

GAIA PHOTOMETRIC SCIENCE ALERTS FOR VARIABLE YOUNG STELLAR OBJECTS



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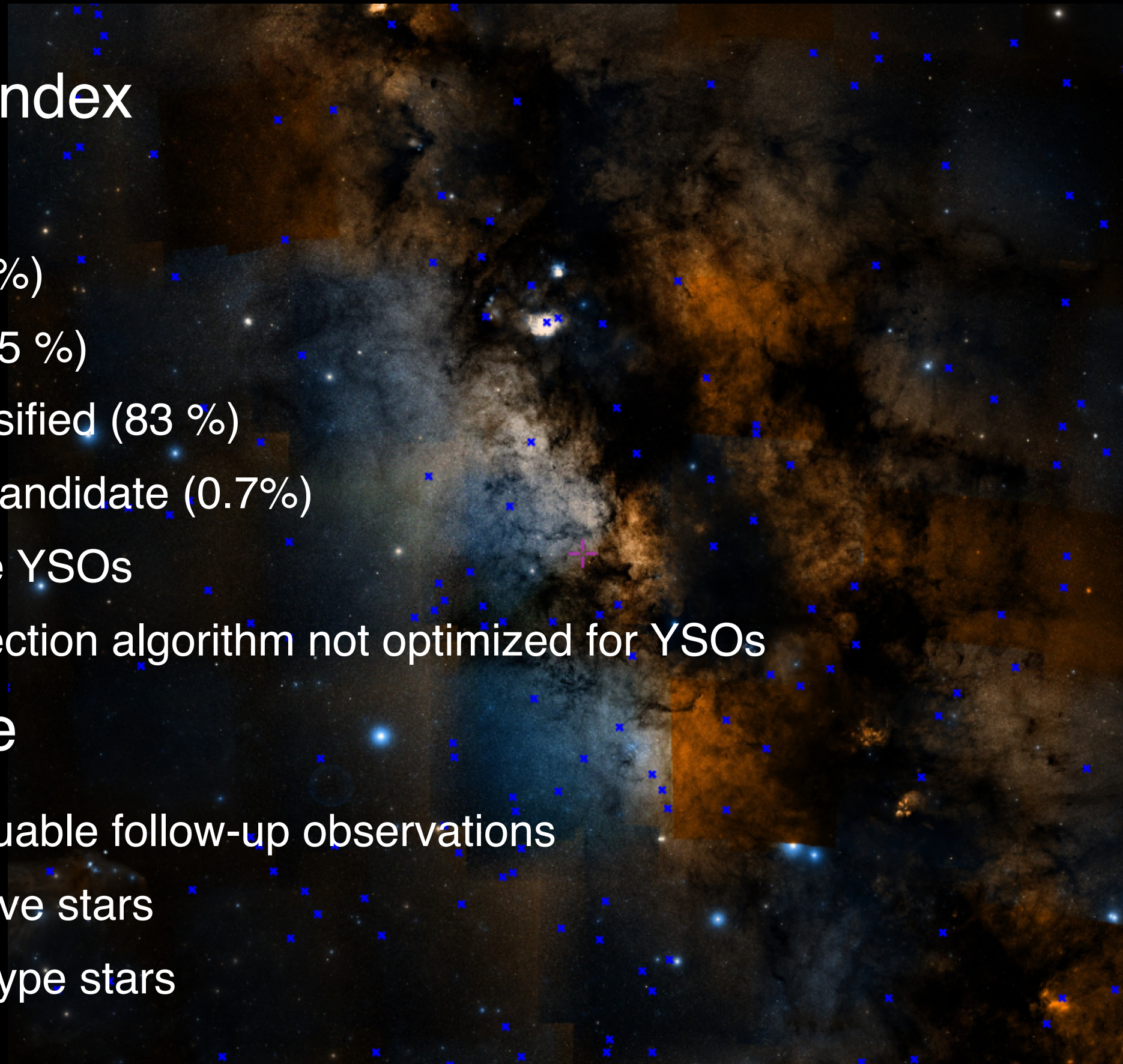
YOUNG STELLAR OBJECTS (YSOs) IN GAIA

▶ GAIA Alerts Index

- ▶ Σ : 3900 alerts
 - ▶ 530 SN (14 %)
 - ▶ 10 YSO (0.25 %)
 - ▶ 3240 unclassified (83 %)
 - ▶ 26 YSO candidate (0.7%)
- ▶ we expect more YSOs
- ▶ issue: alert detection algorithm not optimized for YSOs

▶ Scientific use

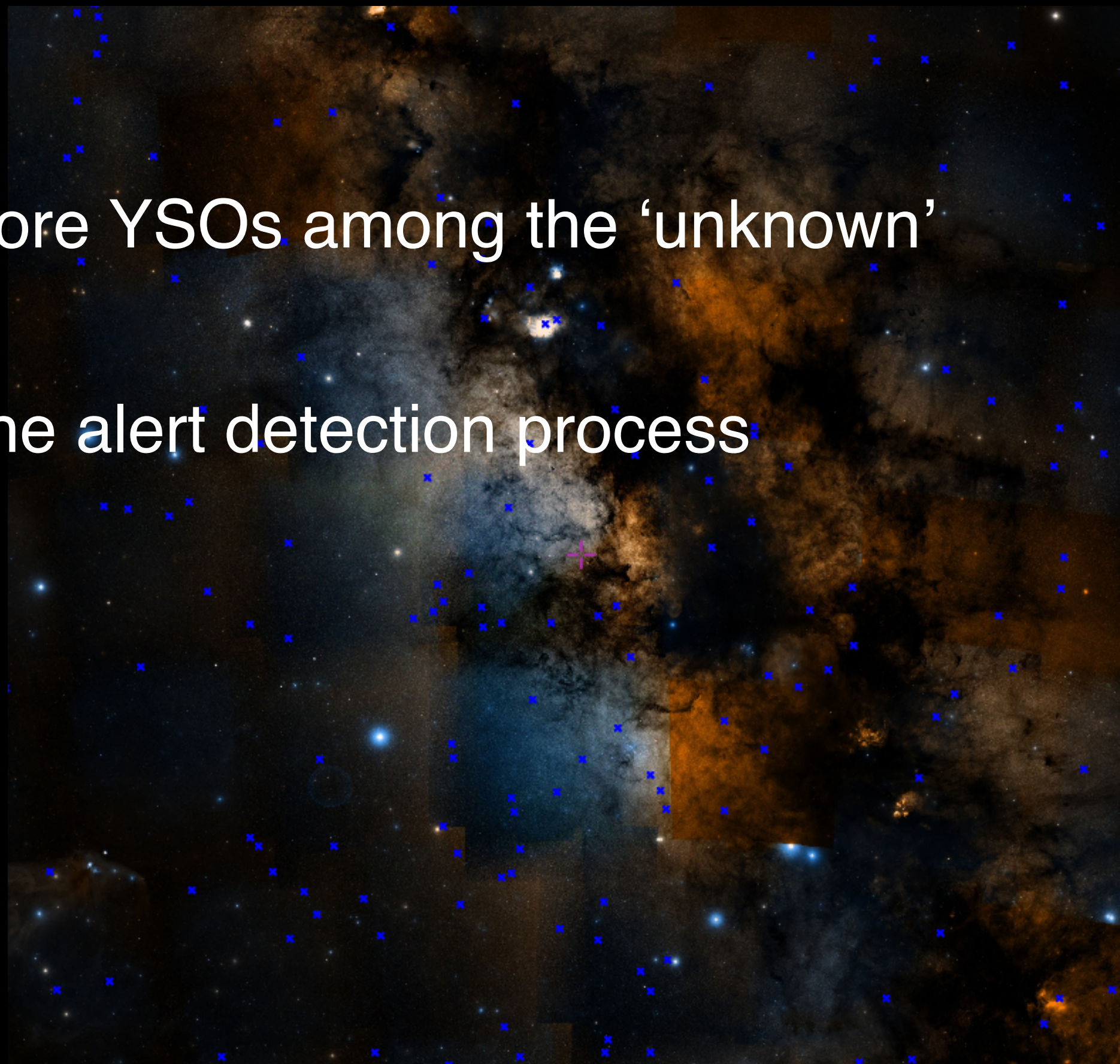
- ▶ may lead to valuable follow-up observations
 - ▶ young eruptive stars
 - ▶ UX Orionis-type stars



YOUNG STELLAR OBJECTS (YSOs) IN GAIA

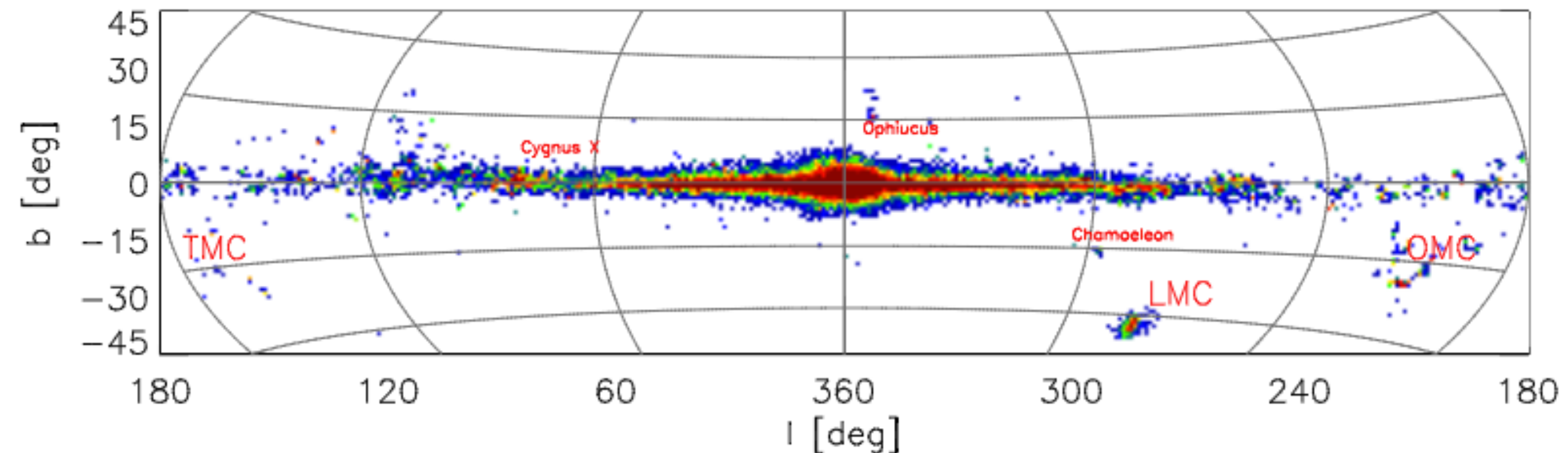
► Aims:

- Identify more YSOs among the ‘unknown’ alerts
- Improve the alert detection process



IDENTIFY MORE YSOs AMONG THE 'UNKNOWN' ALERTS

- ▶ Up to now: check SIMBAD (46 500 YSO)
- ▶ Provide a list of YSOs:
 - ▶ catalog 1.0:
Marton et al. 2016
An all-sky Support Vector Machine selection of WISE YSO Candidates
>130 000 class I-II, > 600 000 class III+



Surface density of the Class I/II YSO candidate sources classified with SVM, shown in galactic equal-area Aitoff projection

IDENTIFY MORE YSOs AMONG THE 'UNKNOWN' ALERTS

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Marton et al. 2016
An all-sky Support Vector Machine
selection of WISE YSO Candidates
>130 000 classI-II, > 600 000 classIII+
 - ▶ catalog 2.0:
Marton et al. 2016 + All published YSO

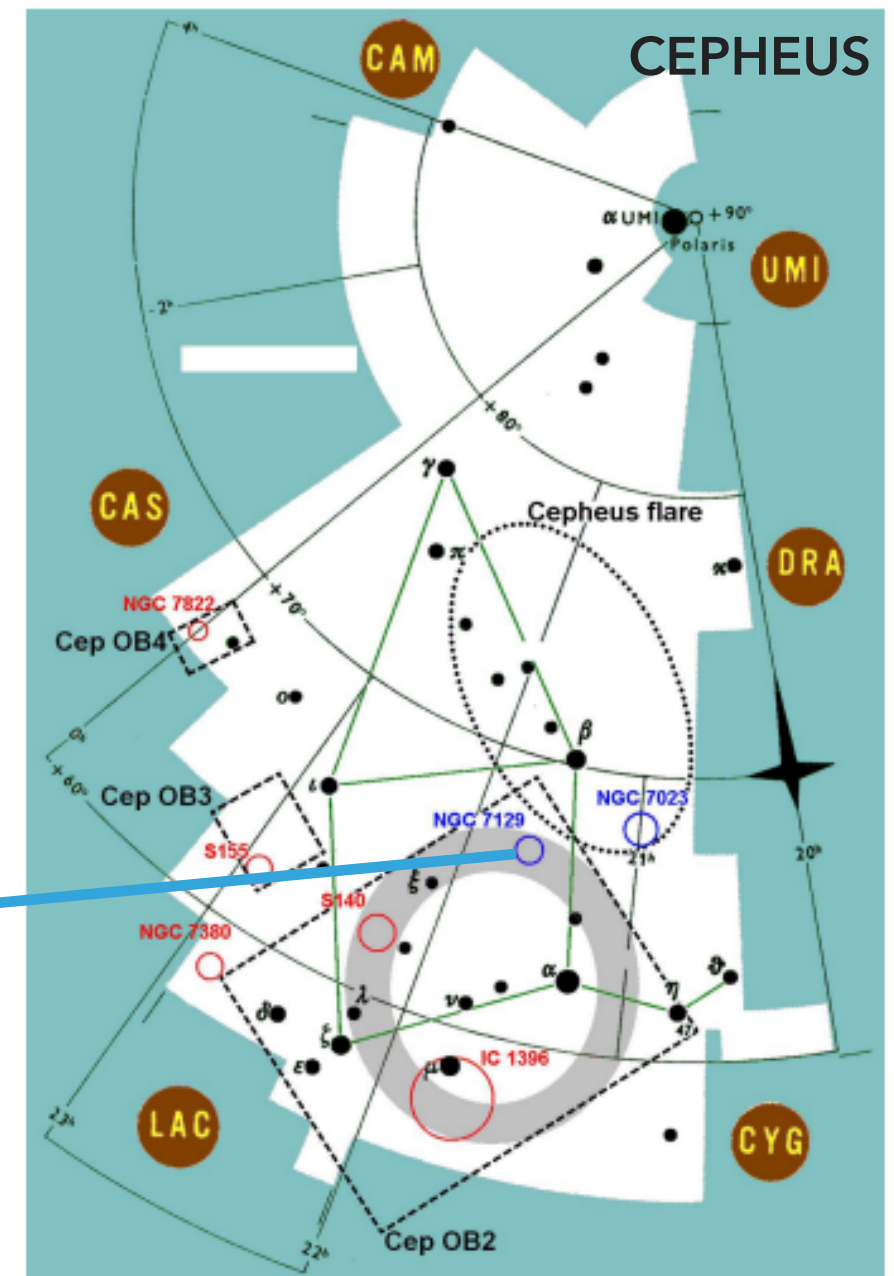
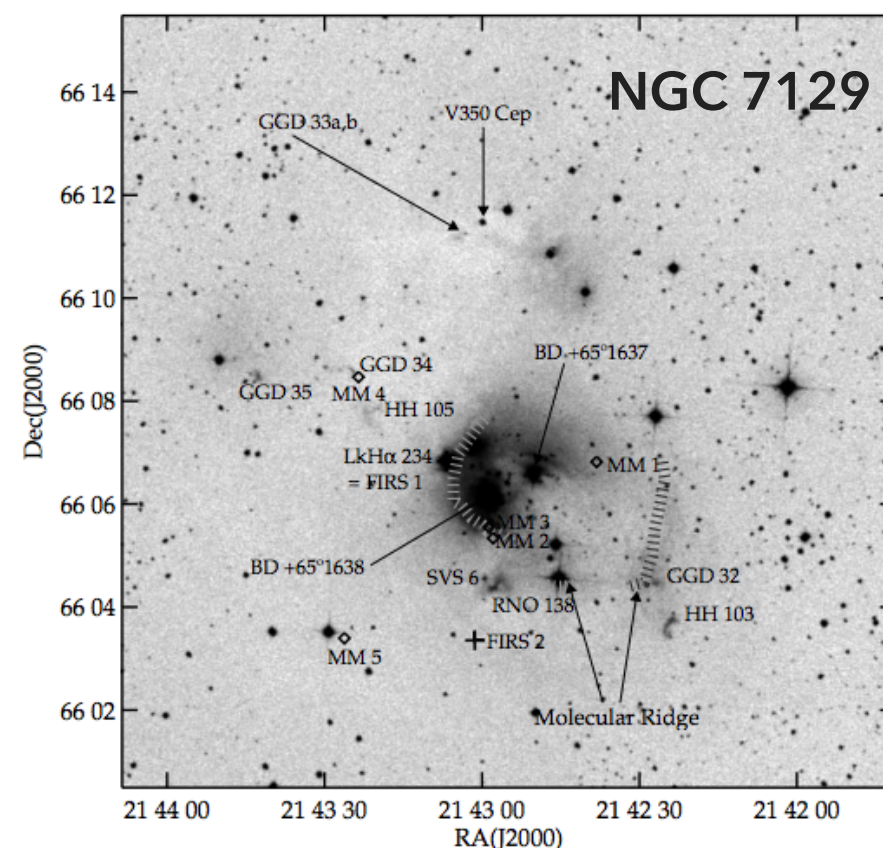
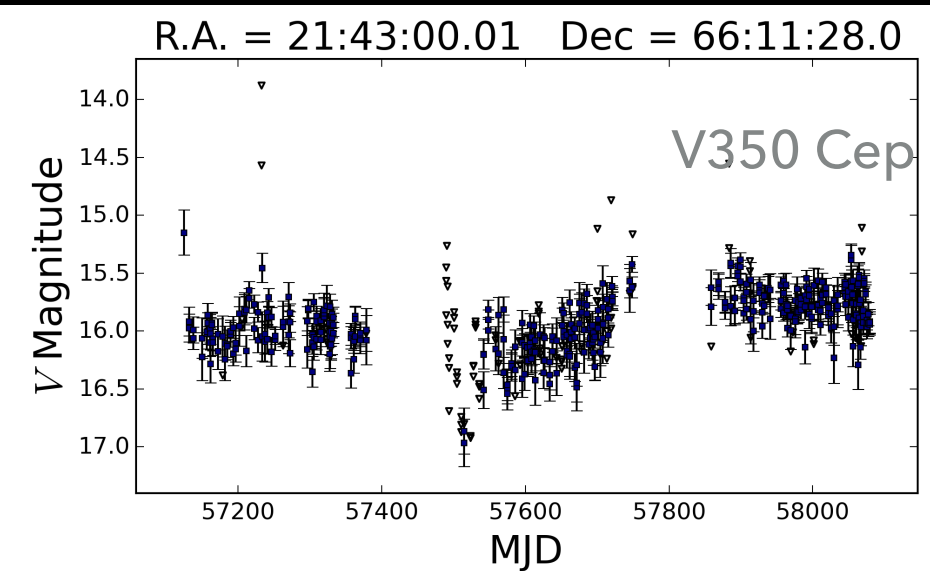
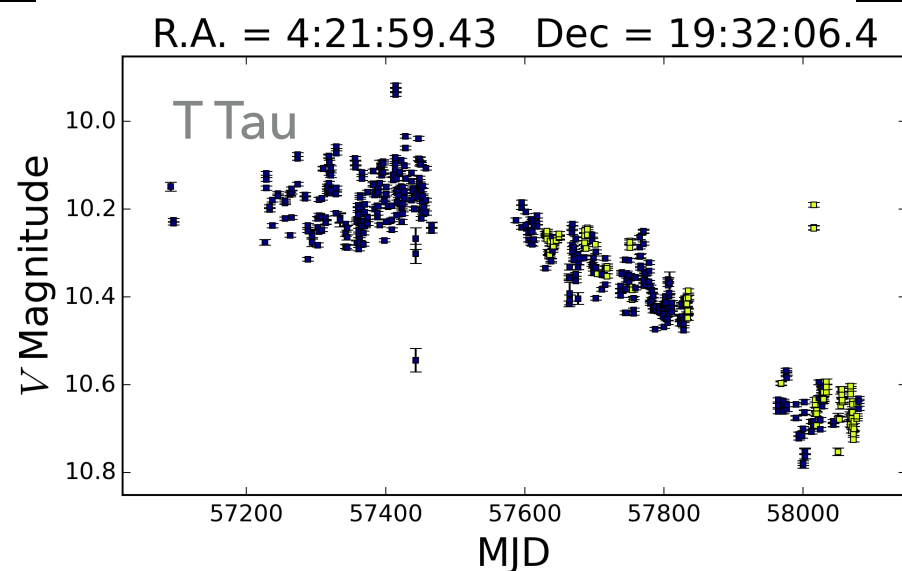
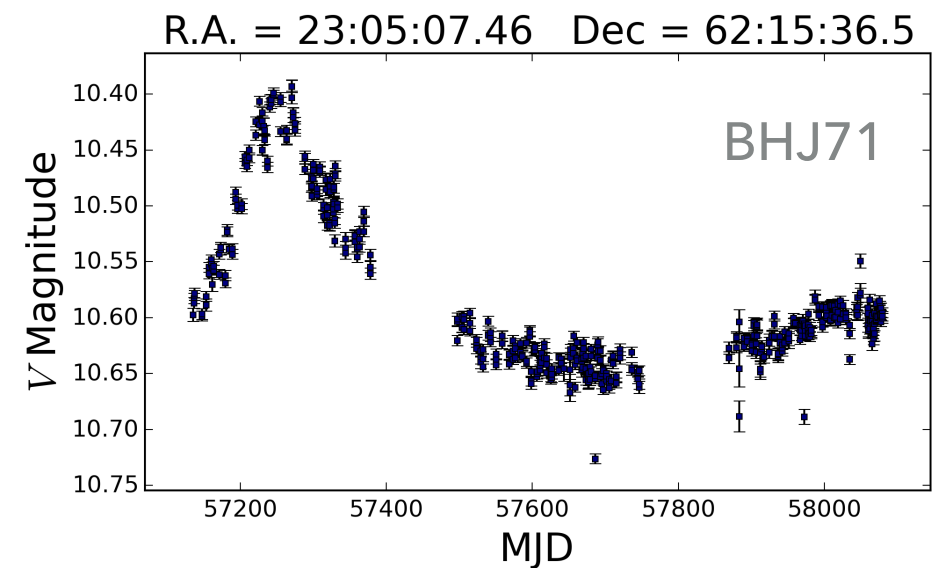
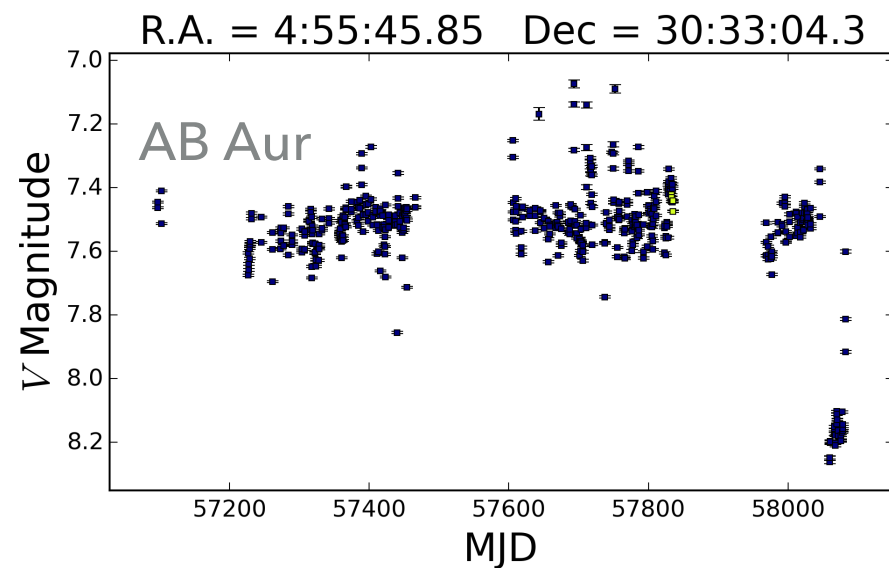
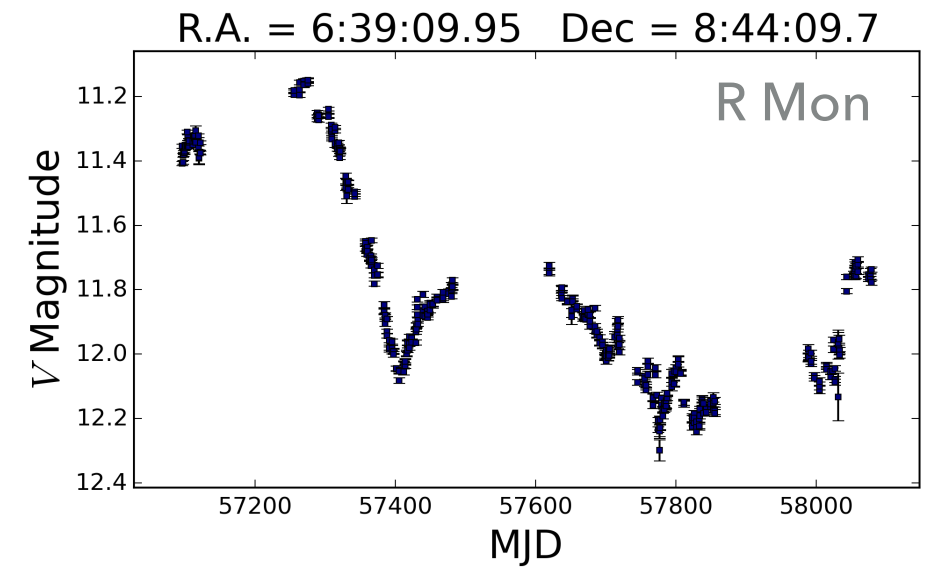


Figure 1. Positions of the major star forming regions of Cepheus, overplotted on a schematic drawing of the constellation.

IMPROVE THE ALERT DETECTION PROCESS

- ▶ Using only GAIA data
 - ▶ light-curve
 - ▶ spectrum

ASAS observations



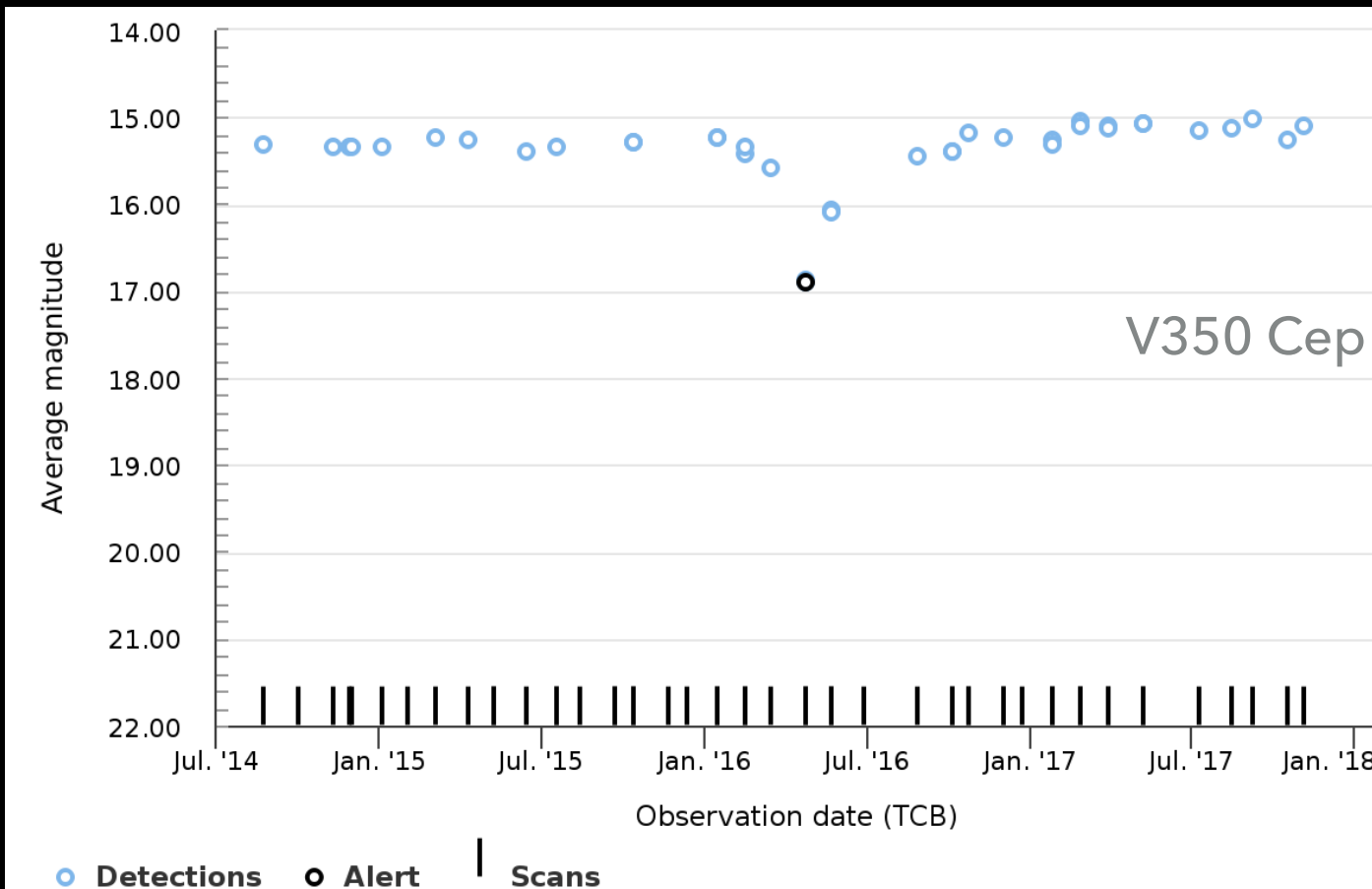
IMPROVE THE ALERT DETECTION PROCESS

► Using only GAIA data

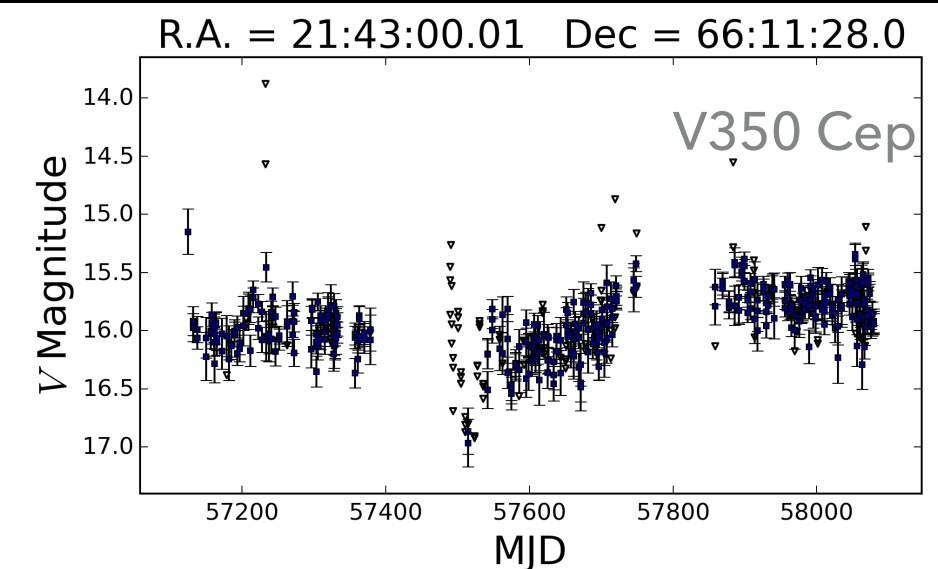
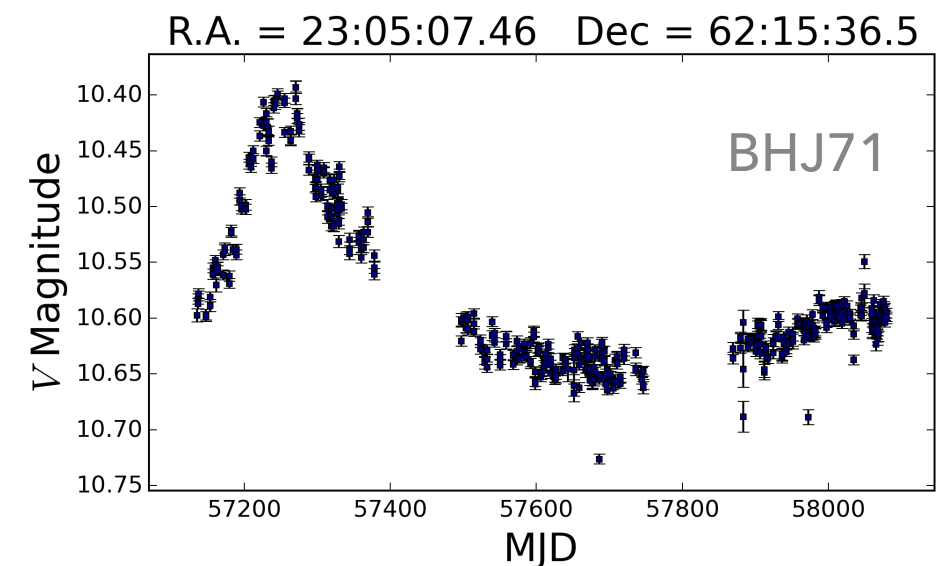
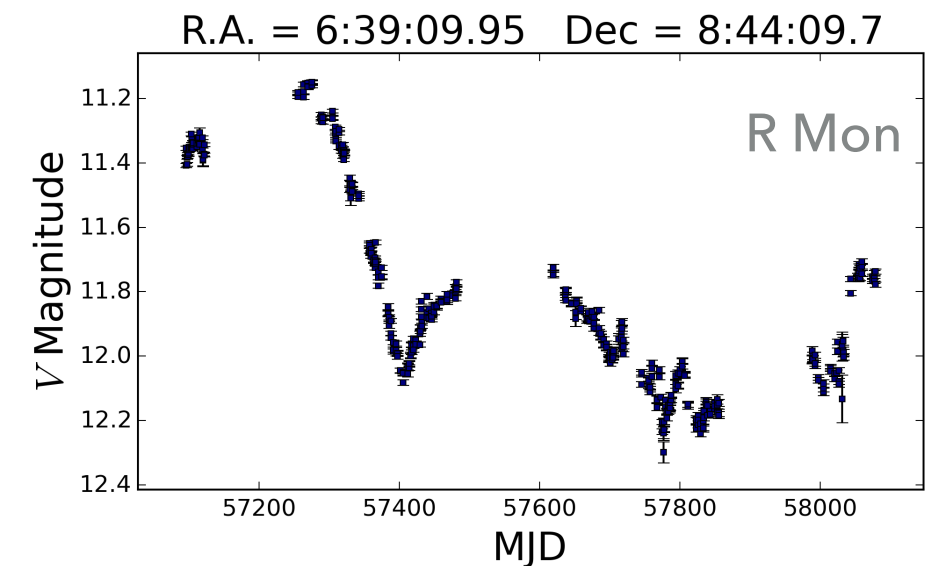
► light-curve

► spectrum

► GAIA: 60 data points instead of 500



ASAS observations

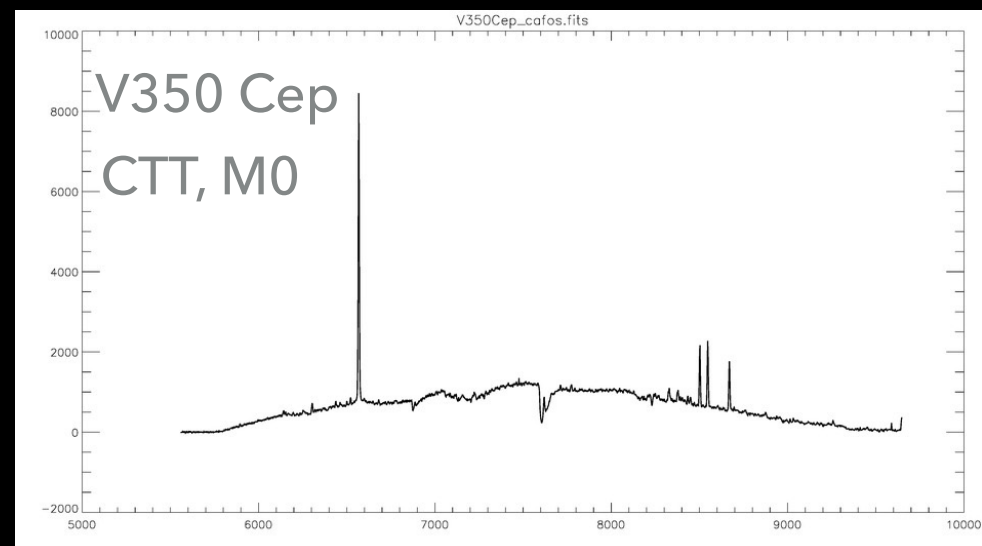
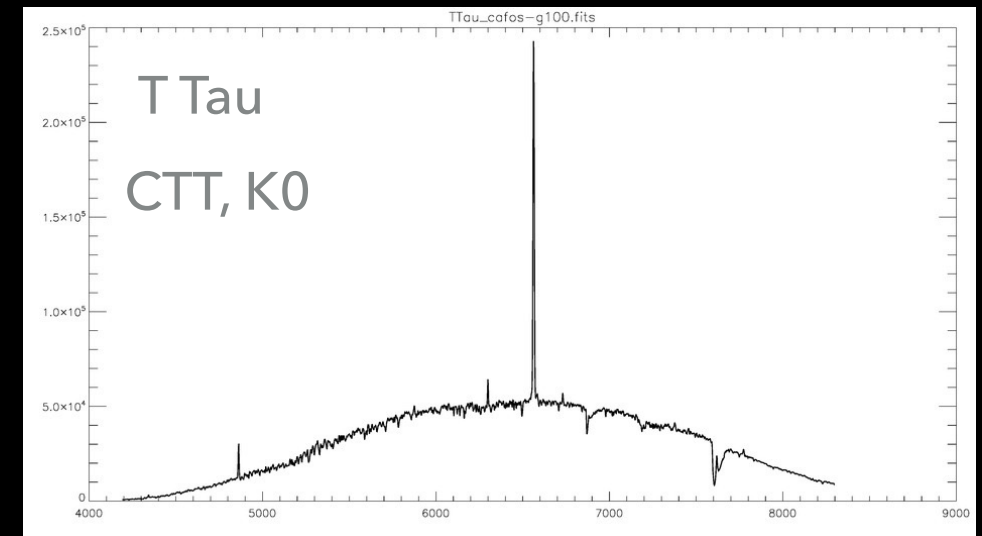
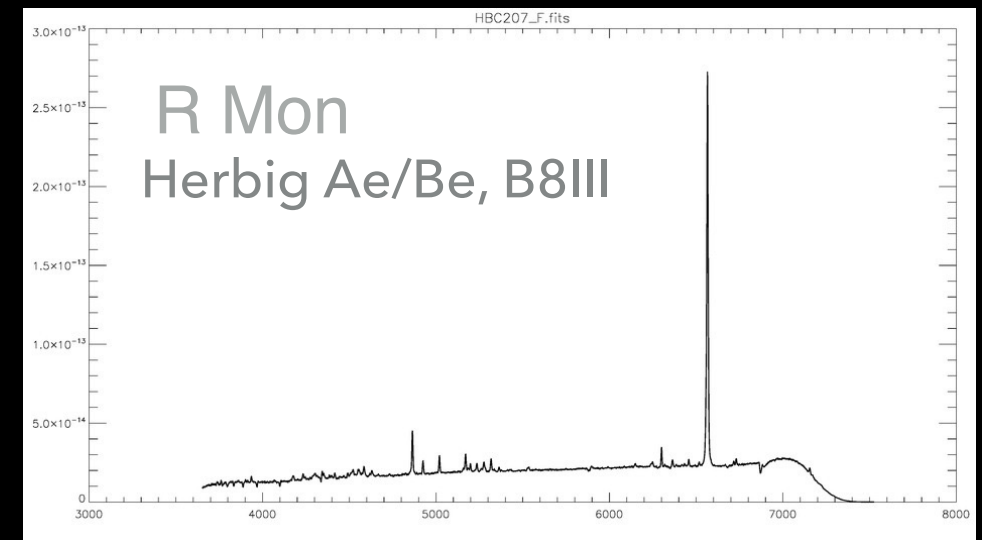
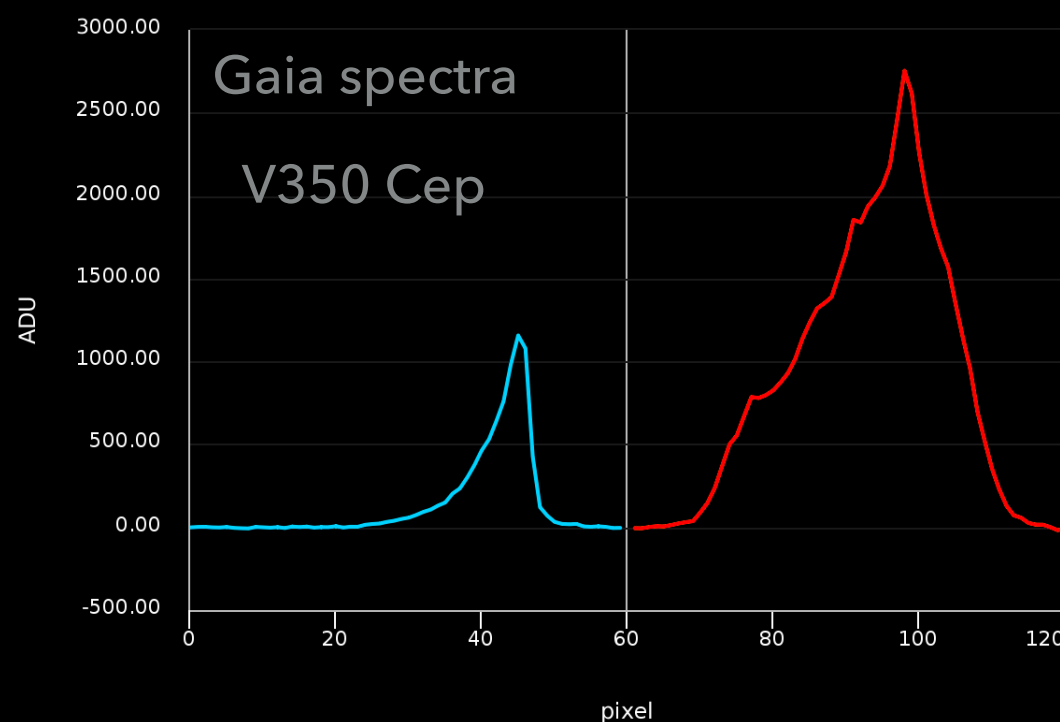


IMPROVE THE ALERT DETECTION PROCESS

Calar Alto 2.2m-Telescope

- ▶ Using only GAIA data
 - ▶ light-curve
 - ▶ spectrum
 - ▶ template spectra from 600+

- ▶ GAIA: lower spectral resolution



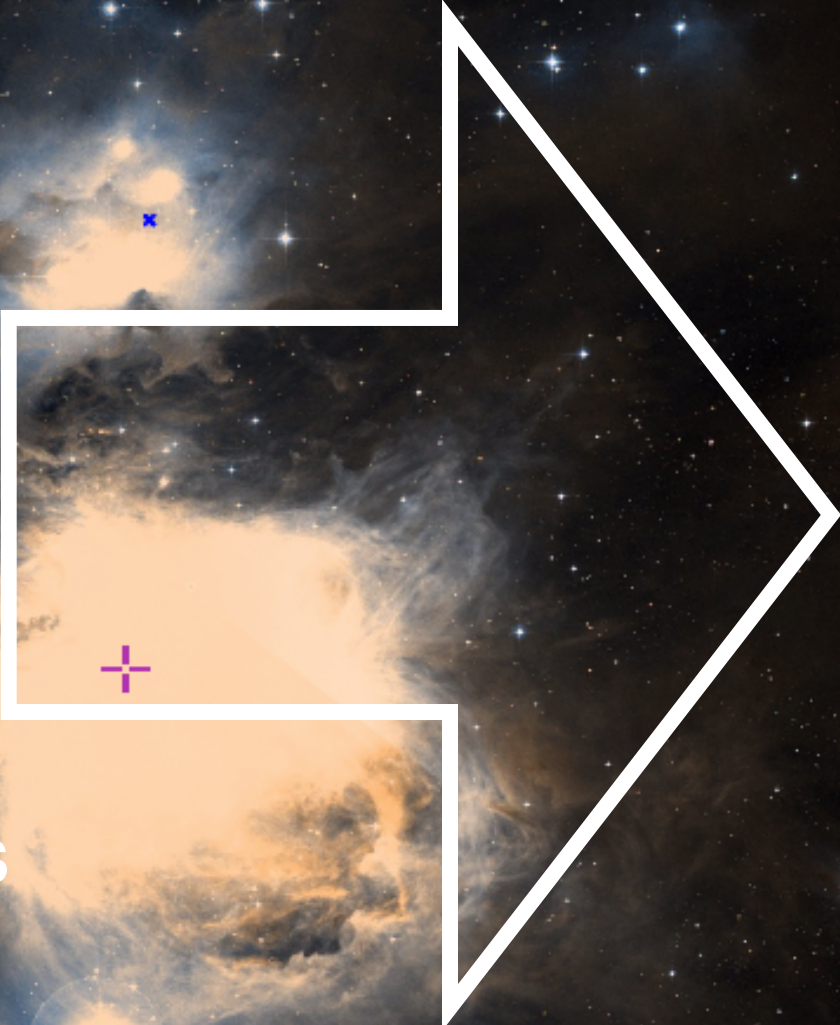
IMPROVE THE ALERT DETECTION PROCESS

- ▶ Using only GAIA data

- ▶ light-curve
- ▶ spectrum
- ▶ abs. magnitude

- ▶ Using external data

- ▶ environment
 - ▶ nearby YSOs
 - ▶ nearby clouds



Use all
information
with optimal
weighting