

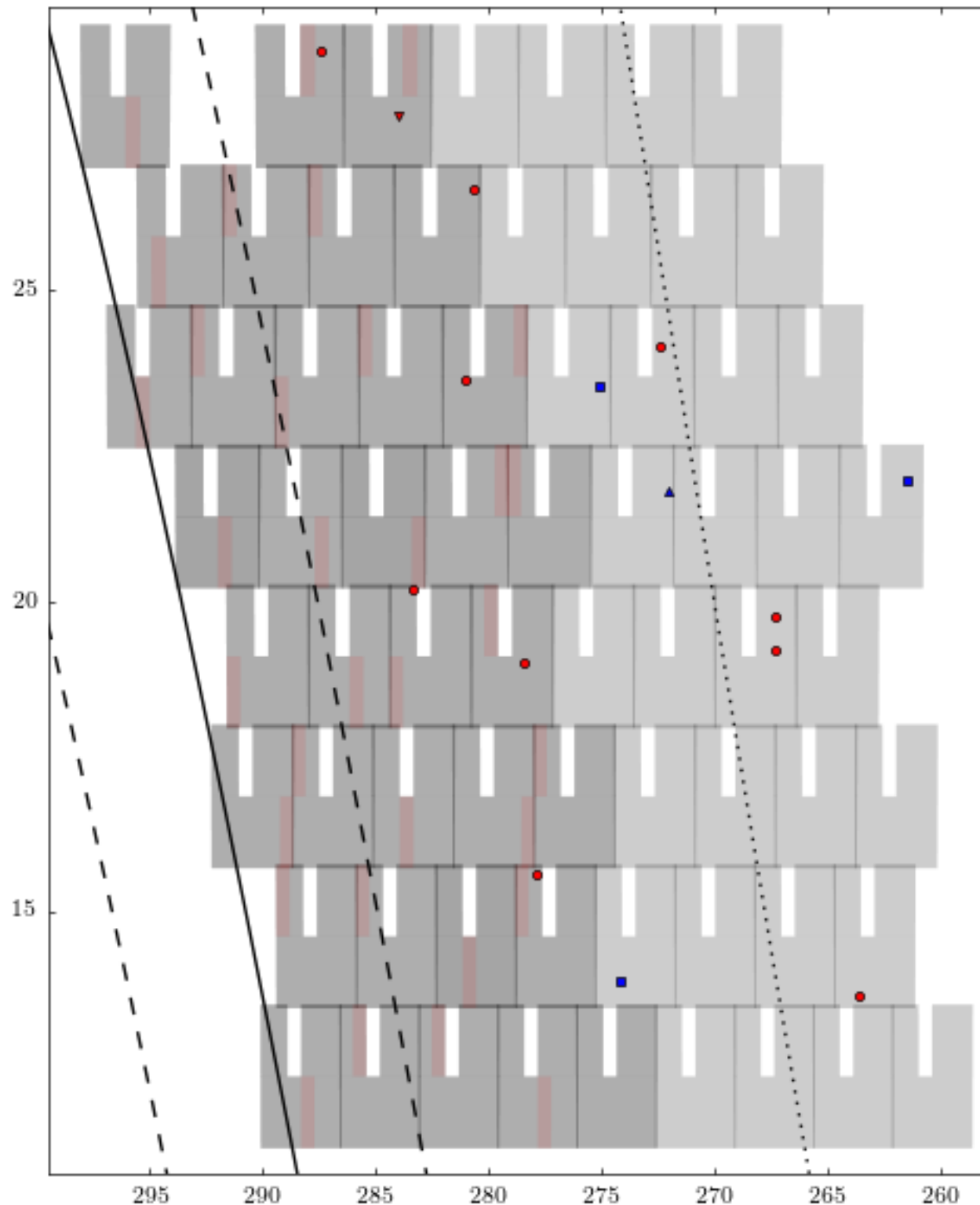
Recent improvements in photometry and astrometry in crowded fields



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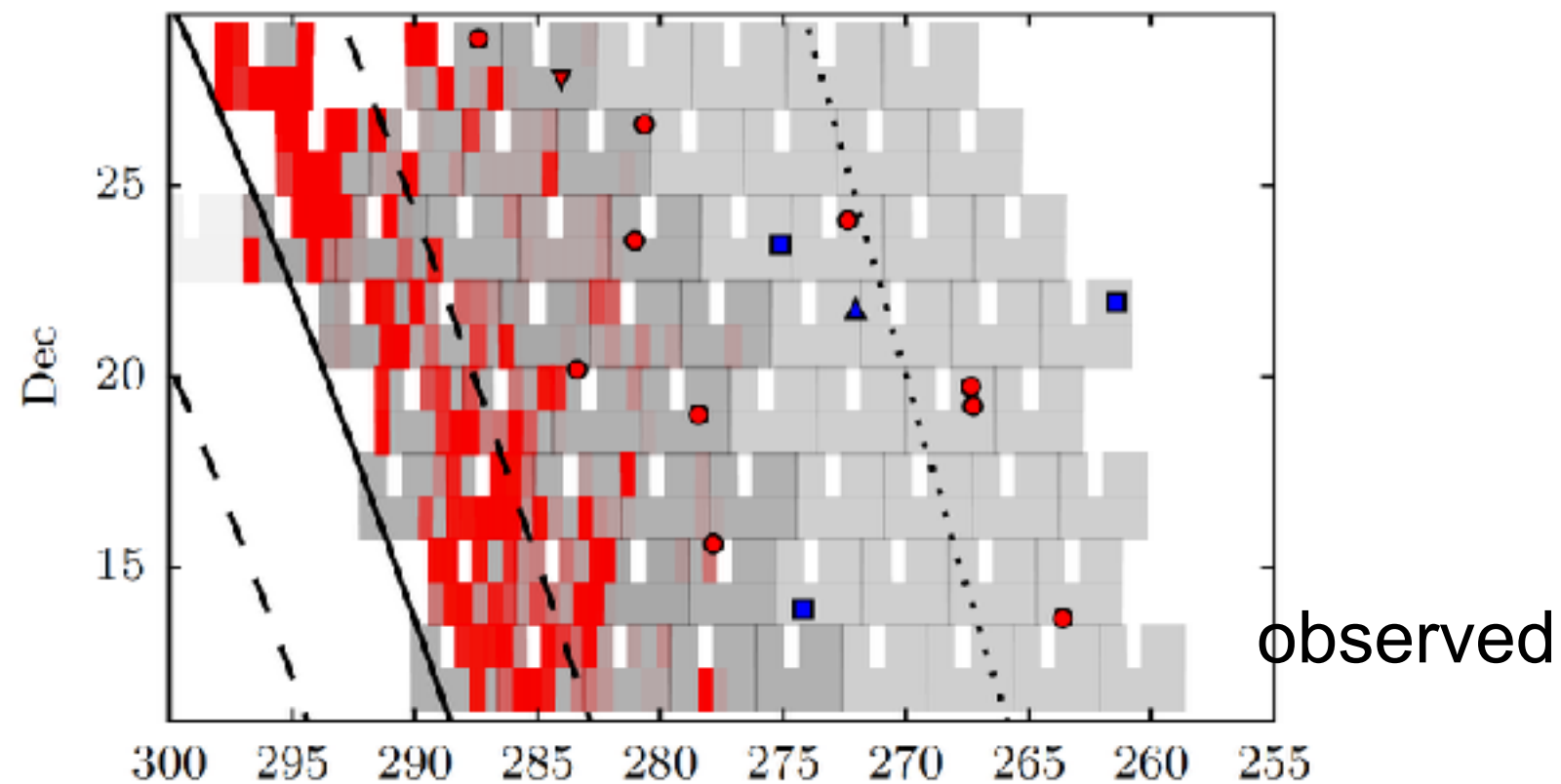
Real bogus and transients in crowded fields before reprocessing



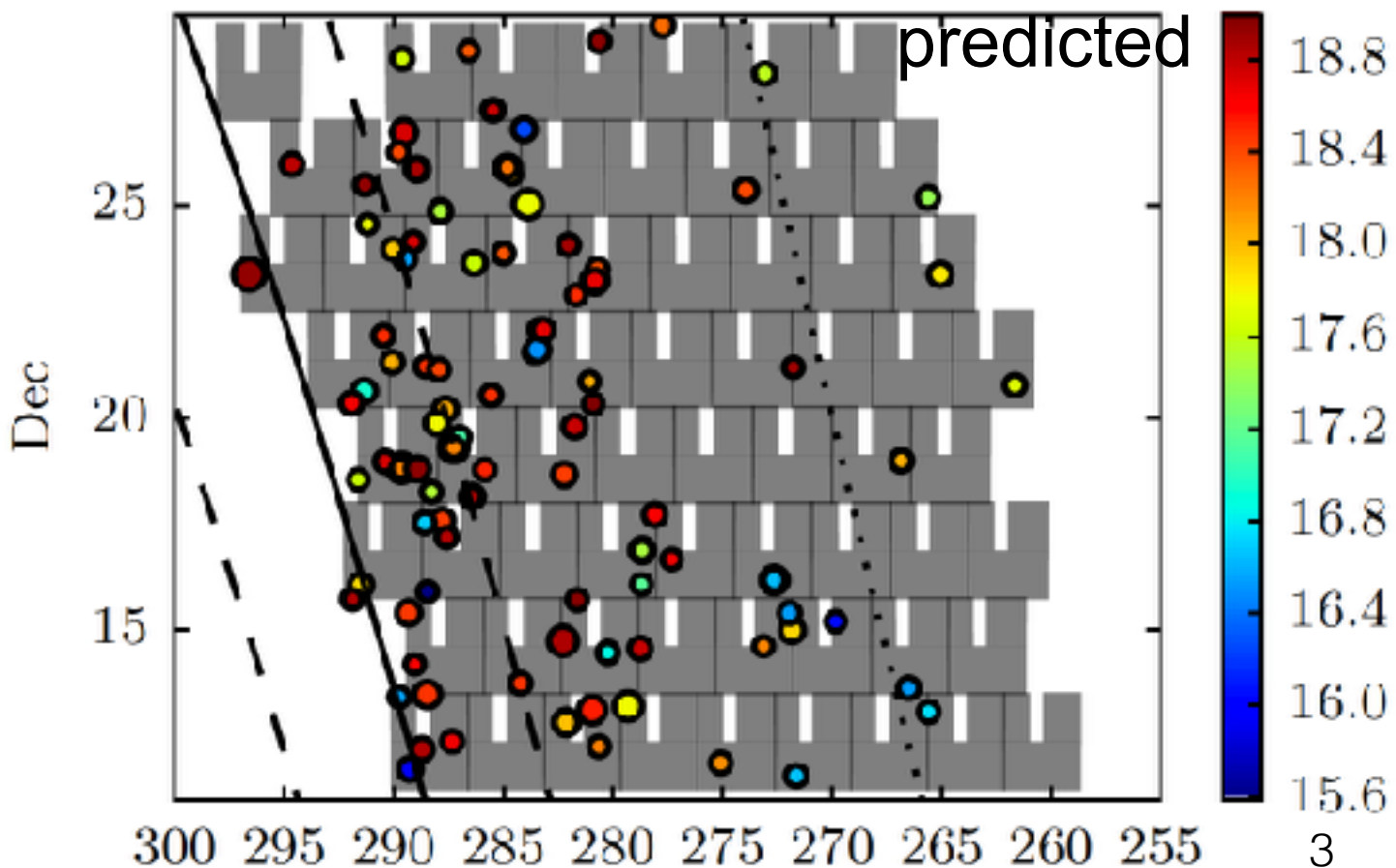
- Sky2night3:
 - 1-2 hour cadence
 - ~450 sqd.
 - low Galactic latitude
 - over 8 nights
- Goal: fast Galactic transients
- Result:
 - 10 dwarf novae (3 had counterpart in ref image)
 - 2 supernovae
 - 1 AGN
 - 1 M-star flare

Is this expected?

Real bogus and difference imaging in crowded fields before reprocessing



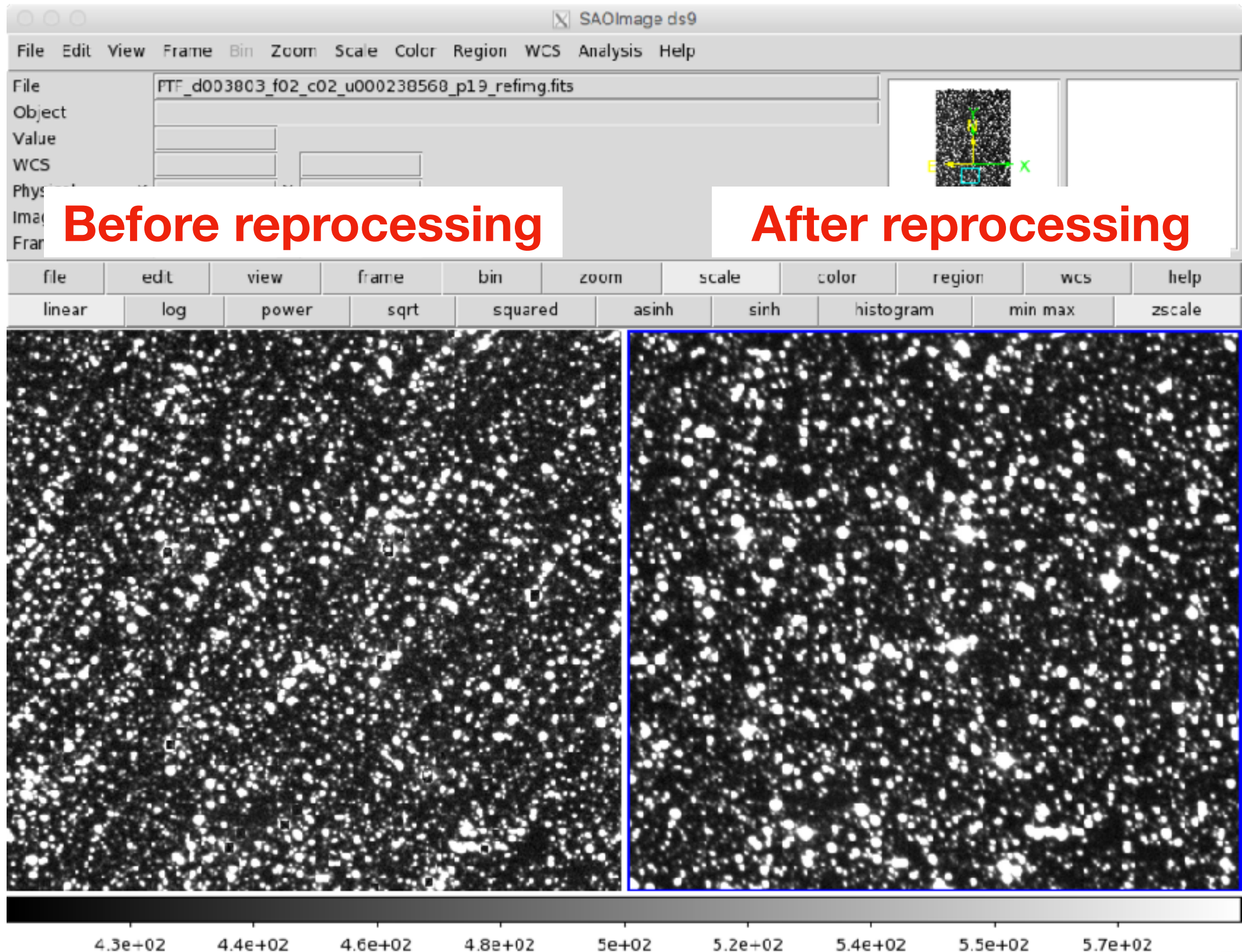
- Tens of M-star flares were expected -> Almost all were missed
- A factor of 5 - 10 too few dwarf novae



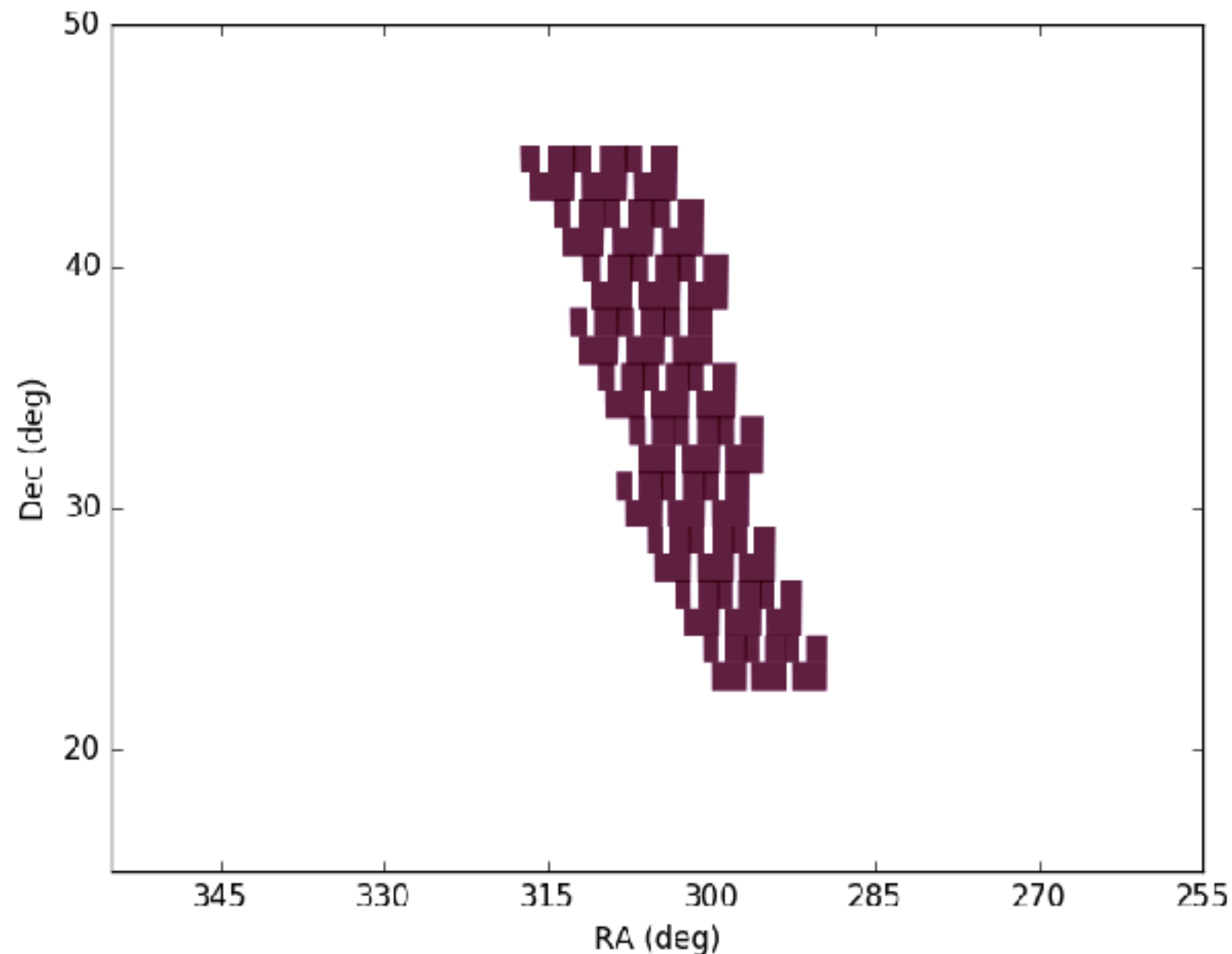
- A large number of difference image failures in the inner Plane

Reprocessing fixed the astrometry

Field at $l=55$ deg, $b=0.5$ deg



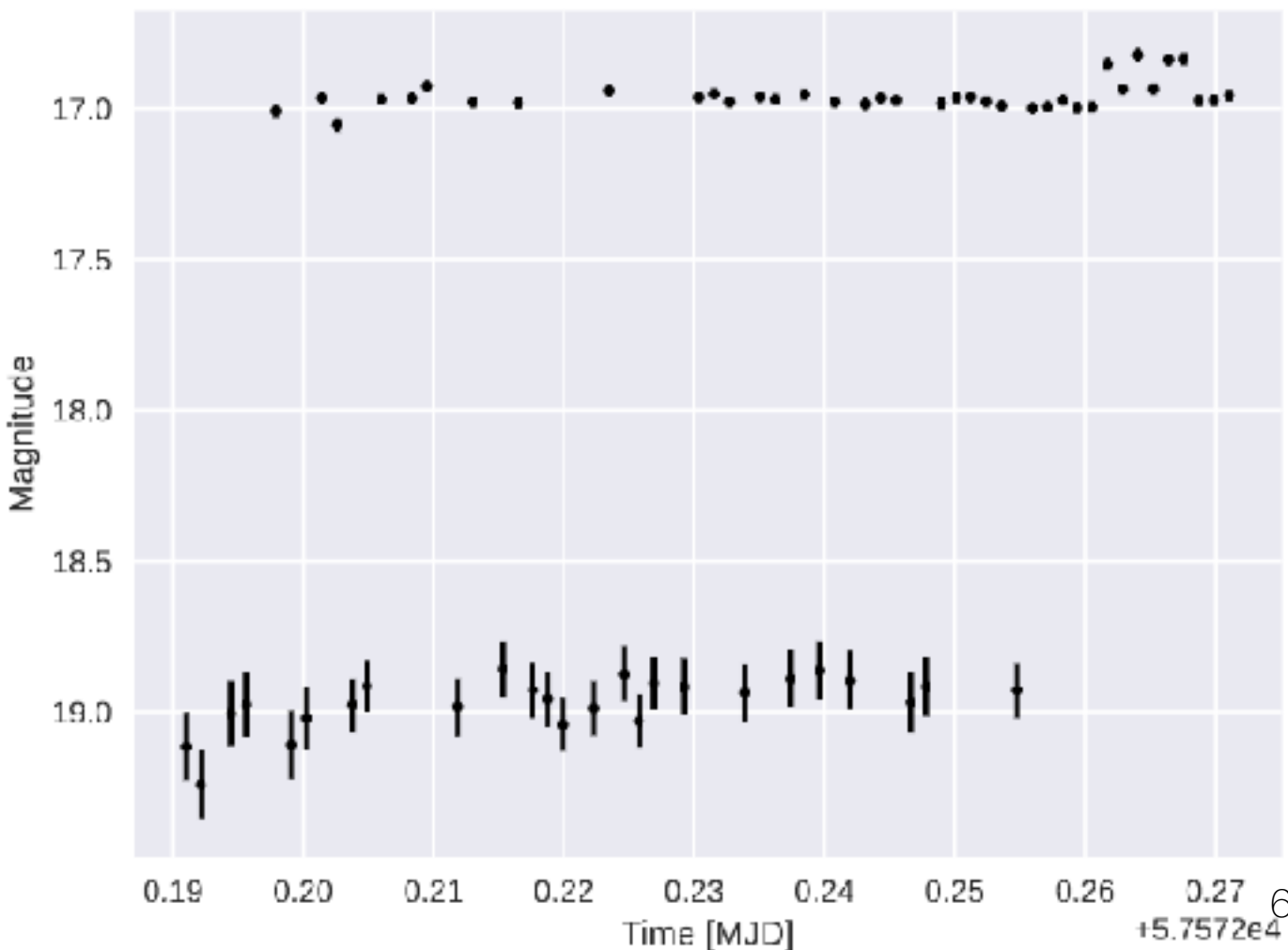
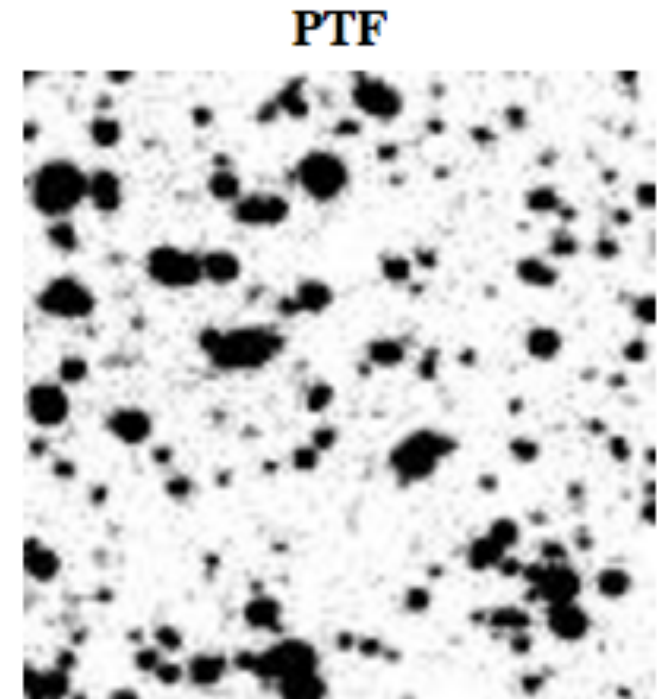
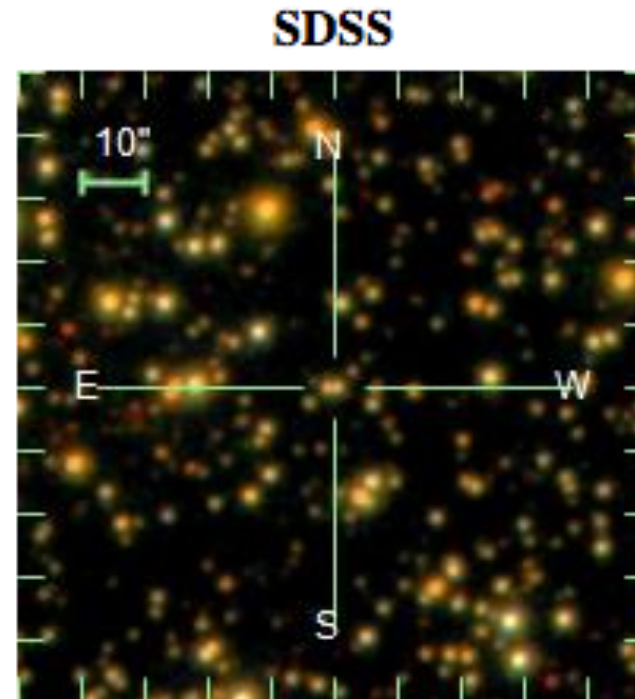
The PTF high-cadence survey



- High cadence observations of 30 Galactic plane fields in summer 2016
 - $l = 55 - 88$ deg, $b < |5|$ deg
- Each field has about 60 - 70 consecutive exposures

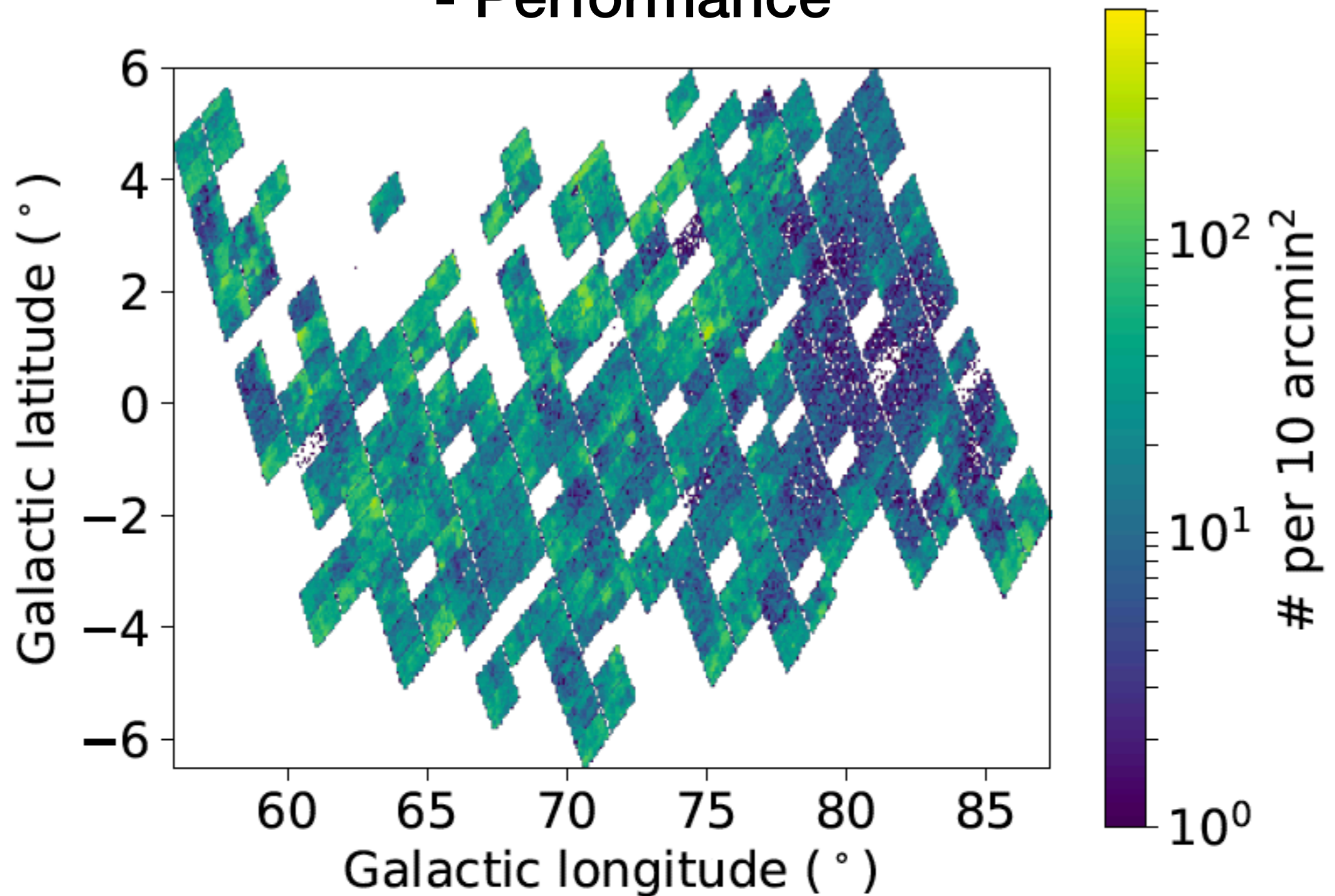
The PTF high-cadence survey - Performance

- 100% of the science images were successfully reprocessed
- We find about 12 Mio individual sources
- About 5 - 10% are blended



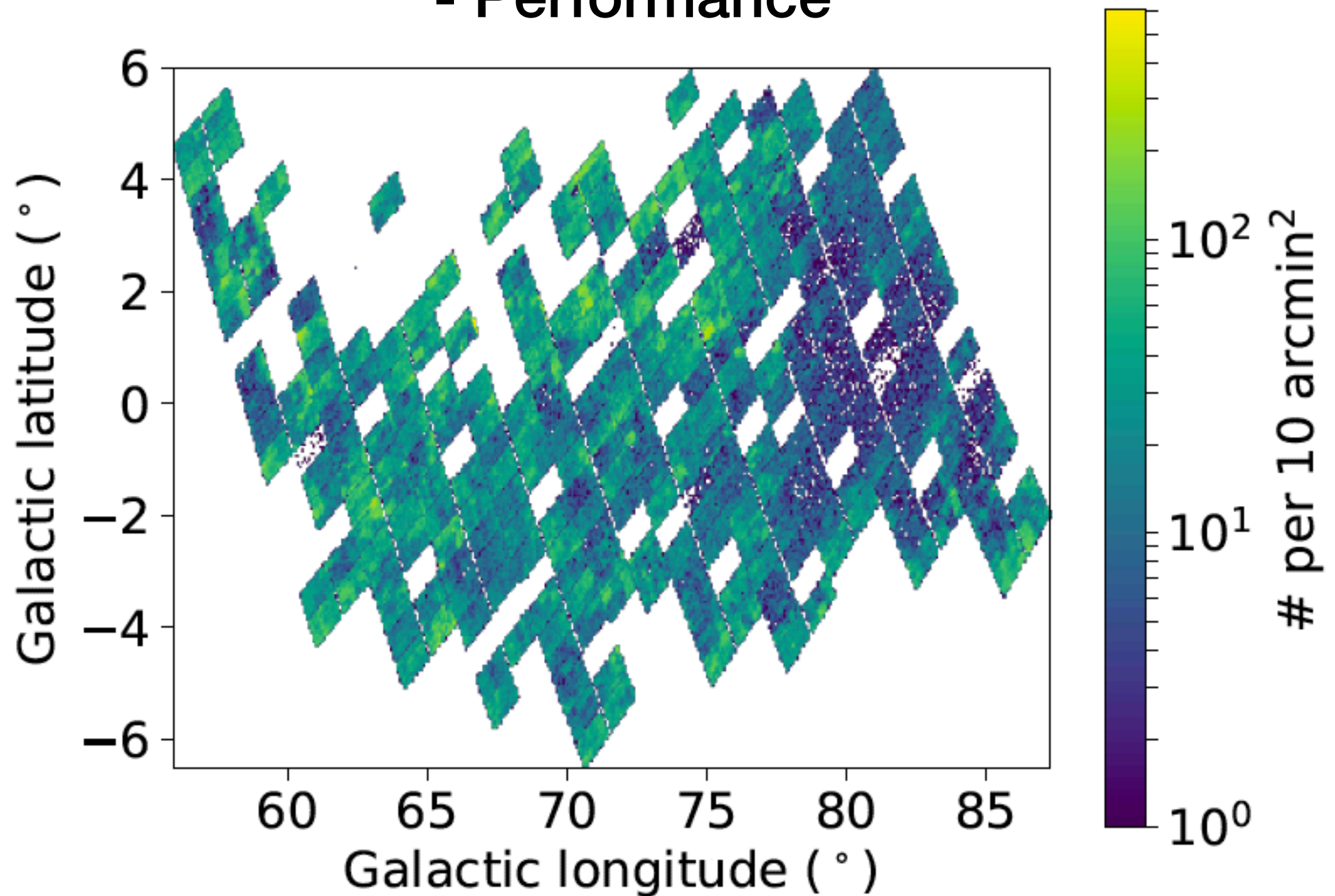
- Blending is easy to filter
- For completeness difference imaging preferred

The PTF high-cadence survey - Performance



- 100% of the science images were successfully reprocessed
- 85% of the epochs have difference images created
- out of 330 CCDs about 35 CCDs have no difference images created

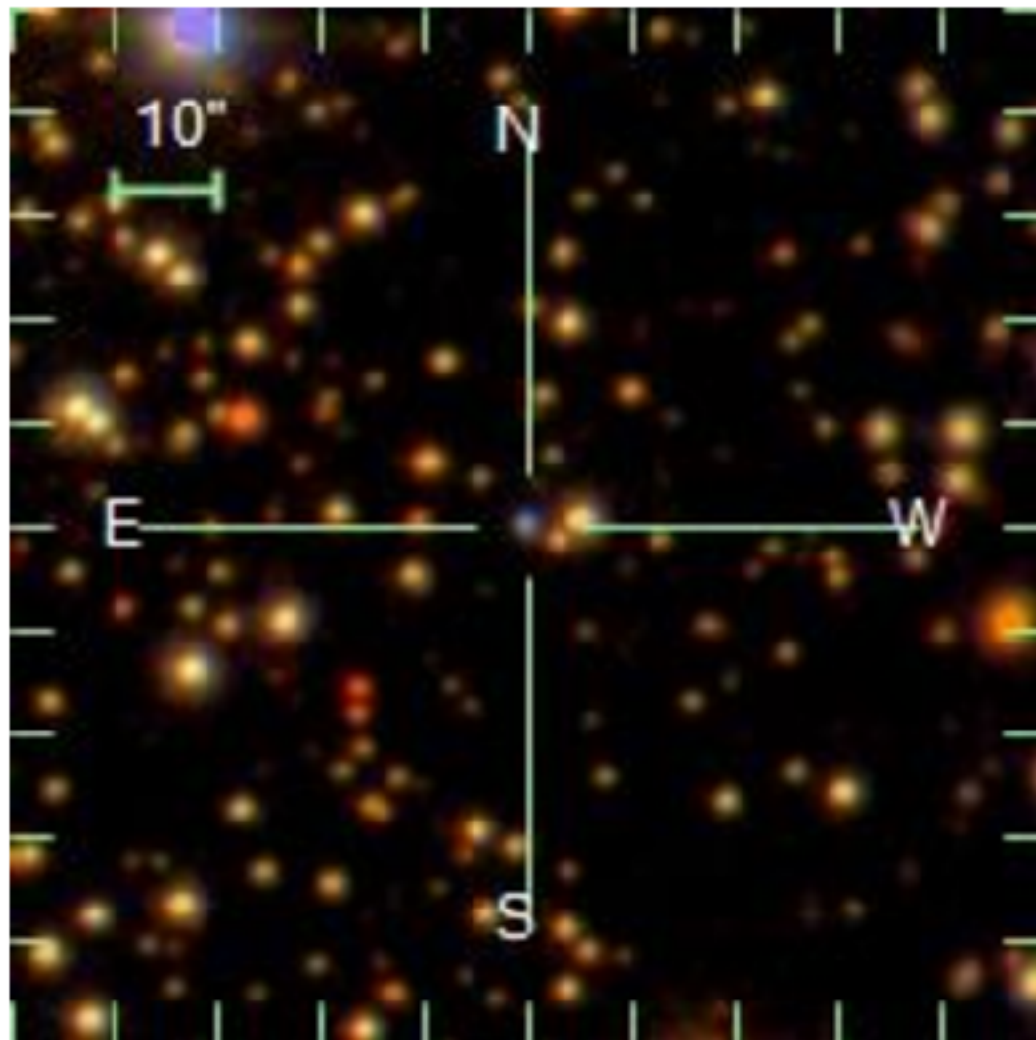
The PTF high-cadence survey - Performance



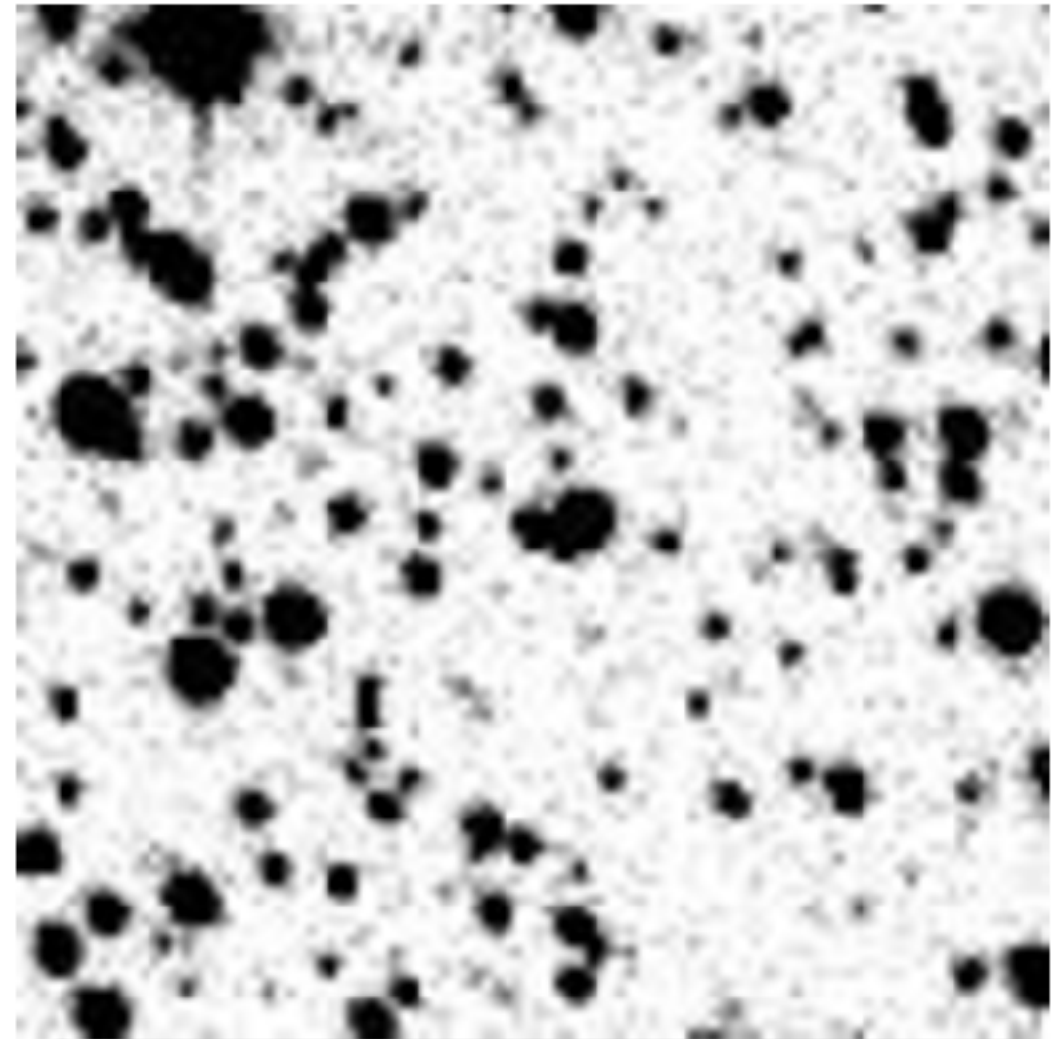
- Extracted about 1.9 Mio individual sources
- 1.5 Mio have PanSTARRS colors
- Higher density towards inner Galactic Plane

The PTF high-cadence survey - PTF1 J2042+3657

SDSS

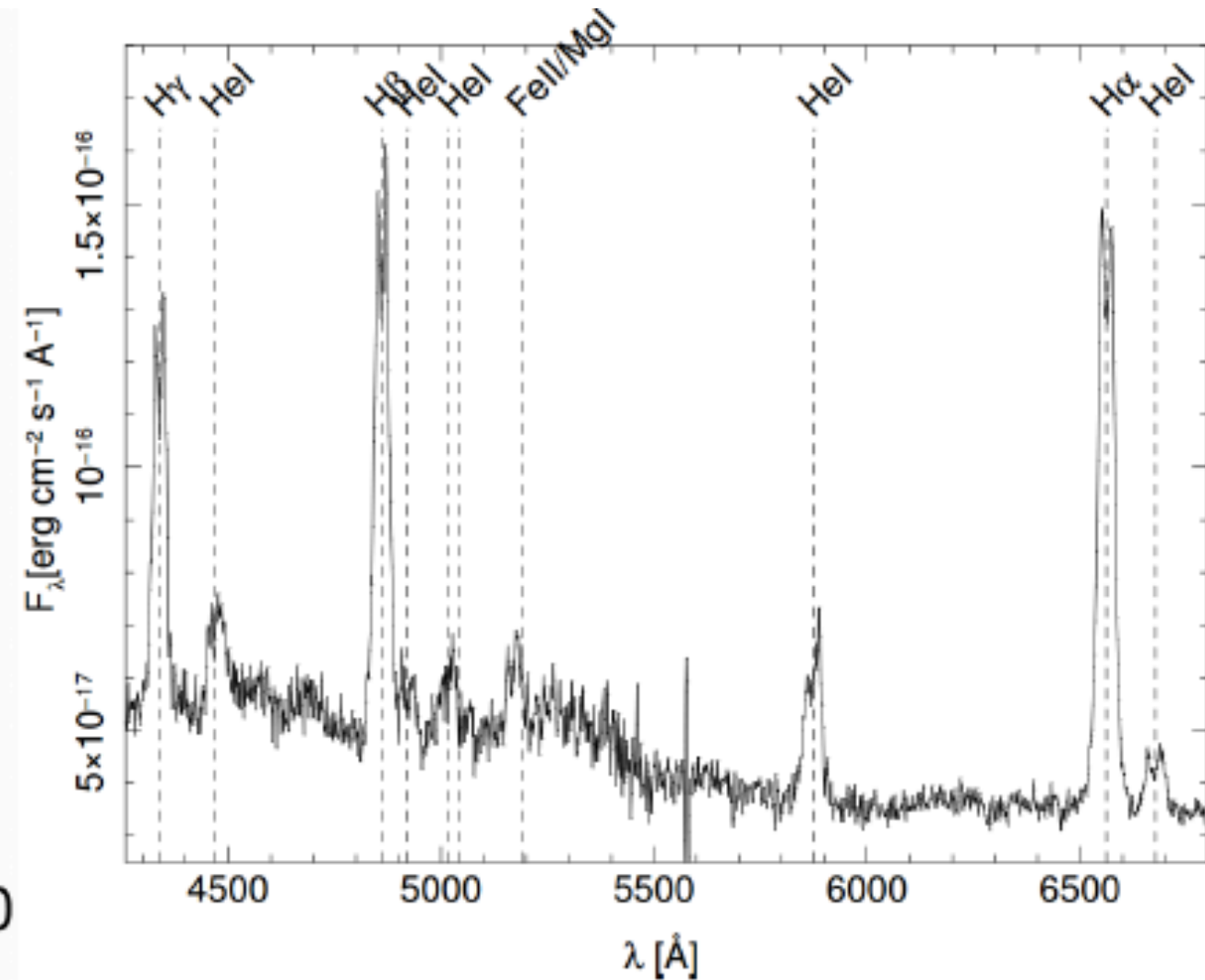
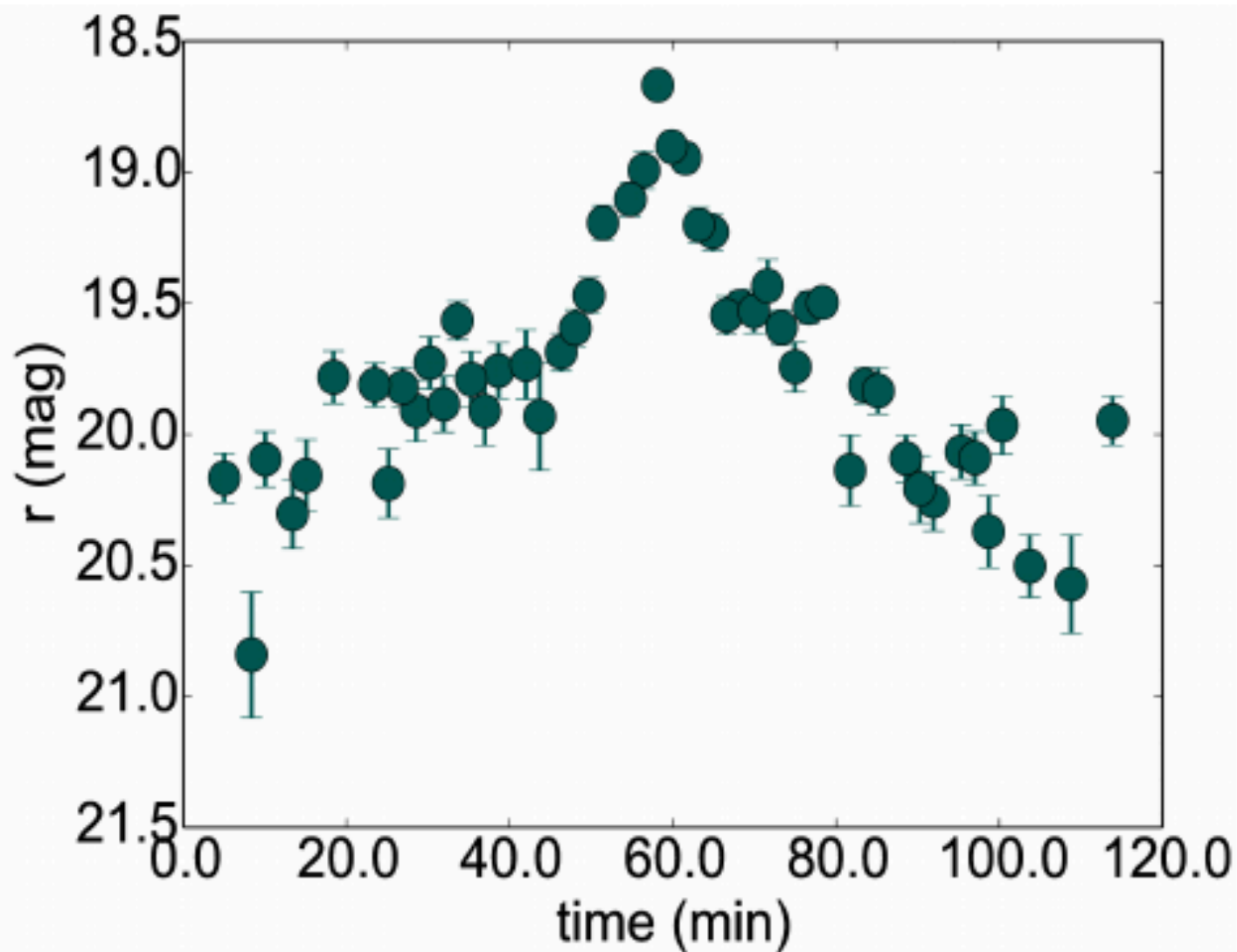


PTF



- Not detected in individual PTF images due to blending
- Was detected as short period variable from difference imaging
- Relatively blue: $g-r \sim 0$ mag

The PTF high-cadence survey - PTF1 J2042+3657



- Follow-up observations revealed a new cataclysmic variable near the period minimum with a period of 84.5min

Summary

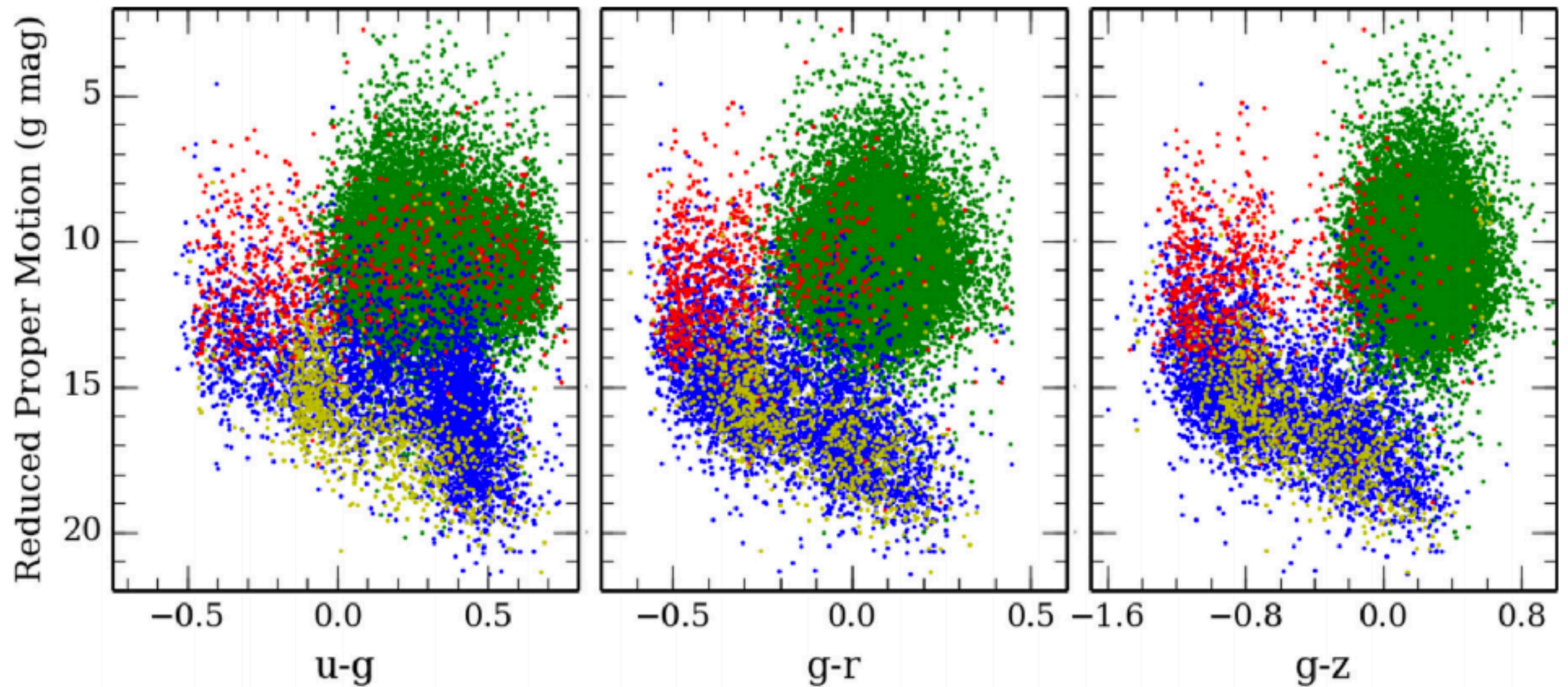
- We observed 200 sqd. with continuous 2hr lightcurves
- **100%** of the science images were successfully processed
 - About **5-10%** of the sources are blended
- Difference imaging was successfully performed on 85% of the images
 - We are still working to understand the remaining 15%
- About **1.9 Mio** individual variable sources were extracted from difference images
 - 1.4 Mio had PanSTARRS colors

Summary

- We observed 200 sqd. with continuous 2hr lightcurves
- **100%** of the science images were successfully processed
 - About **5-10%** of the sources are blended
- Difference imaging was successfully performed on 85% of the images
 - We are still working to understand the remaining 15%
- About **1.9 Mio** individual variable sources were extracted from difference images
 - 1.5 Mio had PanSTARRS colors

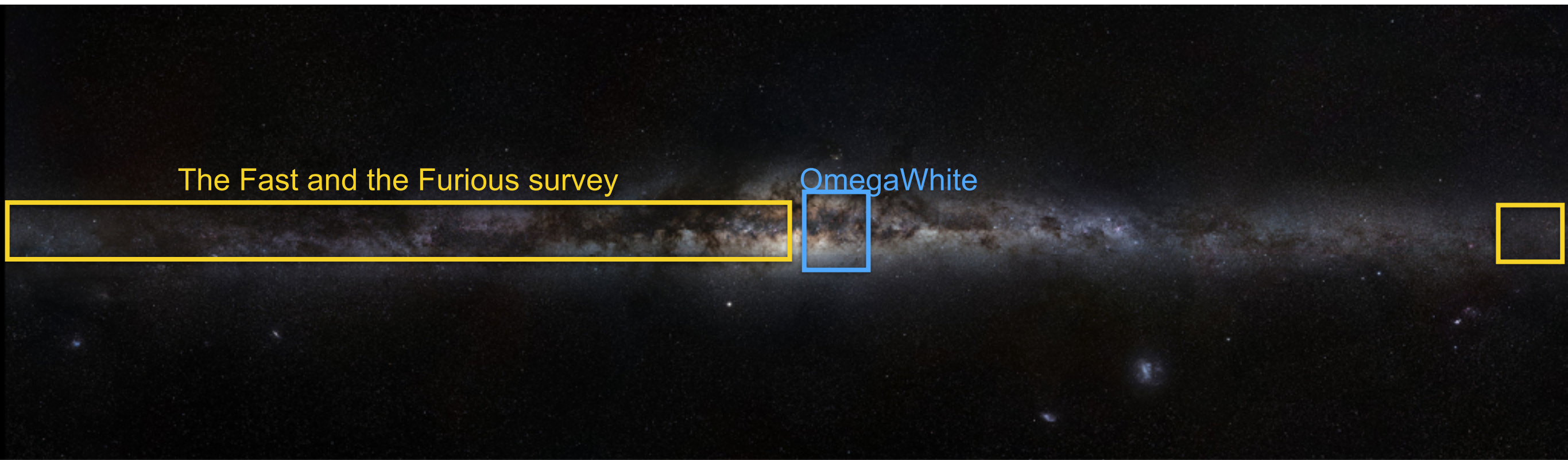
Bottomline: The processing of the Galactic Plane is acceptable and we expect it to be improved even more in the future

The fast and the furious - a fast cadence survey in the Galactic Plane with ZTF



- Gaia provides distances and proper motions in spring 2018
- PanSTARRS, IPHAS provide colors
- ZTF will provide the time domain data

The fast and the furious - a fast cadence survey in the Galactic Plane with ZTF



- **Coverage:**
 - Galactic latitude $|b| < 7$ deg
 - Galactic longitude $10 < l < 230$ deg
- **Full coverage:** 3080 deg^2 - 15x coverage of OmegaWhite

The fast and the furious - a fast cadence survey in the Galactic Plane with ZTF

We learned from PTF and expect many new discoveries from the high-cadence survey

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