IVOA Interop, Victoria – 29th May 2018

ZTF: First experiences with alerts

(and some early results)

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Research Professor
ZTF Project Scientist

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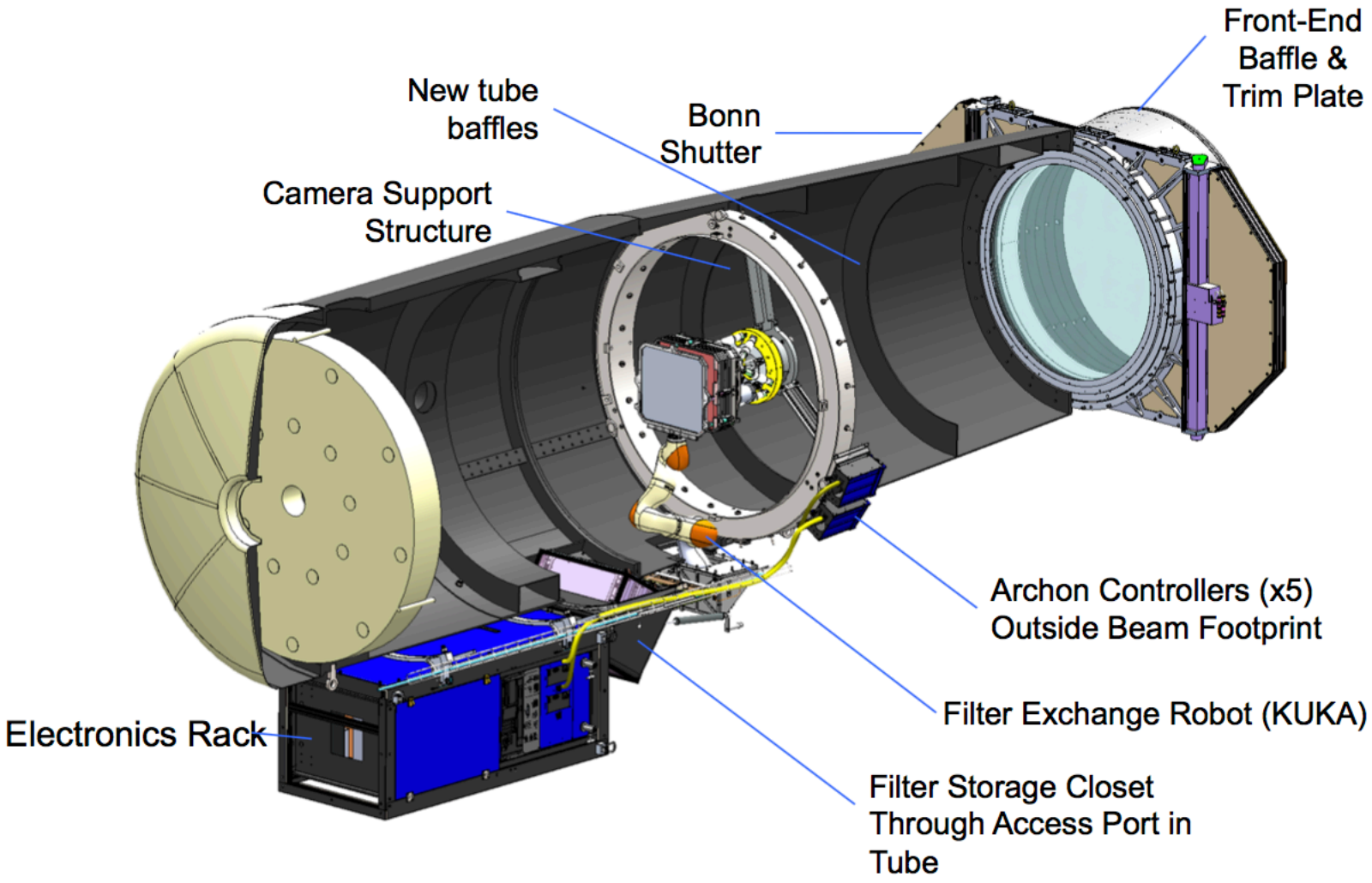
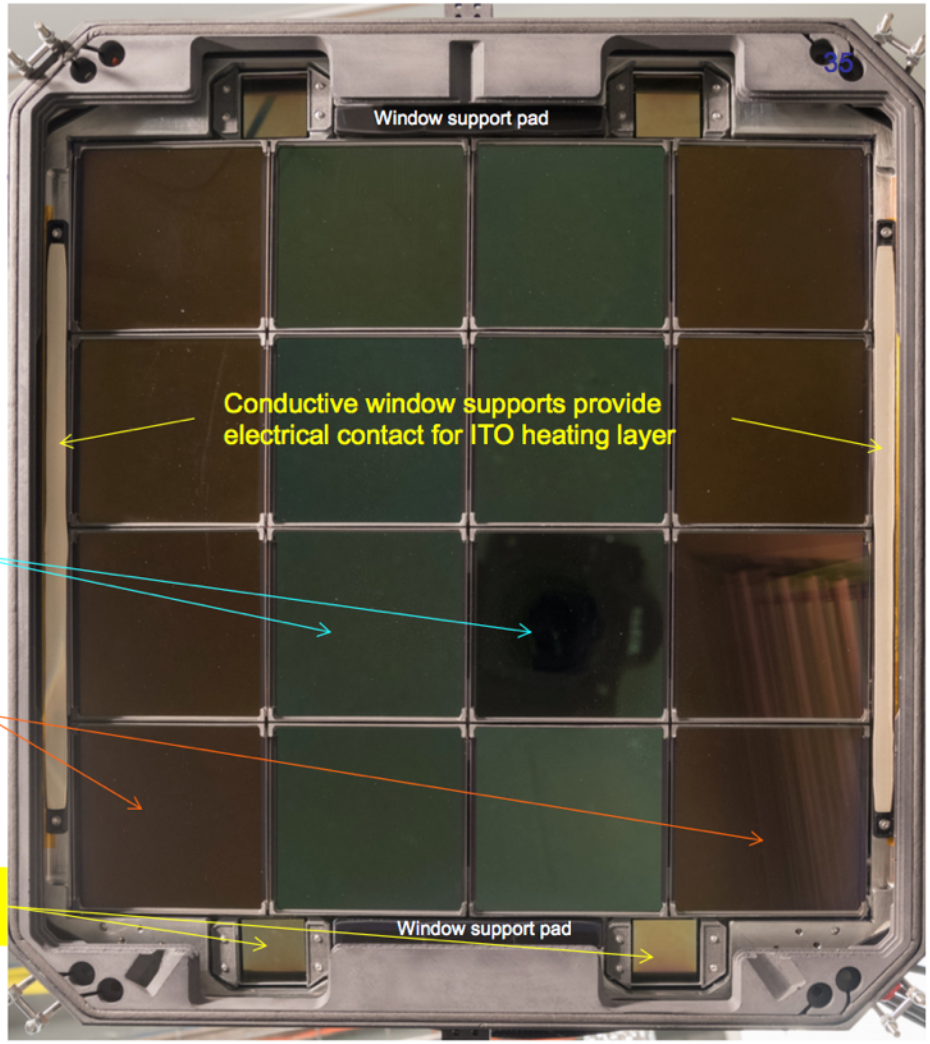
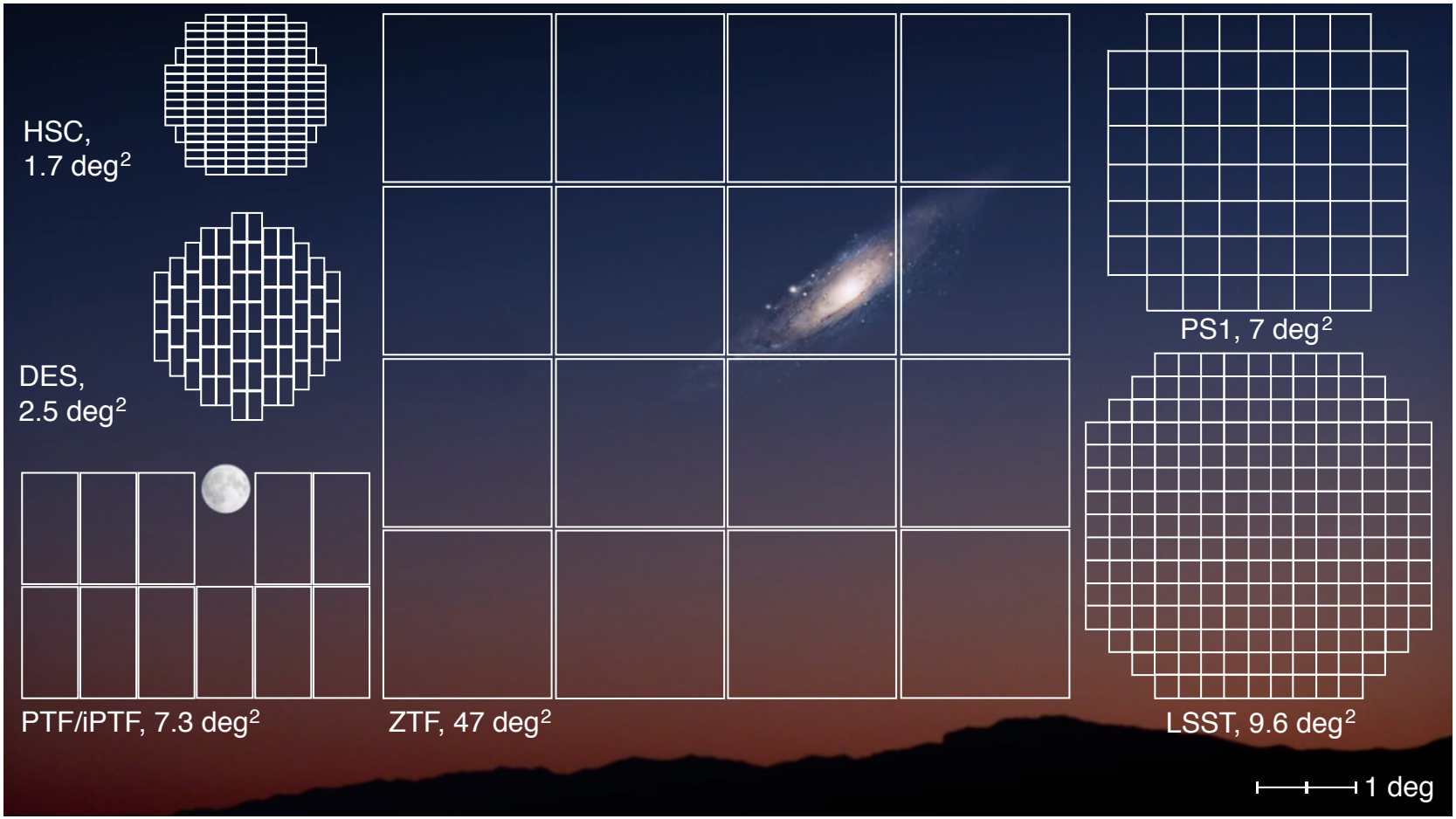
Schematic overview



Focal plane


35
Window support pad
Conductive window supports provide electrical contact for ITO heating layer
2 layer AR coating
Single layer AR coating
Delta doped, multi-layer AR coating, fully depleted thick CCDs
Window support pad

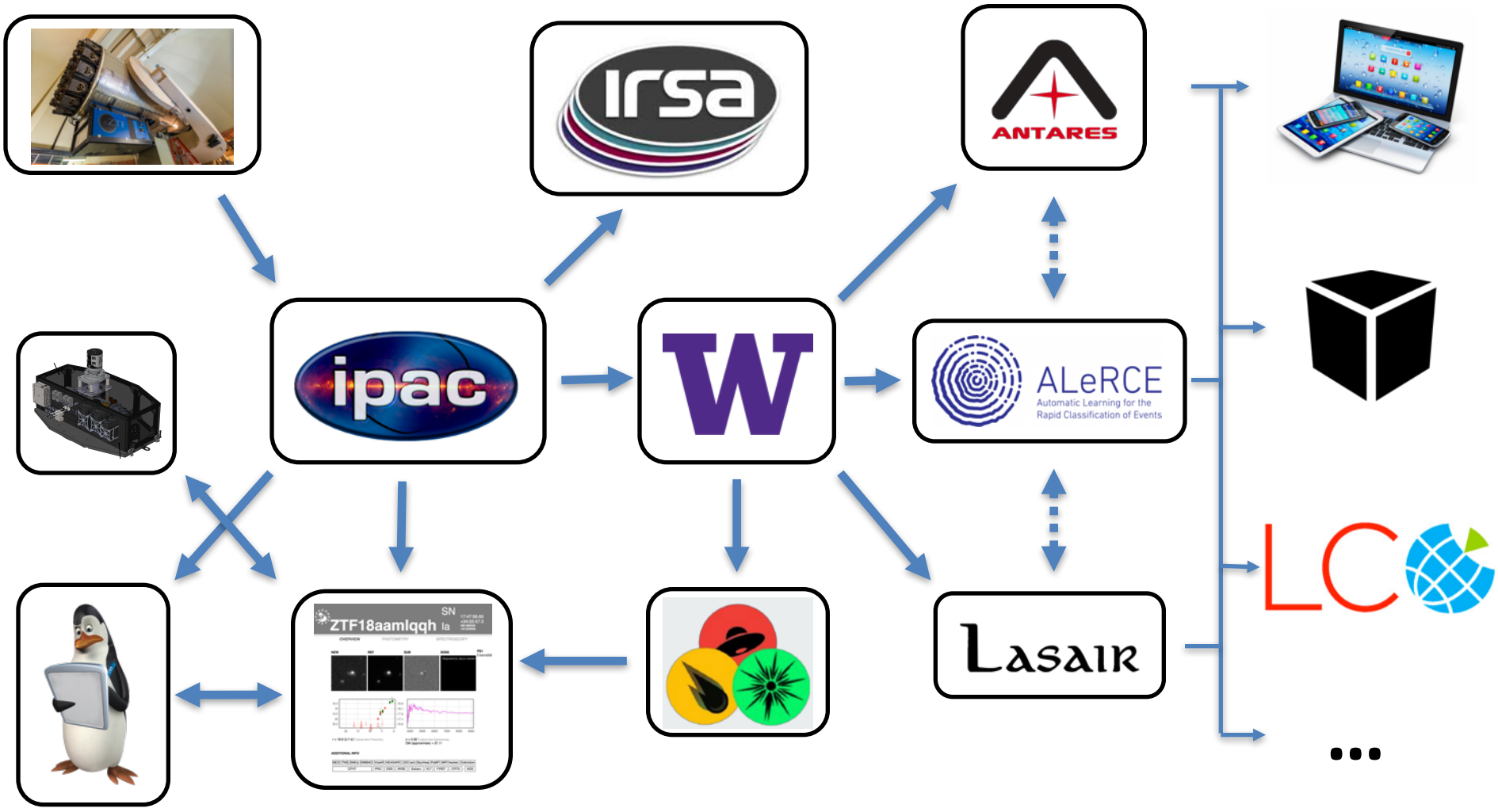
Field of view



ZTF ~ 0.1 LSST

	ZTF	LSST
No. of sources	1 billion	37 billion
No. of detections	1 trillion	37 trillion
Annual visits per source	1000 (2+1 filters)	100 (6 filters)
No. of pixels	600 million (1320 cm^2 CCDs)	3.2 billion (3200 cm^2 CCDs)
Field of view	47 deg^2	9 deg^2
Hourly survey rate	3750 deg^2	1000 deg^2
Nightly alert rate	1 million	10 million
Nightly data rate	1.4 TB	15 TB

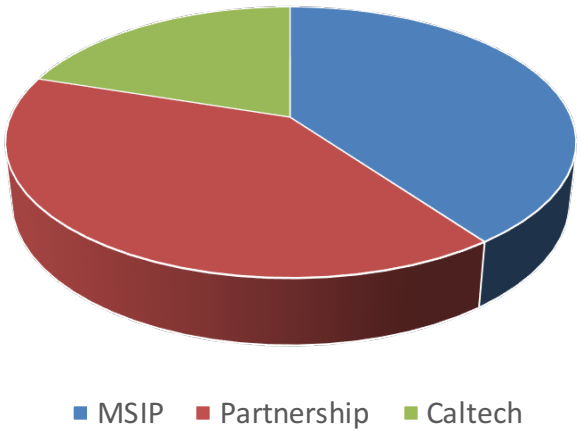
ZTF: The big picture

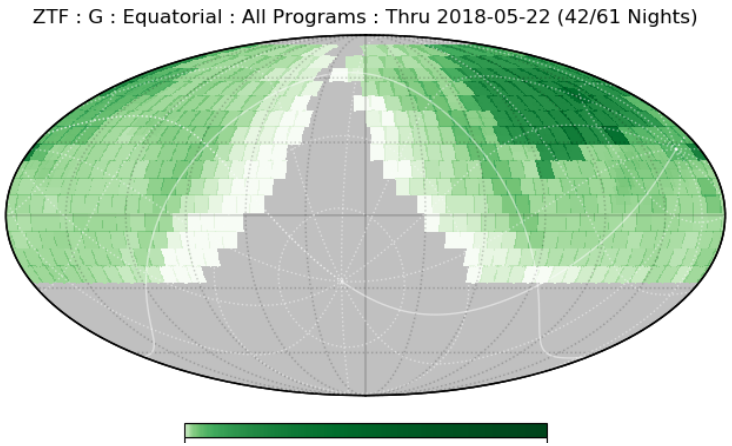


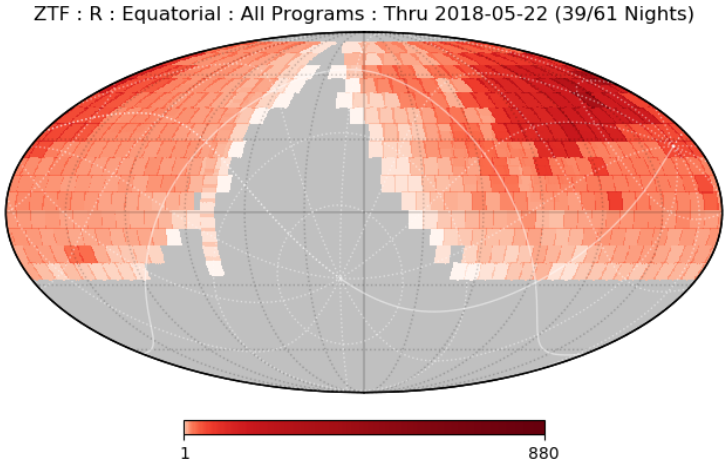
First light – Oct 2017

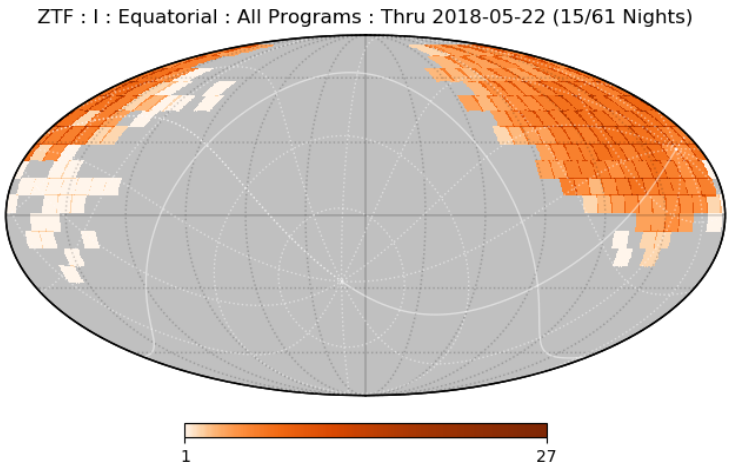
What have we observed so far?

Observing time



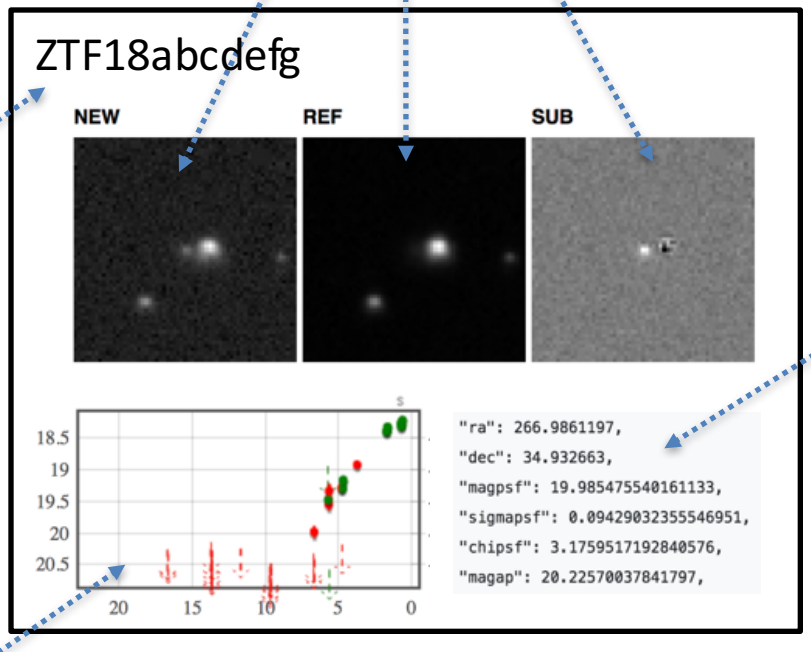






Alert structure: AVRO format

63 x 63 pixel 32-bit images



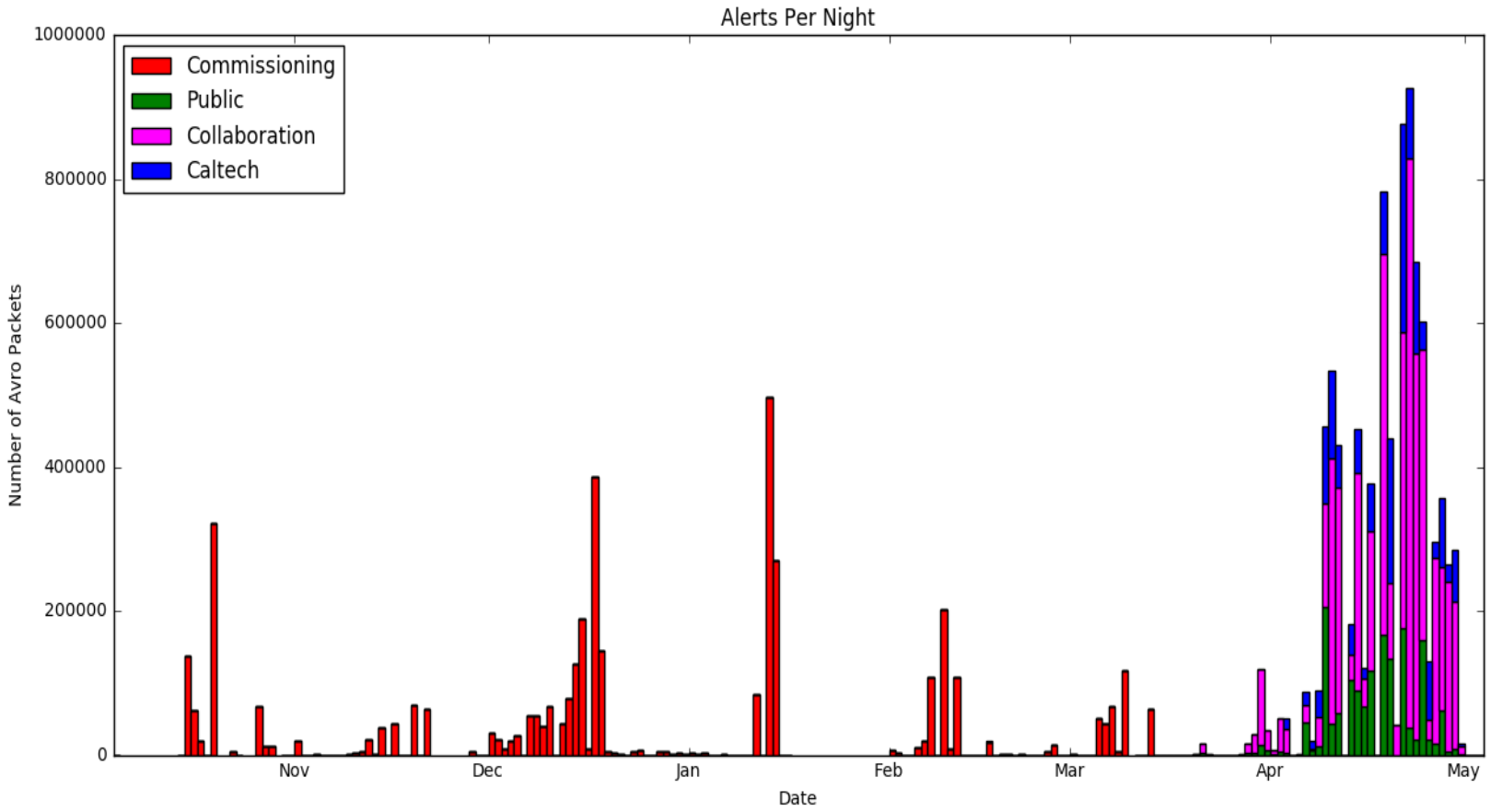
Unique spatially matched alert name

- ZOGY parameters
- Real-bogus score
- Star/galaxy score
- 3 nearest PS1 sources
- Nearest SS object
- Alert history

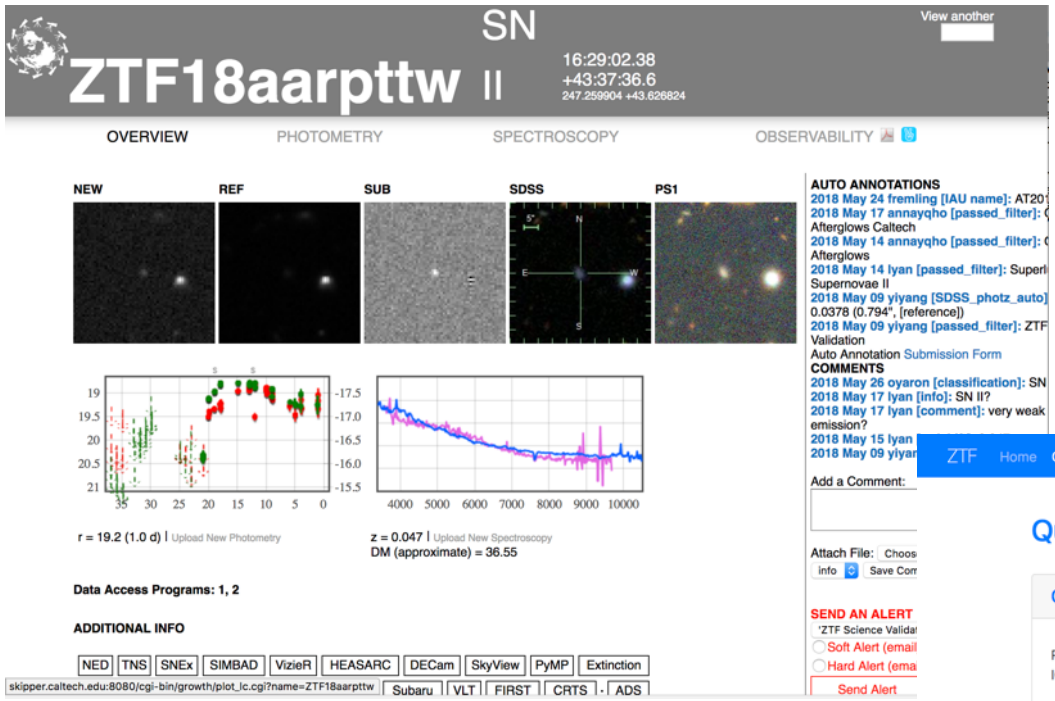
Rolling 30-day window light curve

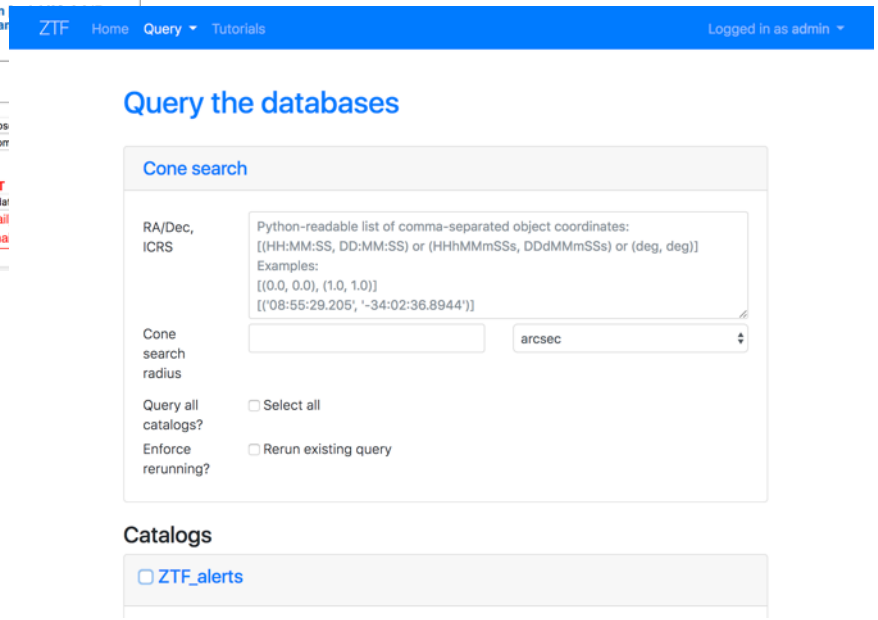
https://github.com/ZwickyTransientFacility/ztf-avro-alert

Alert statistics



Alert management



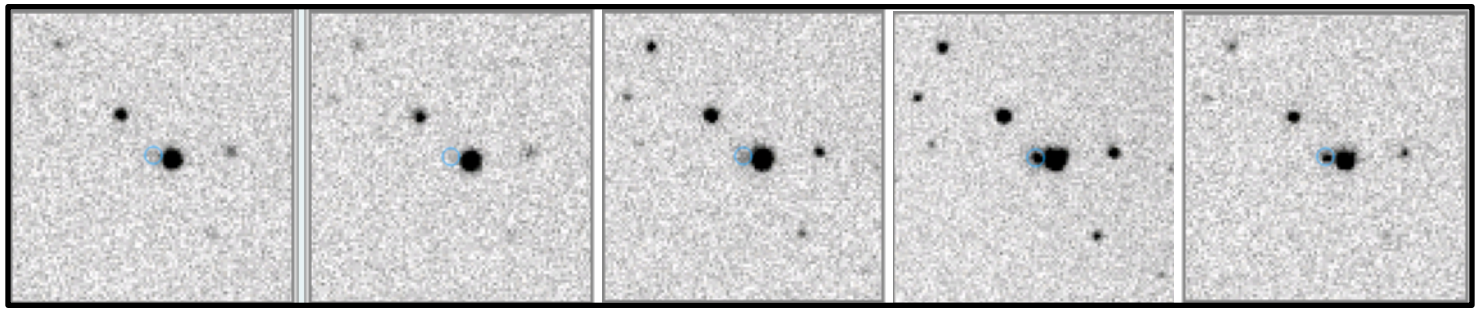


Alert issues

- “It would be useful to also report…”
- “What did we observe last night?”
- “Why can’t I see any alerts?”
- “<Survey x> detected this – why didn’t we?”
- “What’s wrong with the values of parameter <x>?”

- Evolving packet structure: versioning
- Image quality
- User reluctance to participate in QA work

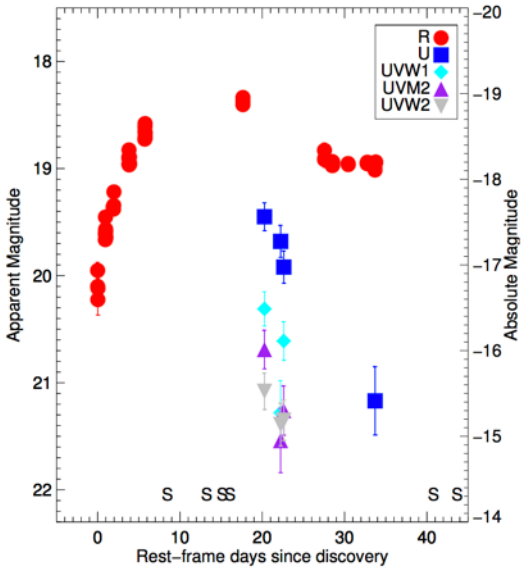
Some early results: SNe



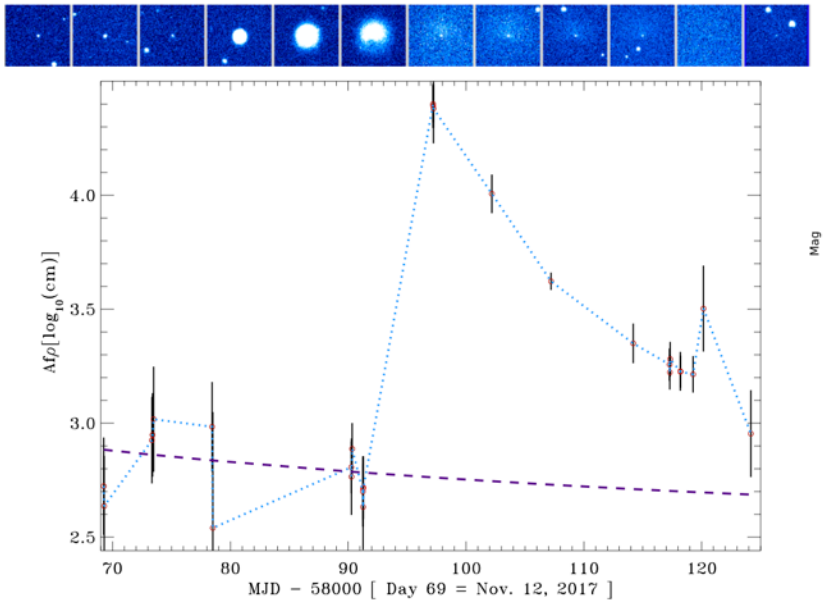
2017-11-06 2017-11-17 2018-03-27 2018-03-30 2018-04-28

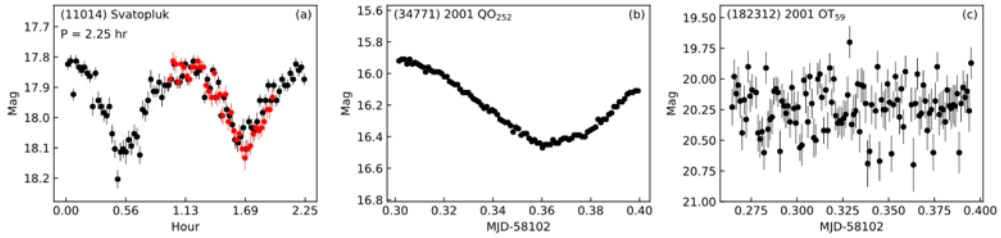
Total: 166 SNe so far

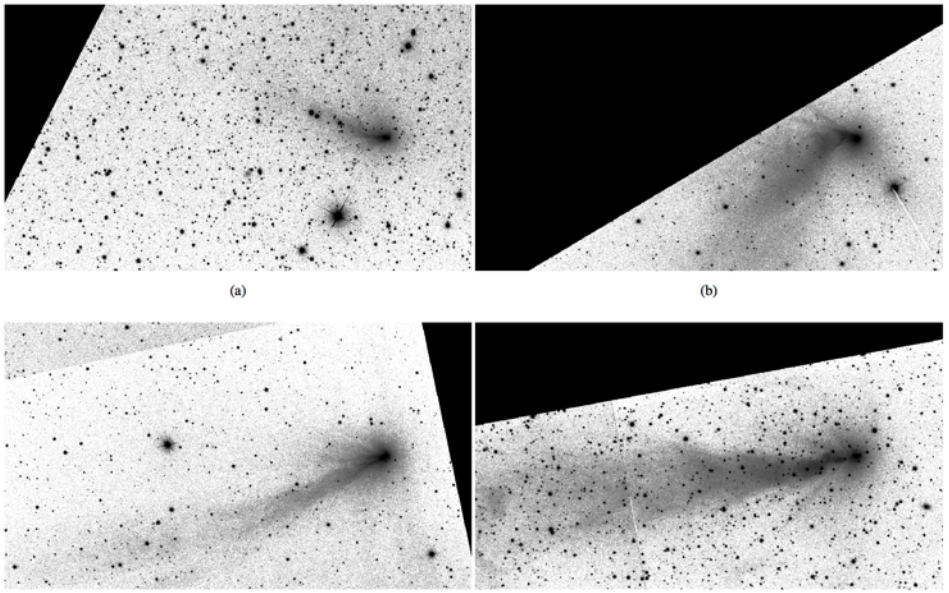
- Ia: 116
- II: 30
- Ib: 5
- Ic: 3
- Ic-BL: 2
- SLSNe: 3



Some early results: small solar system bodies







Summary

- ZTF is the community precursor survey to LSST for:
  - Transient astronomy
  - Follow-up orchestration
  - Machine learning
  - Archival analyses
- Public alerts will being Monday June 4th