

Exoplanet transits, target for both professional and amateur astronomers

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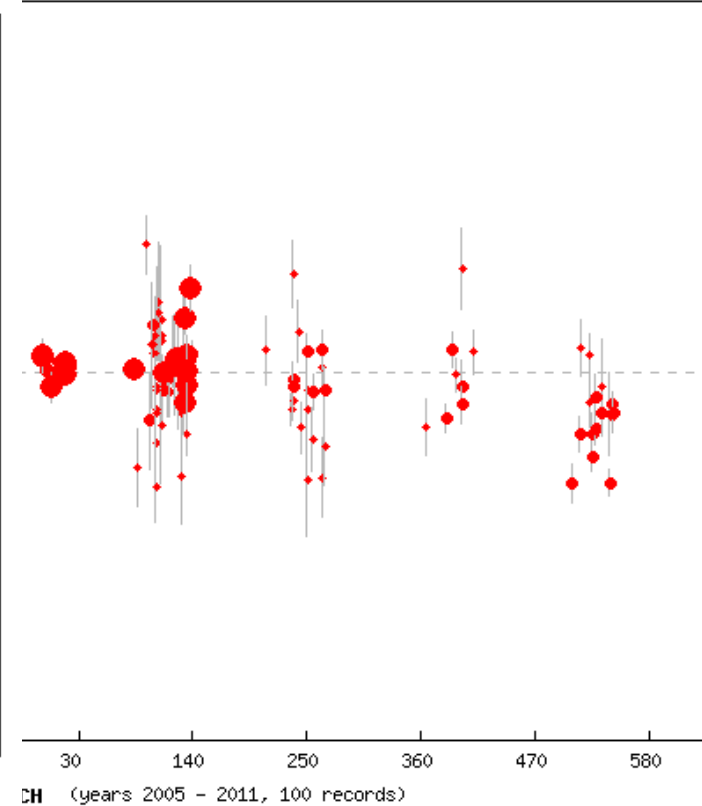
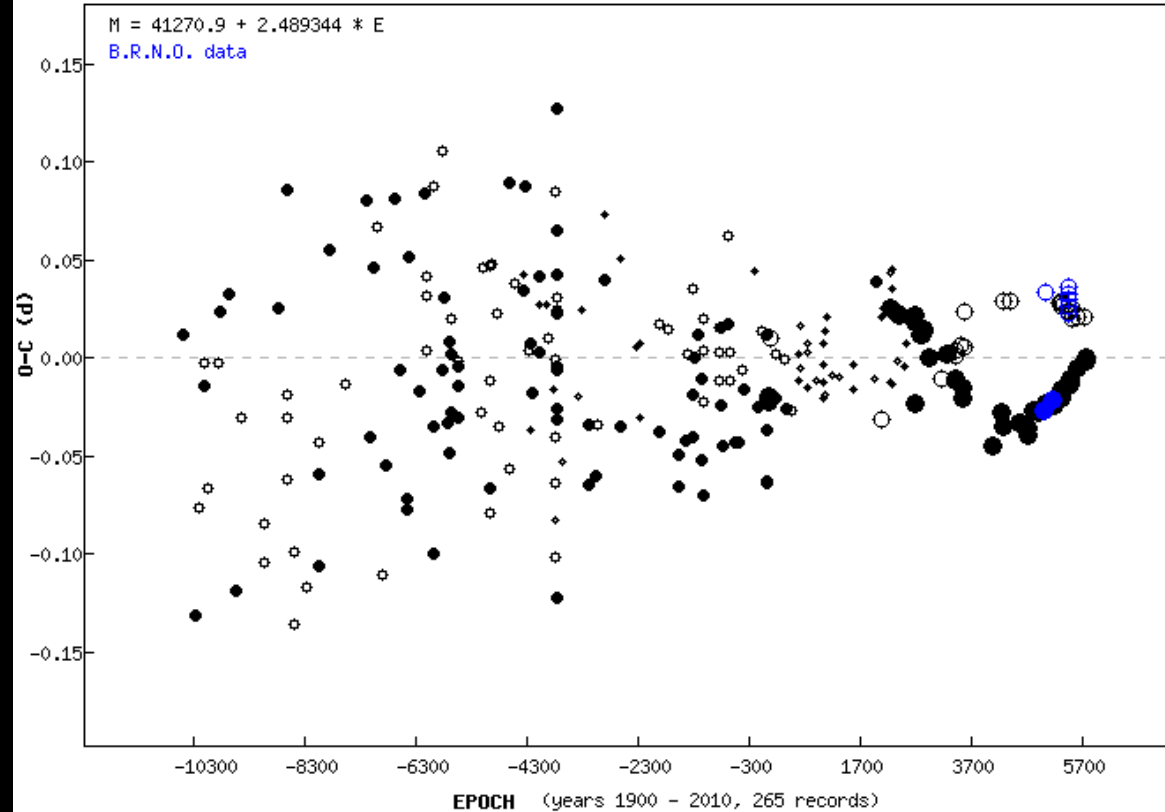
Exoplanet transits – a new field for amateurs (2/5)

OX Cas

O-C gateway

Exoplanet Transit Database: O-C vs EPOCH

$M = 41270.9 + 2.489344 * E$
B.R.N.O. data

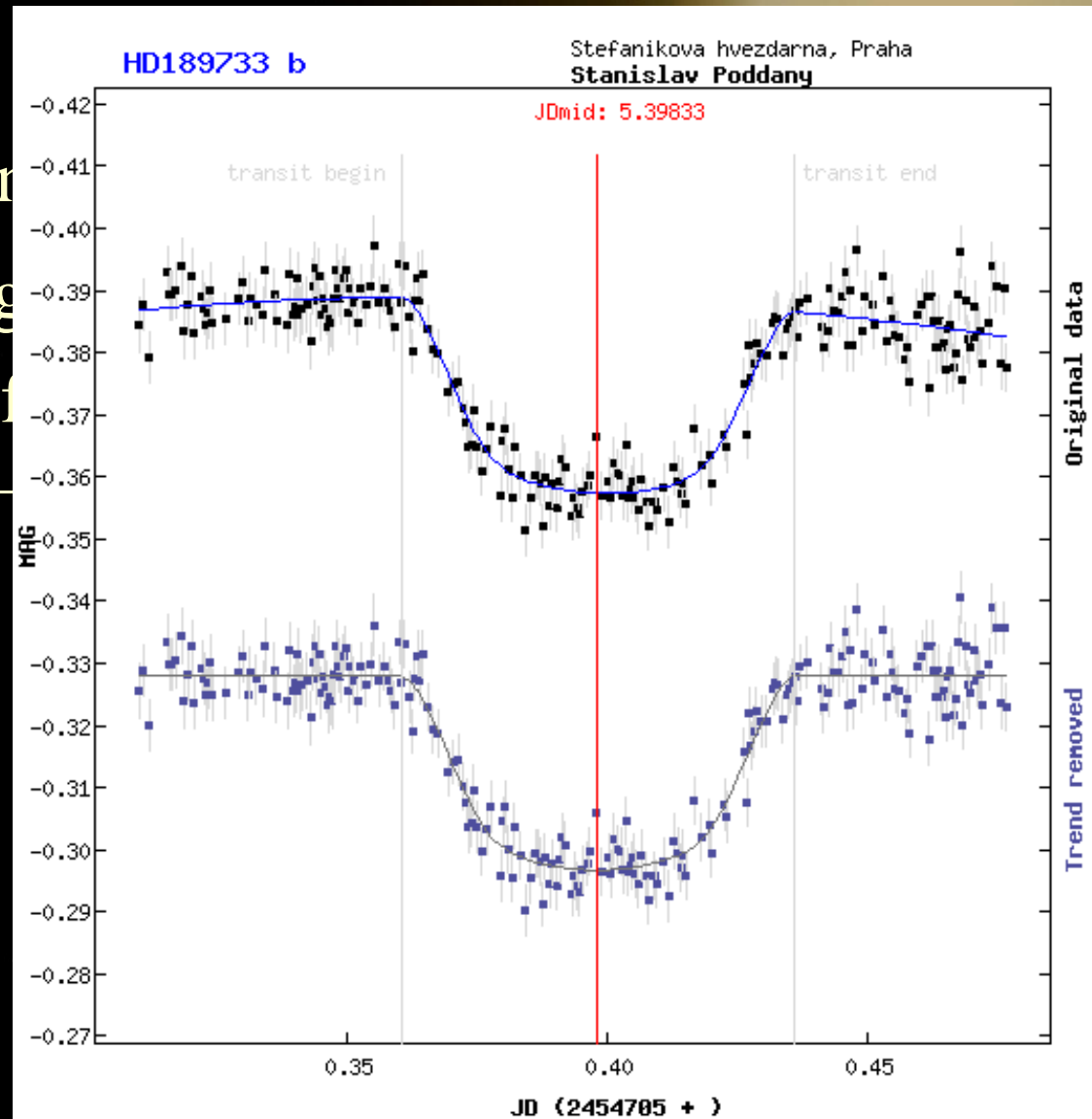


Observational technics (3/5)

- Optics

- Apertures 3 cm and larger
- A dew cap as long as possible
- Small focal ratio
- Light pollution free or light polluted sites

Example of photometric data obtained with f/11 0.4 m telescope from center of Prague – capital city of Czech republic (strong light pollution)

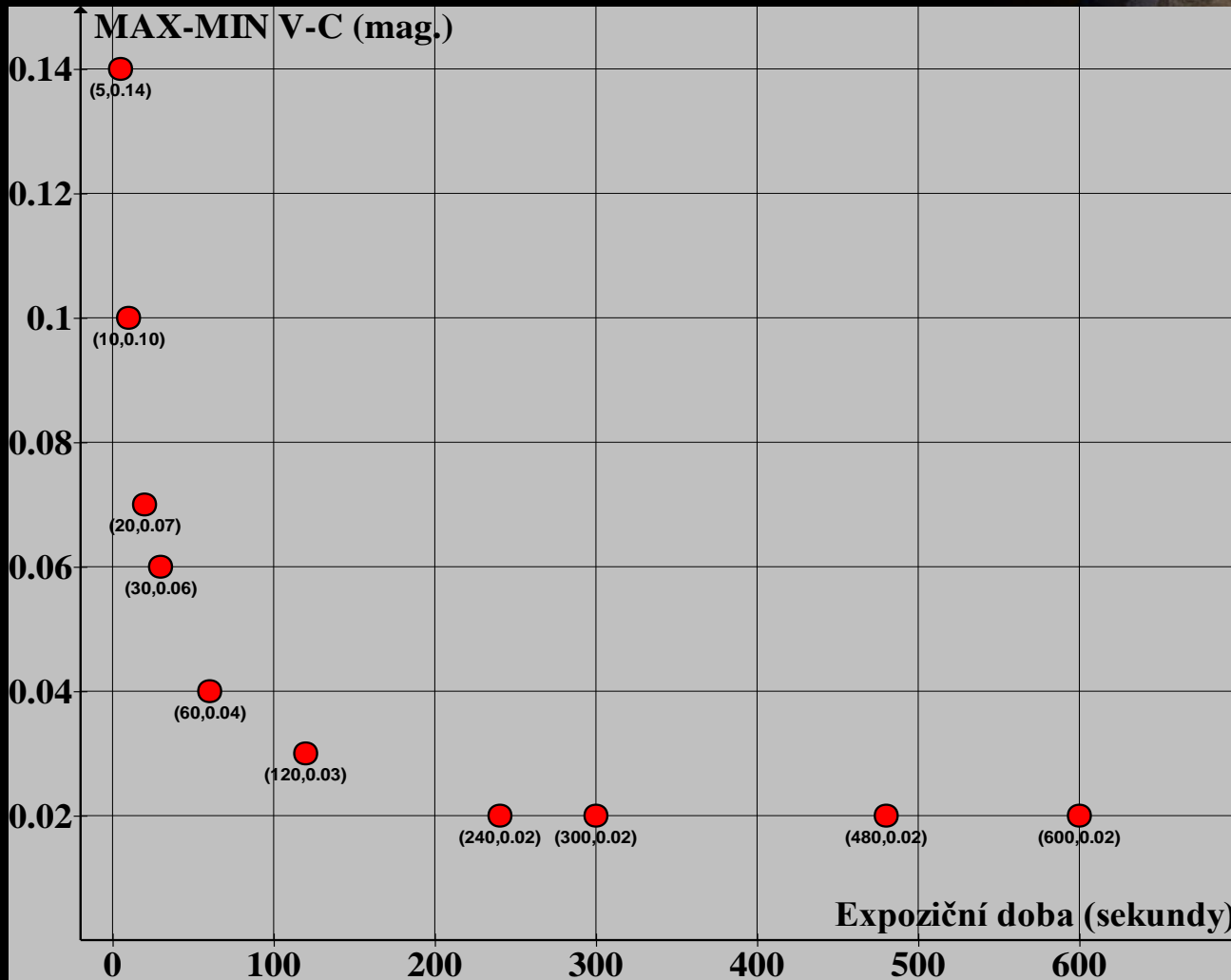


Increasing photometry precision (4/5)

- **Tips for high photometry precision**
 - Effect of exposure time
 - S/N ratio and defocusing
 - Star field must be fixed in CCD frame (autoguiding)
 - Multi comparison stars differential photometry
 - Parallel observing with more telescopes
 - Multi aperture – shutter light curves

Increasing photometry precision (4/5)

- Effect of exposure time



Seeing contribution to photometry noise

- short exposures = large scatter

- longer exposures = small scatter

Increasing photometry precision (4/5)

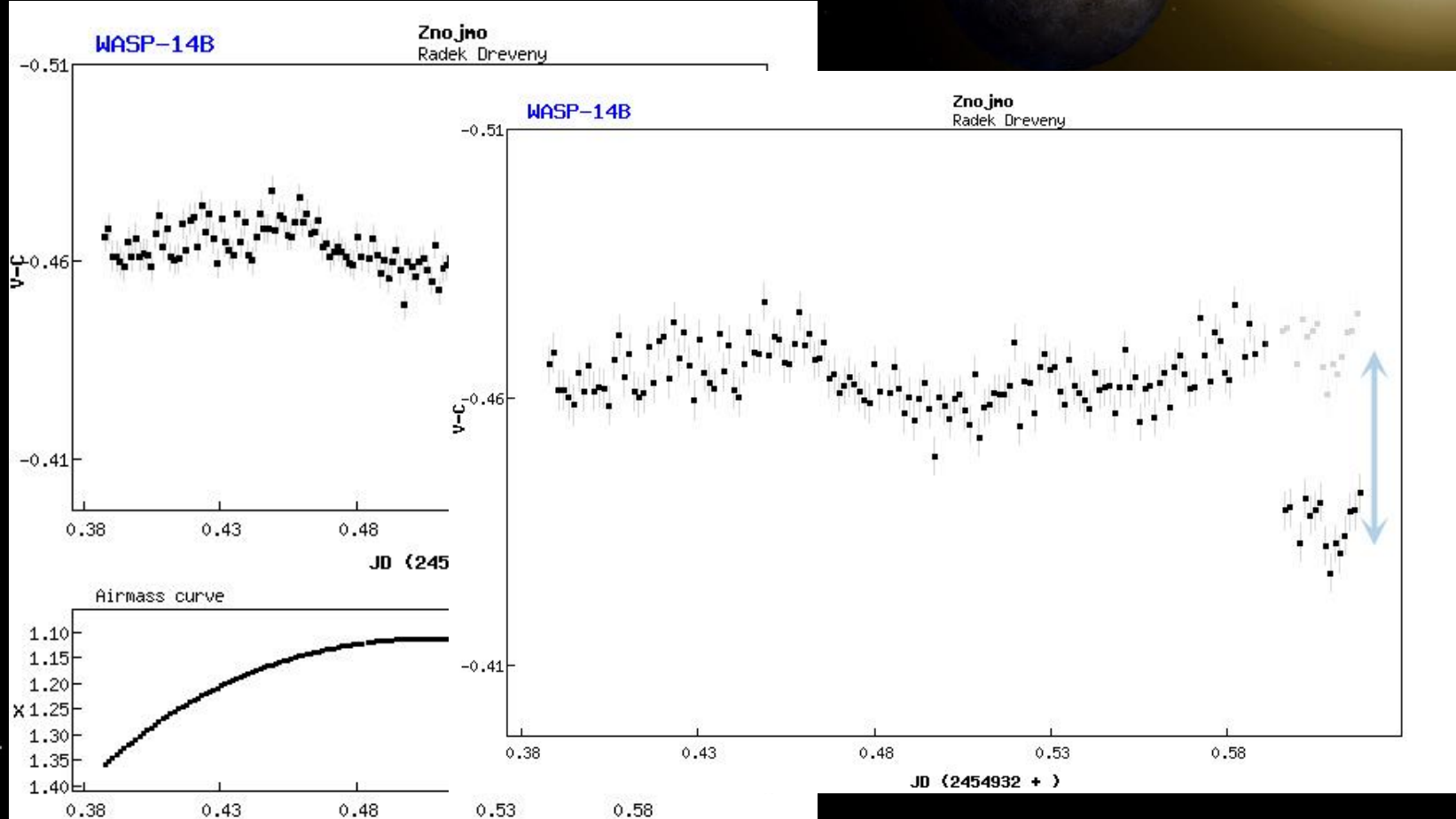
- S/N ratio and defocusing



$$\sigma \approx 1.0857 \frac{N}{S} \quad S_{\text{aperture}} = \sum_{n=0}^{n_{\text{aperture}}} p(s) \text{ [ADU]} \quad N = \sqrt{\frac{S_{\text{star}}}{G} + n_{\text{aperture}} \cdot \sigma_{\text{sky}}^2 + \frac{\sigma_{\text{sky}}^2}{n_{\text{annulus}}} n_{\text{aperture}}^2}$$

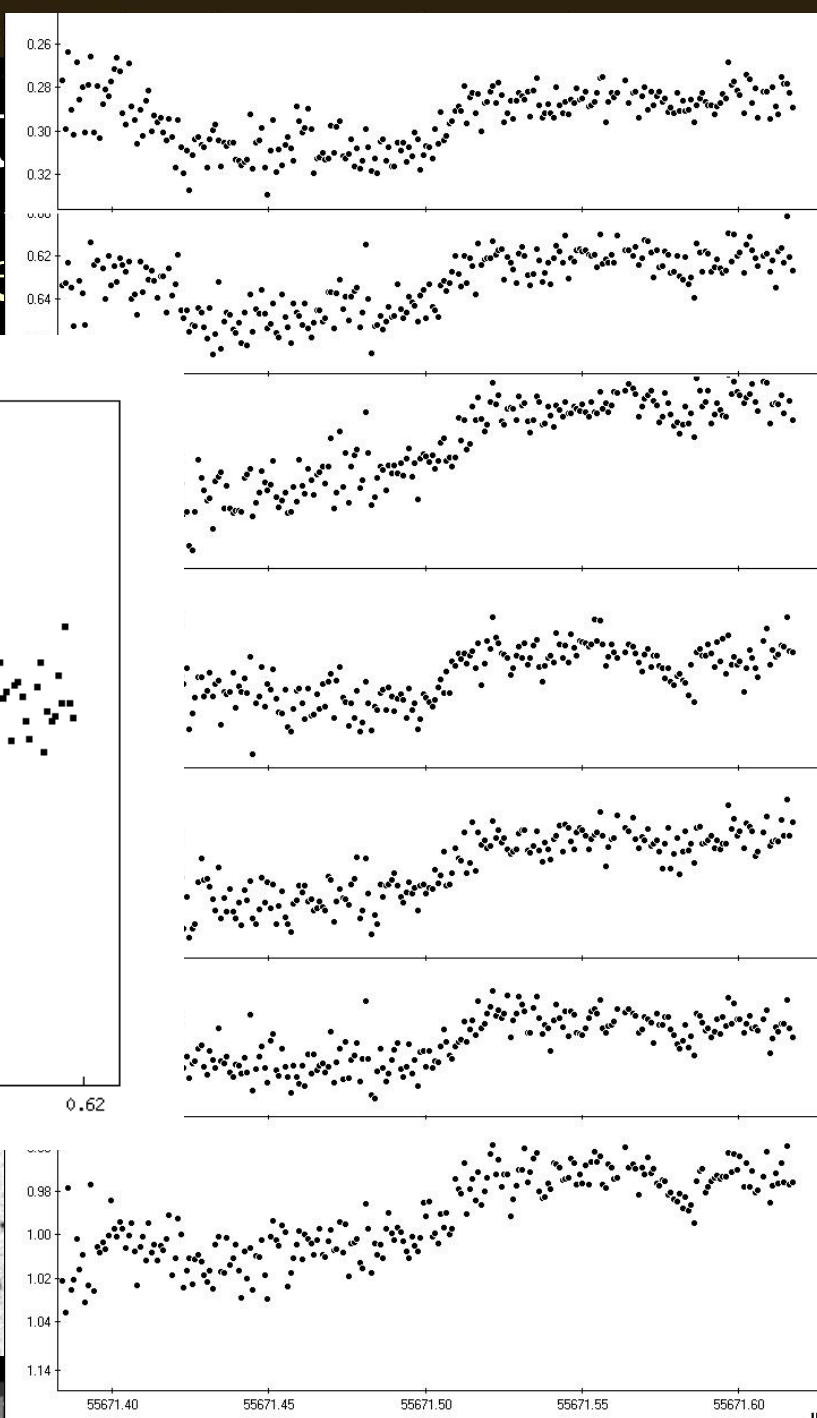
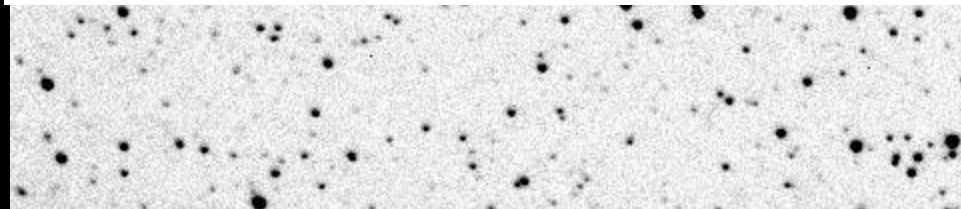
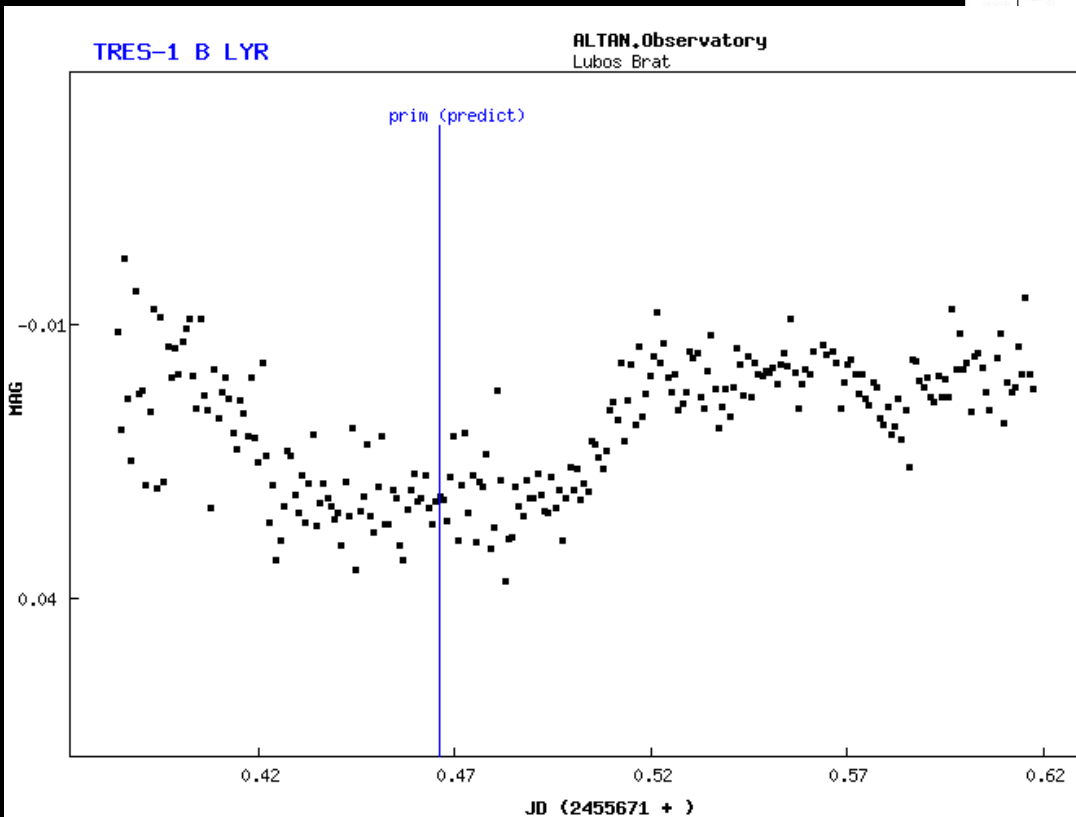
Increasing photometry precision (4/5)

- Star field must be fixed in CCD frame (autoguiding, meridian flip)



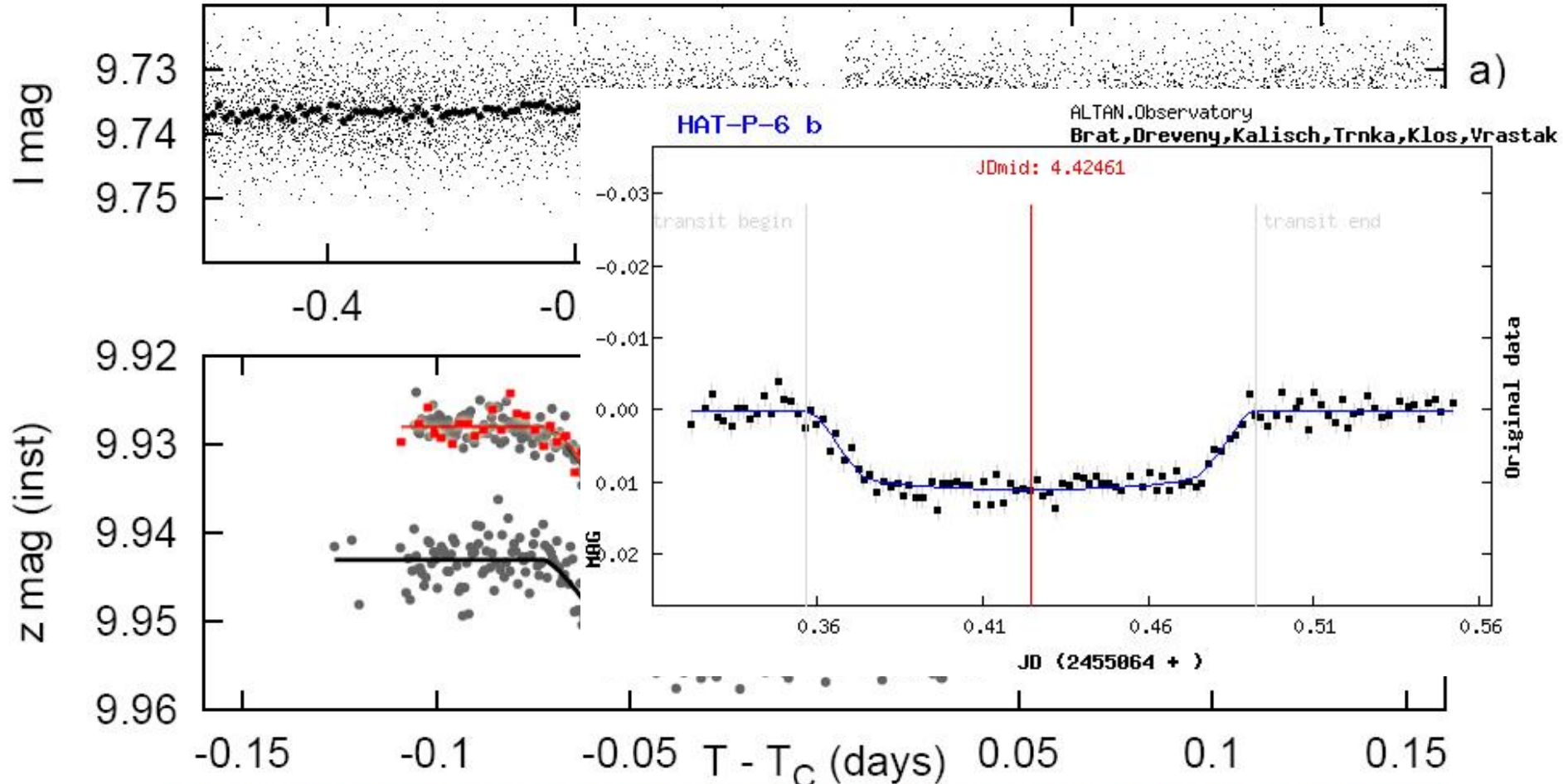
Increasing photomet

- Multi comparison stars differ



Increasing photometry precision (4/5)

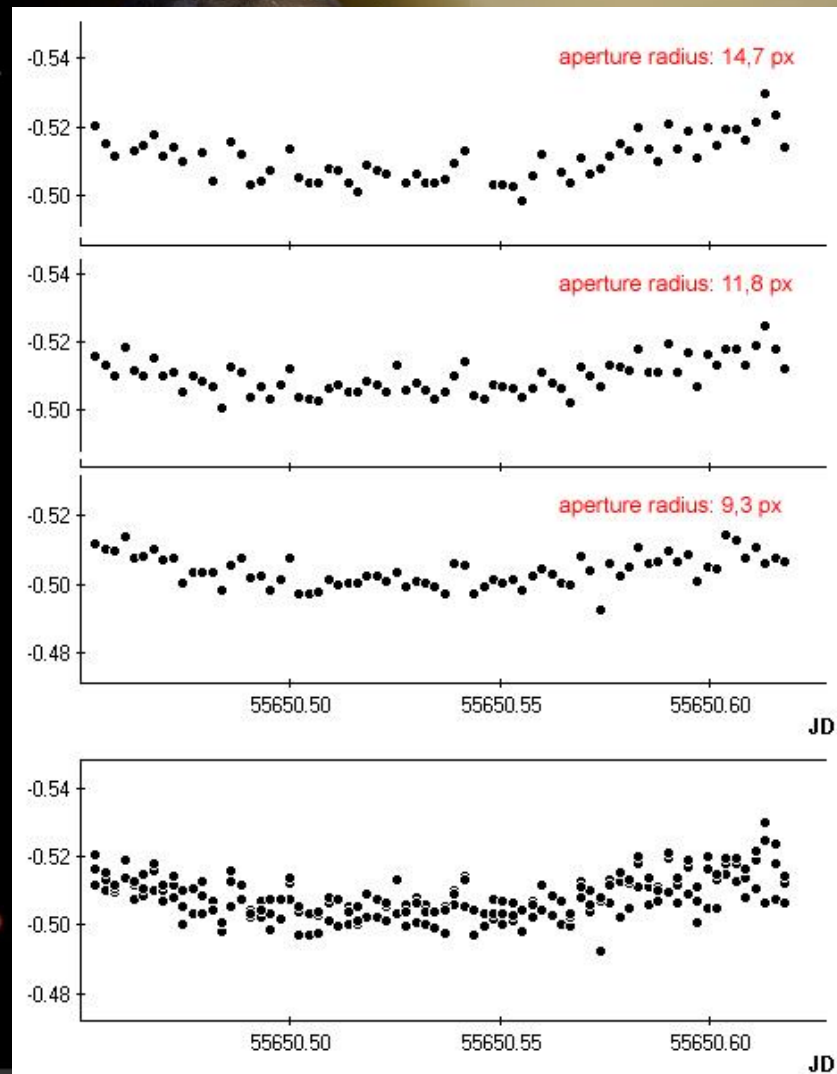
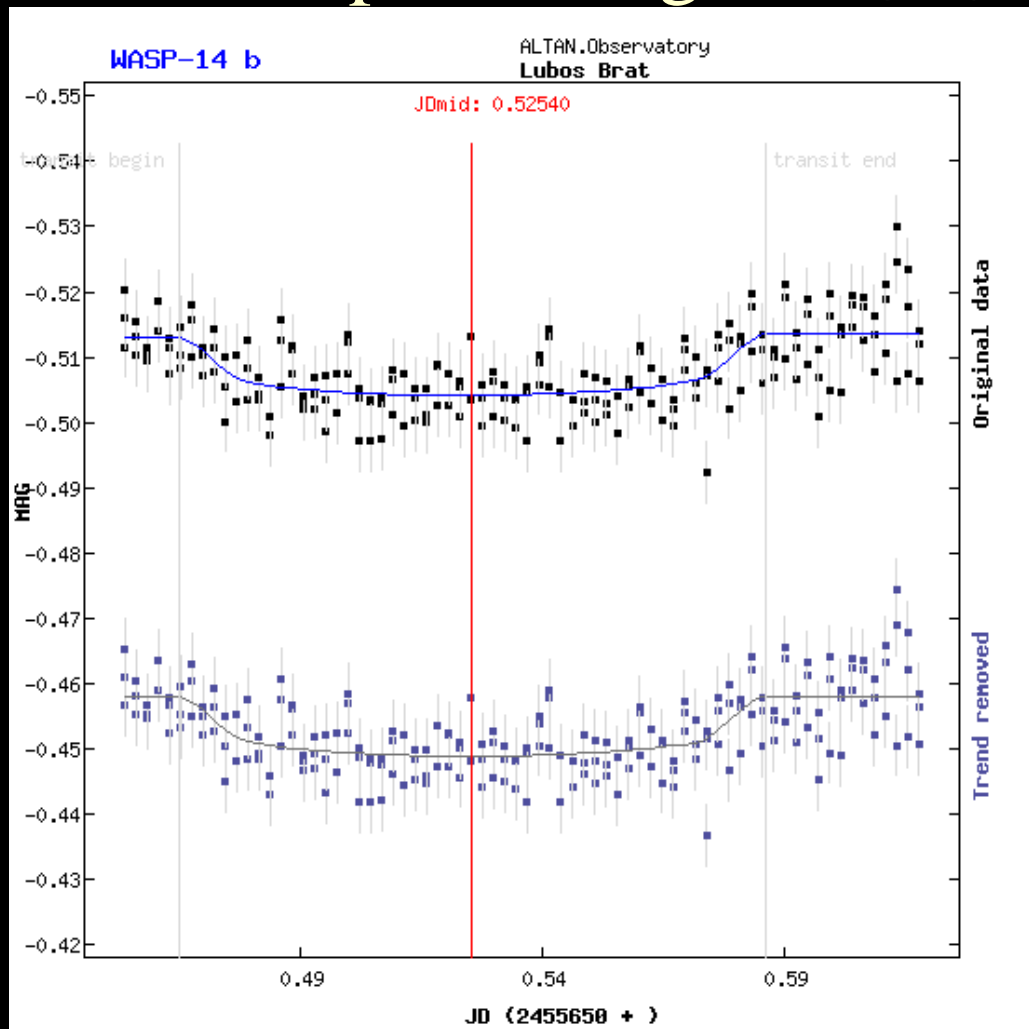
- Parallel observing with more telescopes



Combined LC by Brát, Trnka, Klos, Dreveny, Kalisch, Vrastak, 20.8.2009

Increasing photometry precision (4/5)

- Multi aperture light curves



A space scene with a yellow star in the top right, a dark planet in the top center, a blue planet in the bottom left, and a small black dot in the top right. The background is dark with many small white stars.

Thank you for your attention !