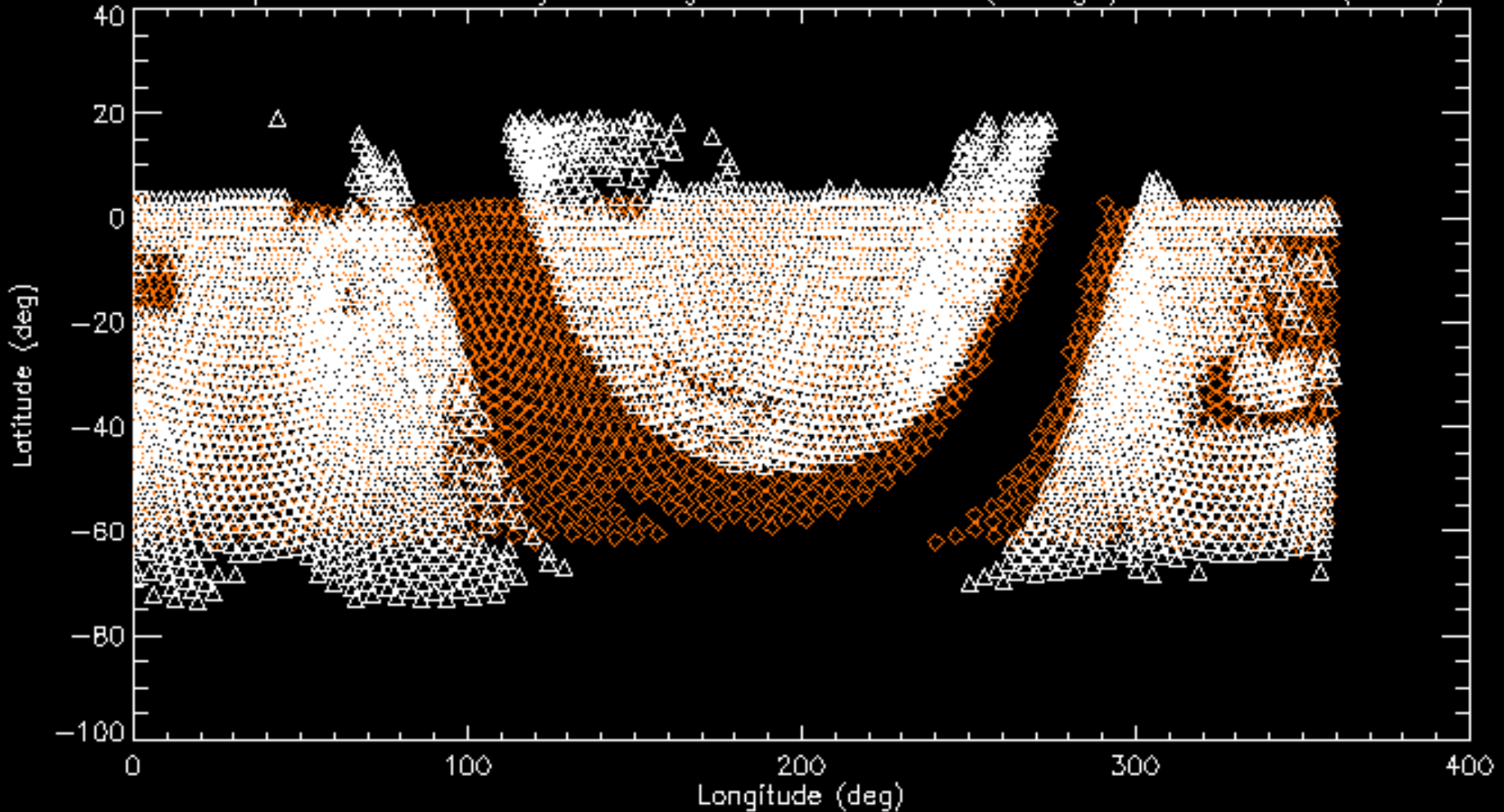
LSST sky coverage of fields visited over 700 times



From B. Turpin and I. Hook

Combination

Overlap between the sky coverages of both LSST (orange) and 4MOST (white)



Capability of up to 50,000 transient spectra over 5 years

From B. Turpin and I. Hook

Follow-up during commissioning

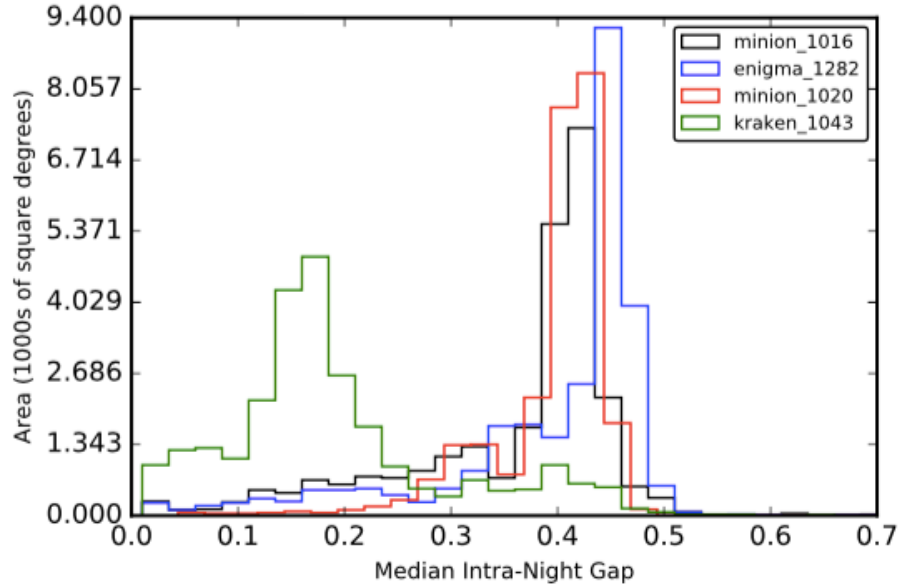
- Linking/exercising ‘transient broker’ and spectroscopic schedulers
 - Algorithms for target selection
 - *Needs to be operational by first light; test during commissioning*
- Optimise spectroscopic strategy
 - What do we need for photometric classification
 - Run proto-survey during commissioning (e.g., AAT)?
- Test classification algorithms on real LSST data
 - How does real-time classification work?
 - How does classification for SN cosmology survive contact with real data?

PLAsTiCC: Photometric LSST Astronomical Time-series Classification Challenge

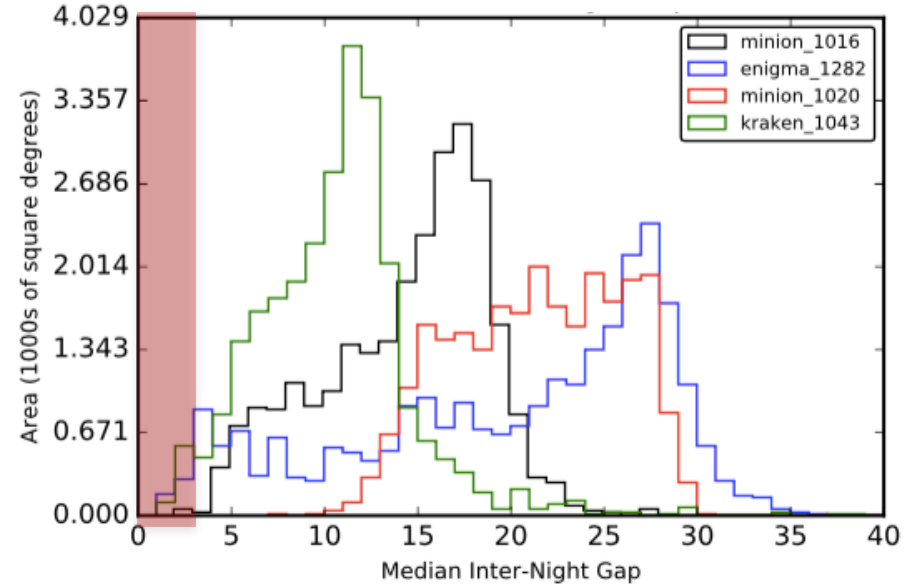
- Designed to address LSST-era transient classification
 - Funded by LSST Enabling Science grant and LSST:UK
 - Planning workshop: Simons Center, New York July 14th 2017
 - Concluding workshop: [here](#), March 2018
-
- Rich simulations of astrophysical populations: sources (SNe, AGN, etc.), spectral types, luminosity functions, dust extinction, host galaxy populations....
 - Contextual information (e.g., nearest galaxies/stars to object, etc.)
 - Best use of limited spectroscopic resources (e.g. training samples)
 - Challenge data easy to update for different survey strategies
 - *Notice of intent has been issued: respond by 1st June!*

LSST “universal” cadence

Within a night



Between nights



From Bellm & Bianco in the Observing Strategy White paper

- LSST Cadence is around 3 days in *some* filter
- But is approx 15 - 30 days in any *specific* filter
- Mostly *not useful* for SN, or SN-like, extragalactic transients