Processing the lightcurves of eclipsing binaries based on GPU
Section 2 triple stars

Triple systems

- Multiplicity is a common feature of short periodic binary systems.
- Detection is not available directly
- Only gravitational effect of the third or fourth companion.
- The eclipsing binary is orbiting around the mass center.
- Because the finite speed of light it seems that the eclipses happens later or earlier compared to our prediction.

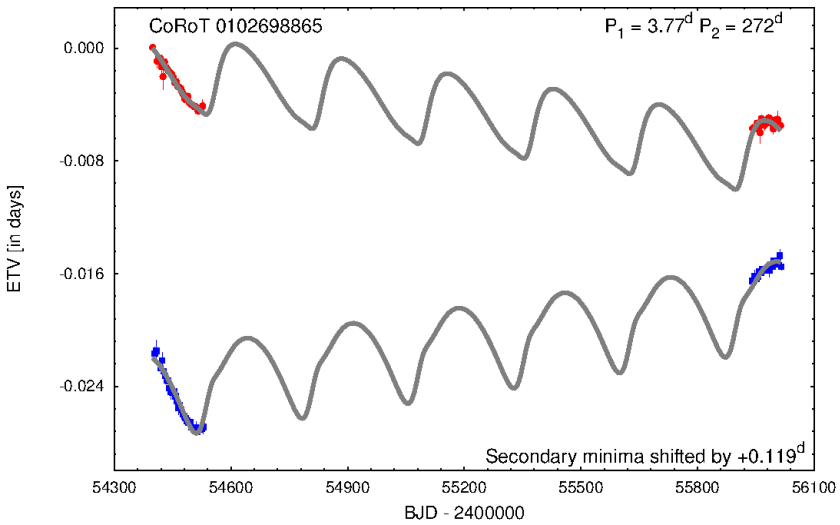
ETV analysis

- O-C (Observed minus Calculated) diagram
- **ETV (Eclipse Timing Variation) analysis**
- Clarify period (sloop of the curve)
- Signs of third body, **LTTE** (Light-Travel-Time Effect)

Space photometry

- Thanks for CoRoT and Kepler space crafts we have **ultra-high precision photometric data of around 5000 eclipsing binary system**.
- **Measured their targets flux continuously for months or years**.

Example for an O-C diagram of a CoRoT target



Method

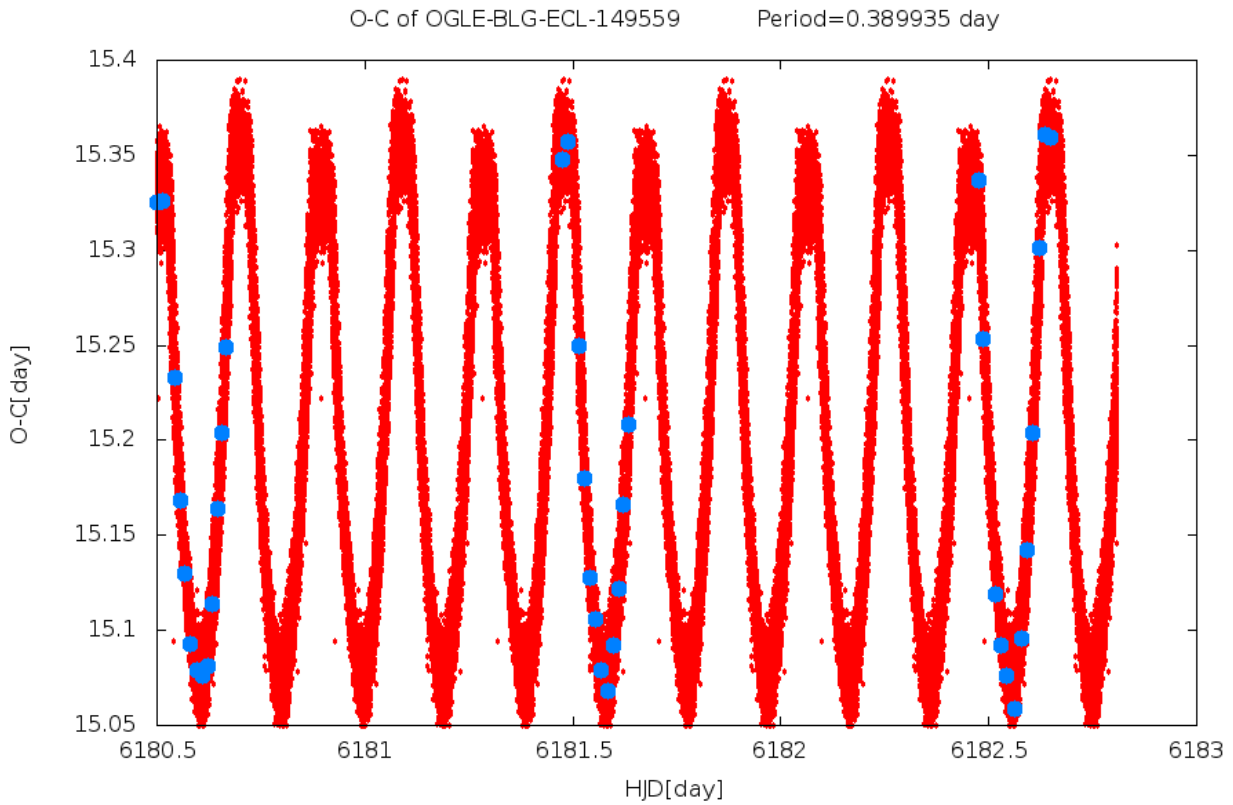
Upgraded version of a CPU based C program

1. Folded binned light curve more than 1000 times faster than before thanks for GPU
2. Determine the phase borders of the eclipses
3. Create 2 template polynomial functions
4. Calculate the possible shift of each eclipse compared to the folded binned light curve. (Averagely its faster by GPU, but depends on the number of eclipses.)

Ábrákkal bemutatva az egyes lépések.

Ground base photometry

- During the daylight they couldn't observe the targets.
- Atmosphere

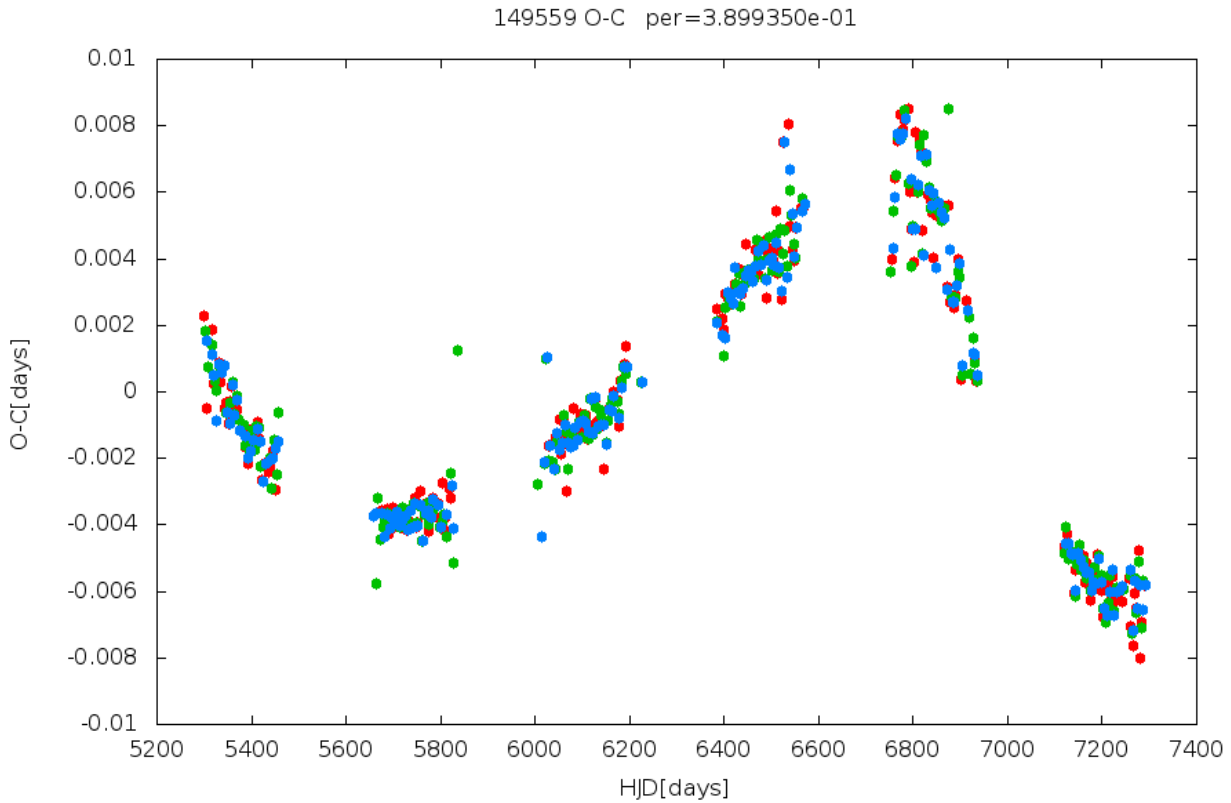


OGLE

OGLE (Optical Gravitational Lensing Experiment)
OGLE provide us light curves of around half million eclipsing or ellipsoidal variables that can be a new treasure chest for exploration of hierarchical triple star systems.

Solution

We need more points→ a wider interval of time
Luckily for wide hierarchical systems it isn't makes that much problem at all since mostly the changes aren't that fast.



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