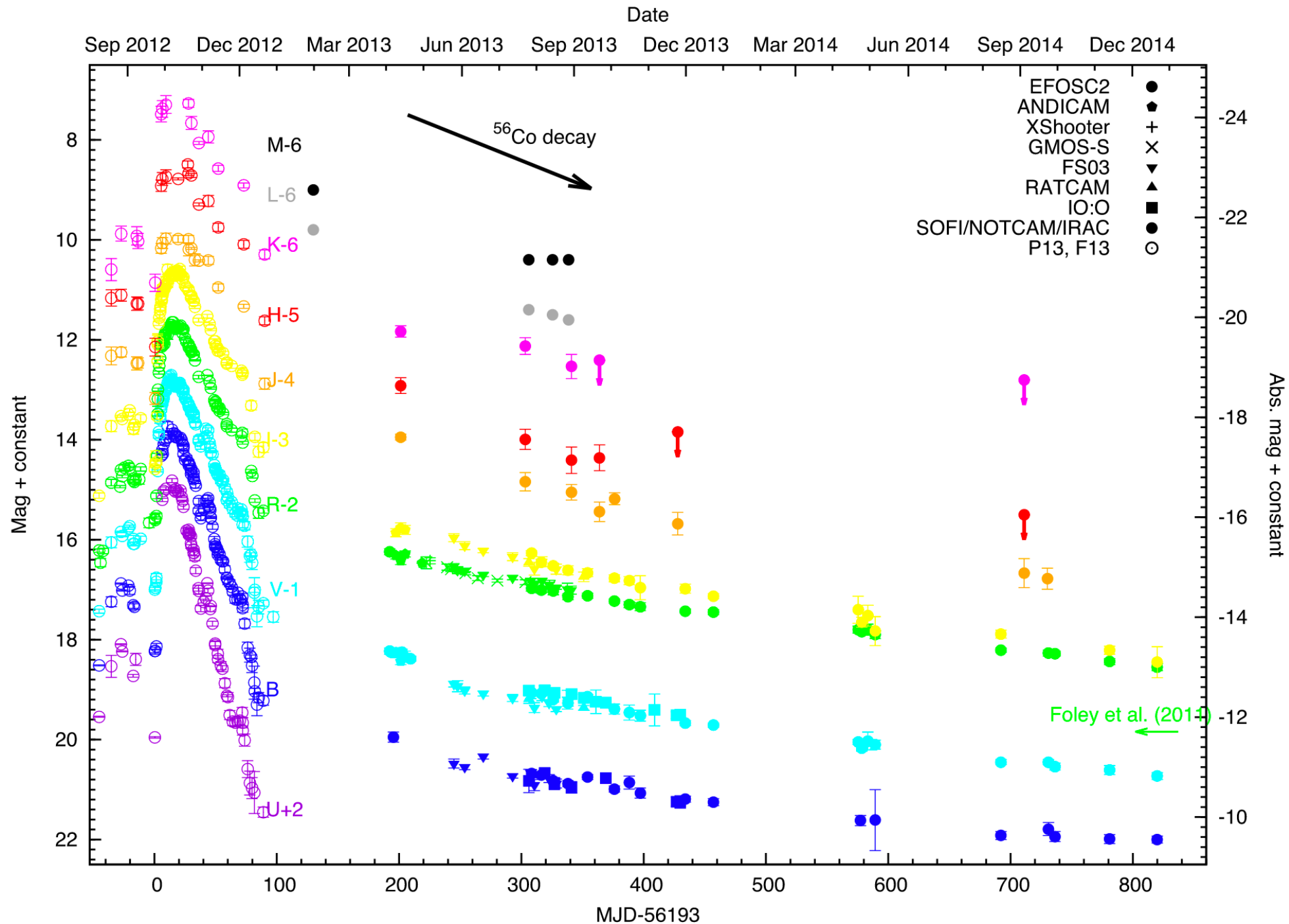# ~~Finding and Characterizing Extragalactic Transients: From the Luminosity Gap to Supernovae~~

# Software as an instrument

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# 1. Homogeneous analysis of data from multiple telescopes
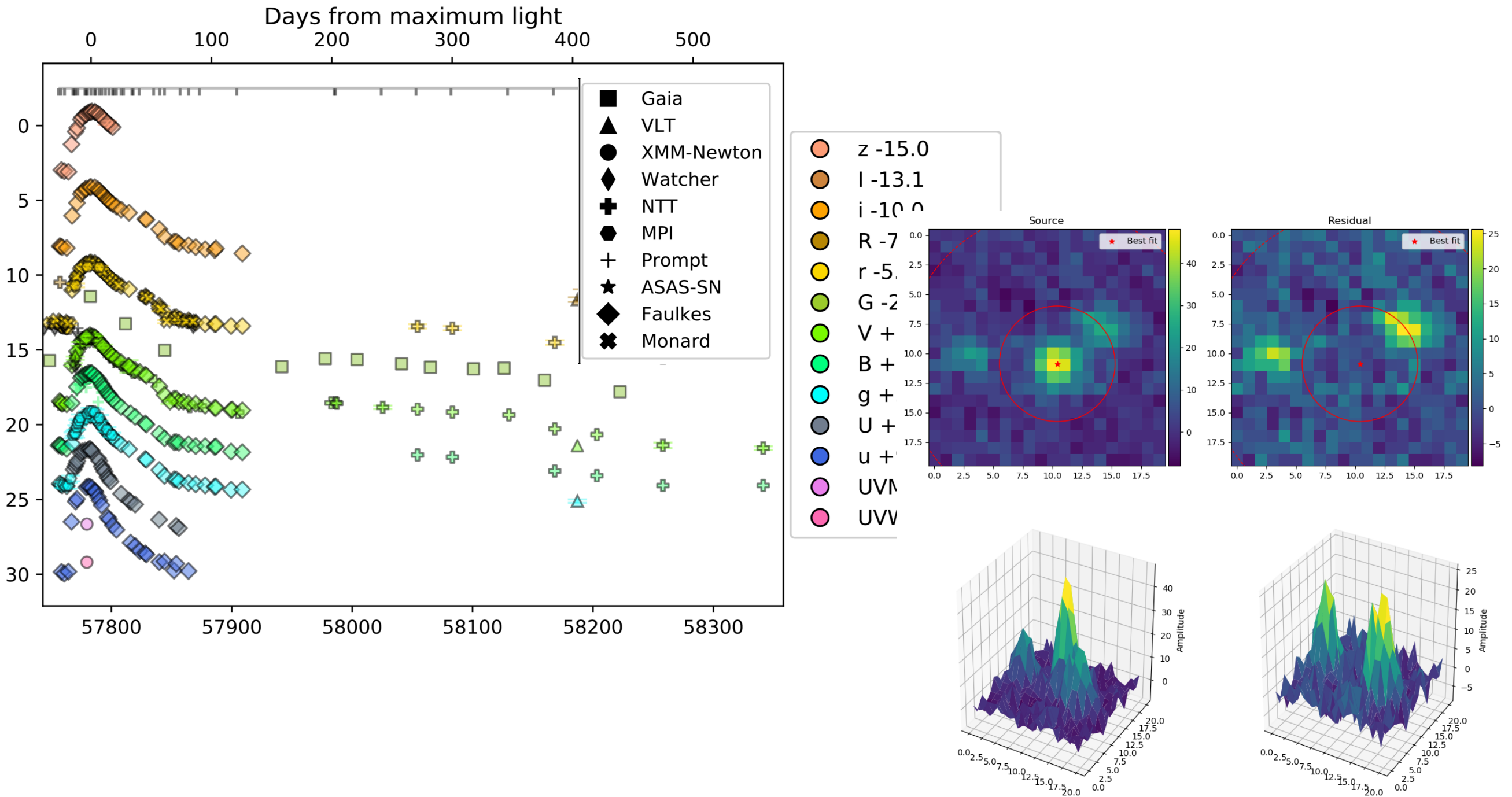


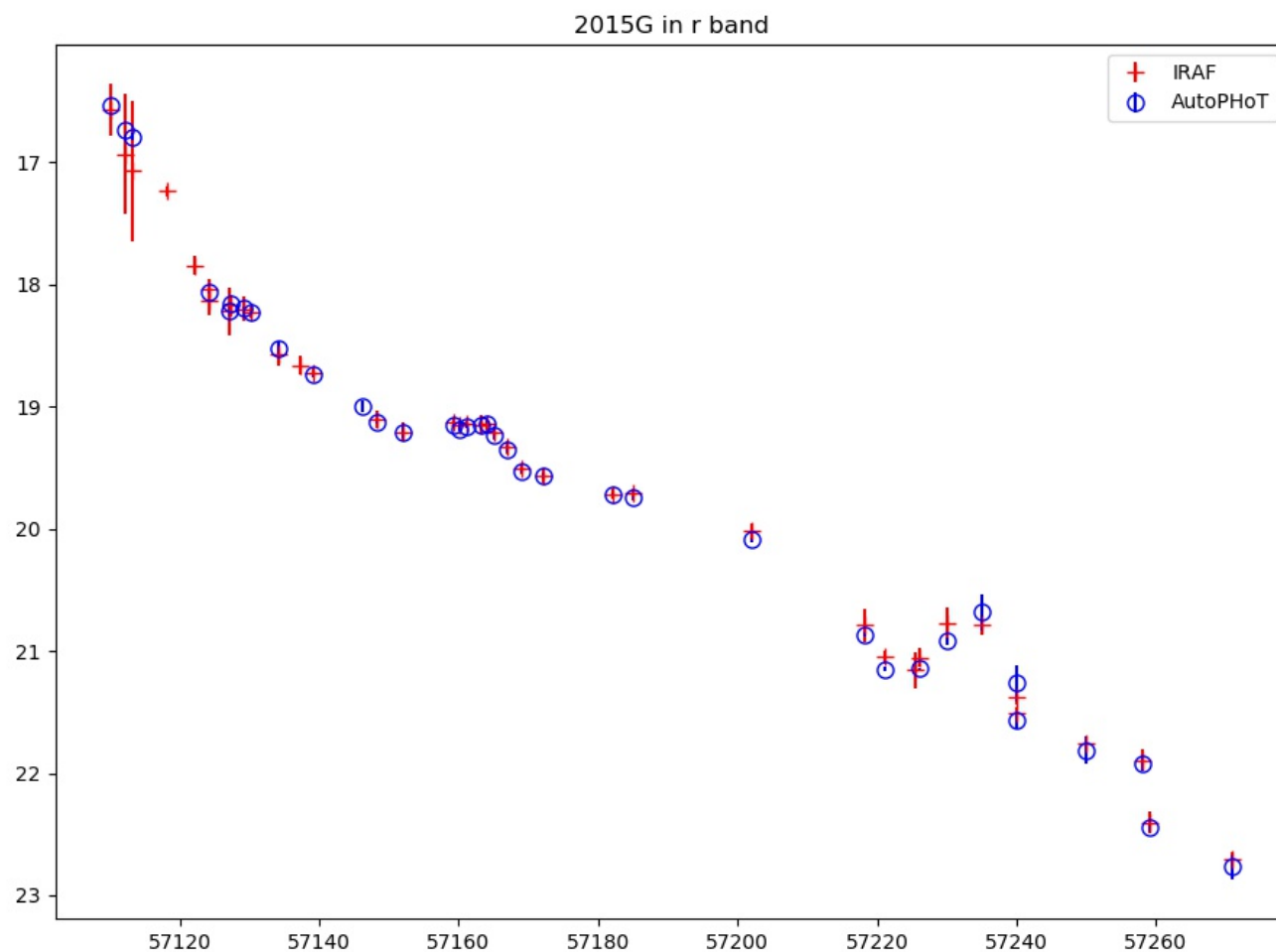9 different instruments used across optical, NIR!

Significant work to do photometry and calibrate.

Even if instrument pipeline exists, data will not be calibrated onto *homogeneous* system.

# 1. Homogeneous analysis of data from multiple telescopes

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2015G in r band

- No reliance on legacy software (i.e. no Python 2, no IRAF)

- PSF-fitting, limiting magnitudes and uncertainties from artificial source injection.

- Completely automated. Zero human interaction

# 1. Homogeneous analysis of data from multiple telescopes
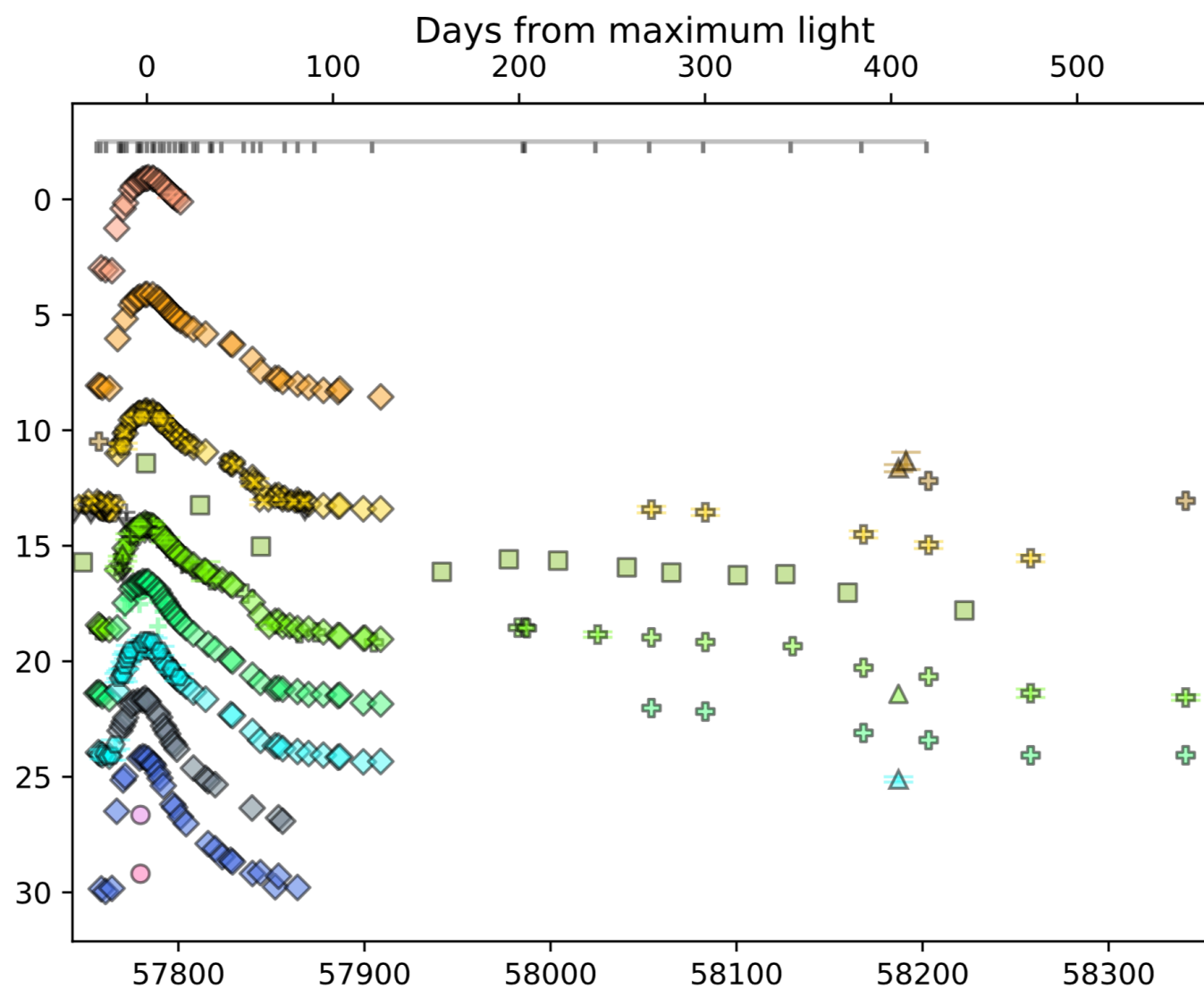


- Currently in closed beta.

- Using for GW followup program on WHT

- Will be ultimately available via open web interface. We get instrumental info, field stars, you get science target.

# 2. Pushing the extremes of HST imaging
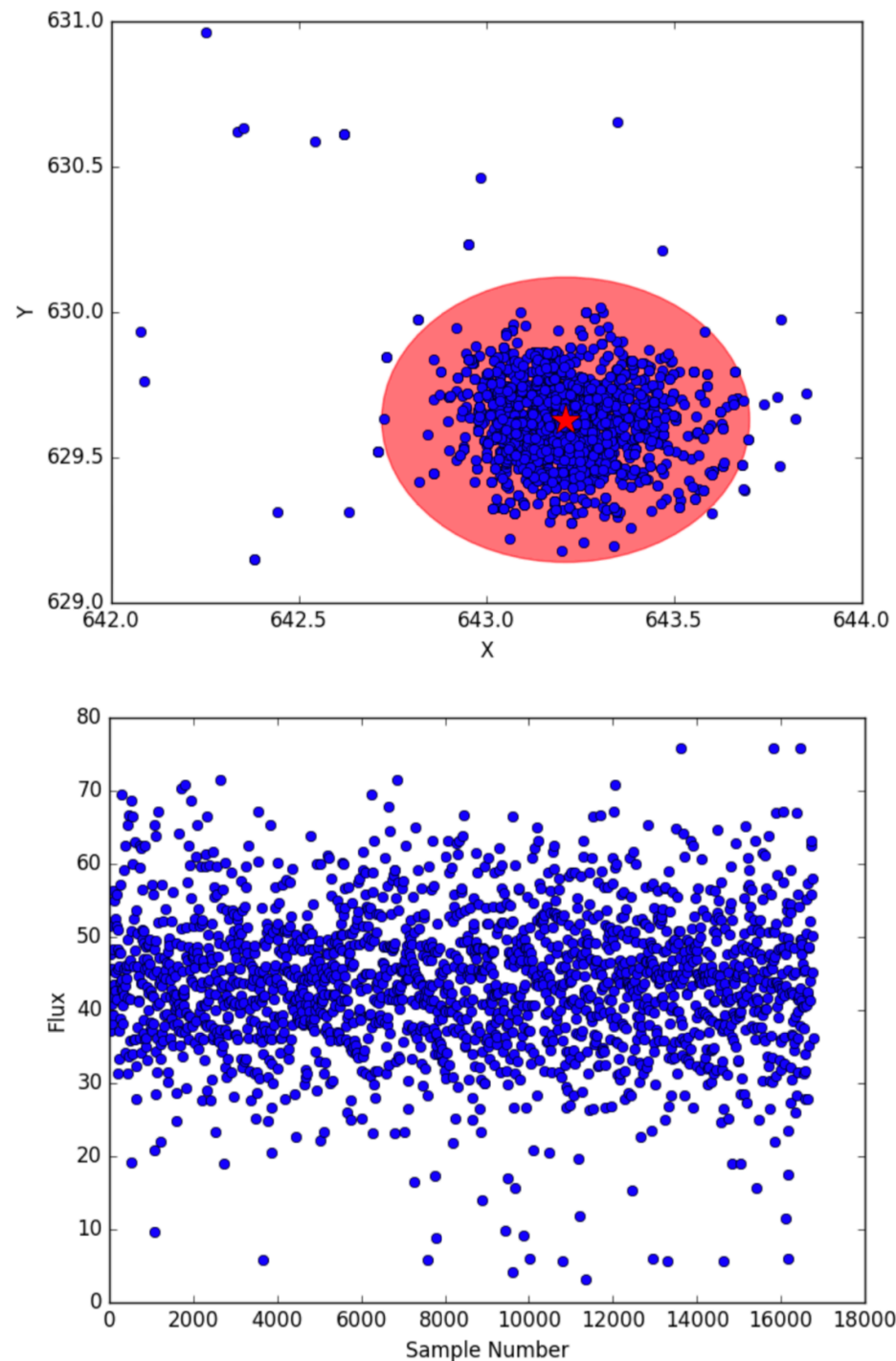


- *Bayseian Star Identifier (BSI)* -Using Nested Sampling to do probabilistic Bayesian source detection and photometry on HST images.
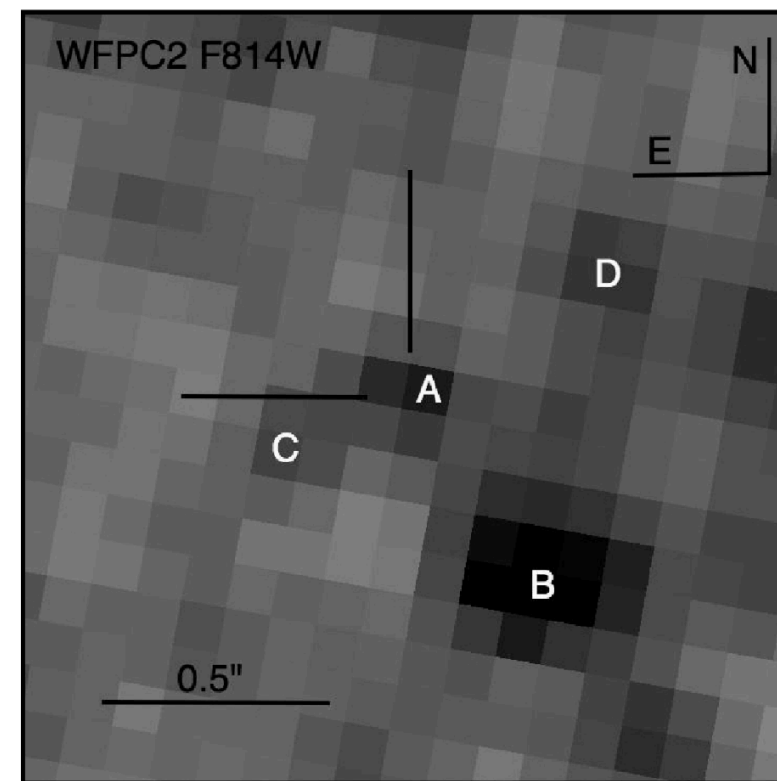


(c) Blow-up of progenitor (Source A, at intersection of lines) together with nearby sources (B, C and D).
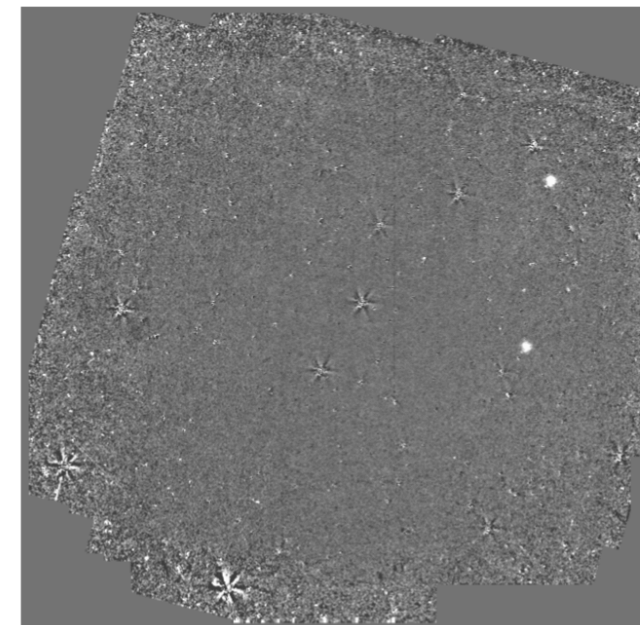
# 3. Machine learning for transient surveys

- Generic pipeline for image registration, PSF-matching / convolution, subtraction.

- Machine learning for real/bogus discrimination.

- Collaborating with School of Computer Science - exploring new approaches such as *committees of experts*
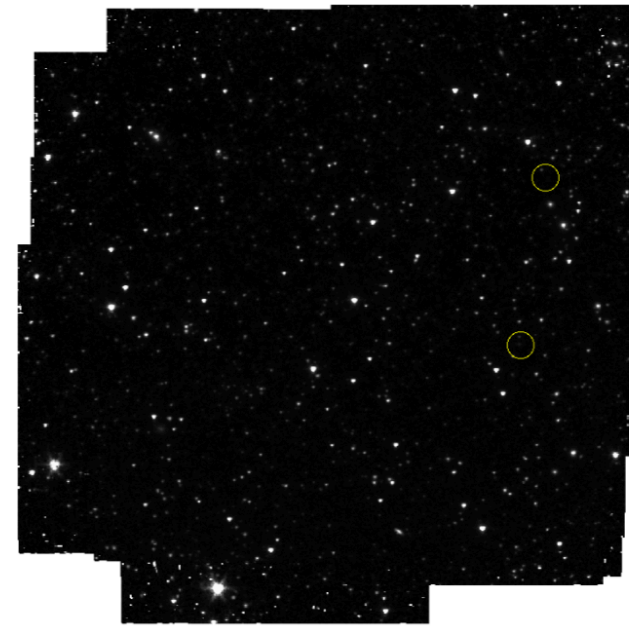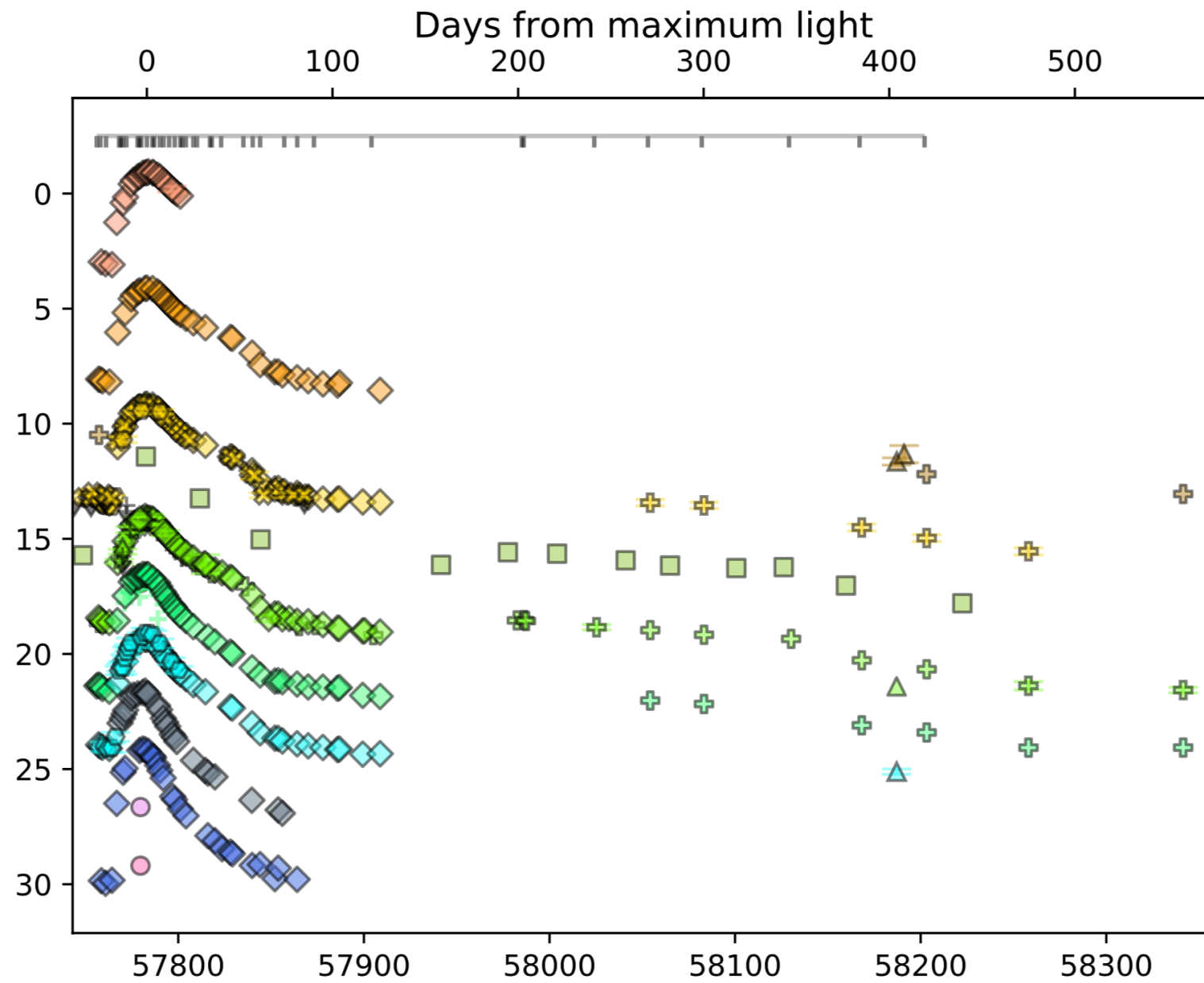


(a) IRAC image 1
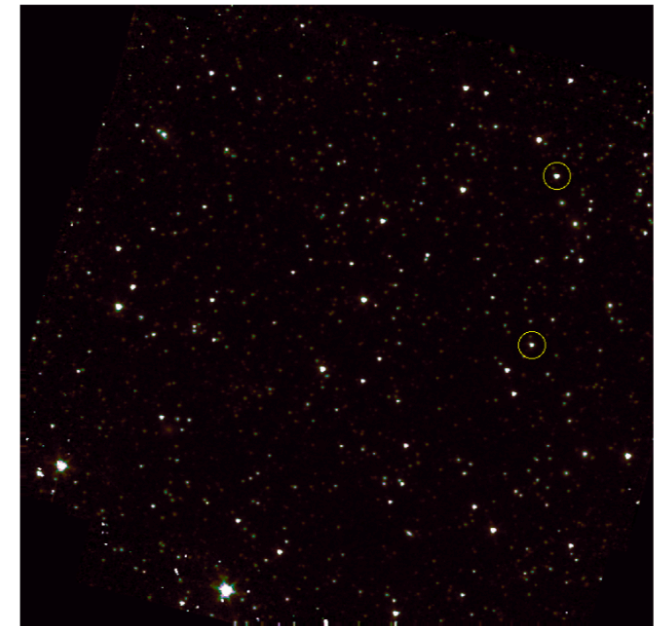
(b) IRAC image 2 (aligned with image 1)

(c) Subtracted image

# Questions?



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