Long-term monitoring of Gaia transients at the Terskol Observatory

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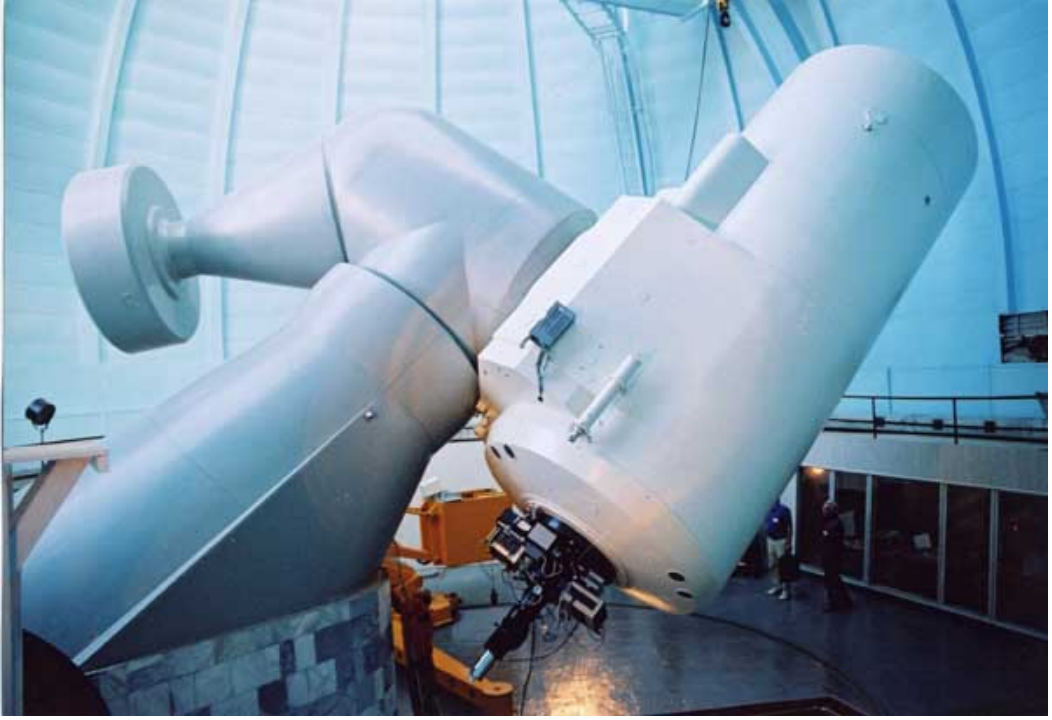
Terskol Observatory (IAU code B18)

the Northern Caucasus (43°16’29”N, 42°30’03”E, 3143 m asl)



2m telescope
Ritchey-Chretien system
equivalent focal length: 16 m
Coude system
equivalent focal length: 72 m
field of view: 5'
CCD Camera FLI PL4301:
2084 x 2084 pixels
(pixel size 24x24 micron)
Field of view: 11x11 arcmin

60-cm telescope (Zeiss-600)
f/12.9 Cassegrain

CCD camera SBIG STL-1001:
1024x1024 pixels
(pixel size 24x24 micron)

field of view :10.9 x 10.9 arcmin

The program on long-term monitoring of Gaia transients has started at the Terskol Observatory in 2016.

Since 2016, a lot of Gaia transients, which were discovered by *ESA Gaia, DPAC and the Photometric Science Alerts Team (gsaweb.ast.cam.ac.uk/alerts)* have been observed at the Terskol Observatory (total ~70 objects).

Recent activities are highly focused on BVRI photometry of **unclassified** objects (including their long-term monitoring).

Photometric observations through BVRI filters have been used to perform a quick analysis of the imaging data in order to reveal short- or long-term variability in the brightness of sources, as well as changes of their color indices.

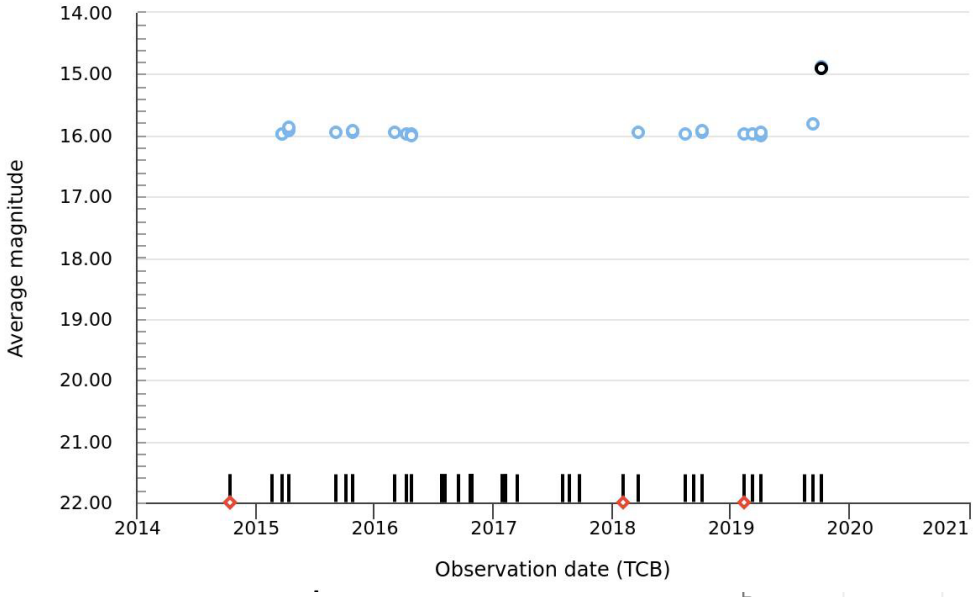
More than 10000 photometric measurements were recorded; images were taken mainly with the Zeiss-600 telescope. For sources of magnitude G~16, a photometric accuracy of better than 0.05 mag was achieved for V, R, I passbands, while the errors in B values are somewhat larger.

The follow-up data points obtained have been continuously uploaded to the Cambridge Photometric Calibration Server *(http://gsaweb.ast.cam.ac.uk/followup).*

In 2019, the following Gaia transients were observed at Terskol:

Gaia15afz, Gaia16aia, Gaia16bnz, Gaia16cfn, Gaia17agr, Gaia17agj, Gaia17cuh, Gaia18aak, Gaia18aen, Gaia18aes, Gaia18cct, Gaia18dvy, Gaia19asz, Gaia19bcv, Gaia19bfh, Gaia19bfr, Gaia19bgg, Gaia19bpg, Gaia19bzf, Gaia19cuu, Gaia19cvn, Gaia19dbb, Gaia19dfx, Gaia19dvu, Gaia19enk, Gaia19euw, Gaia19ezi, Gaia19fdx, etc.

Gaia19enk



Galactic coords. 7.7232 11.66834
Alerting date 2019-10-08 22:05:51

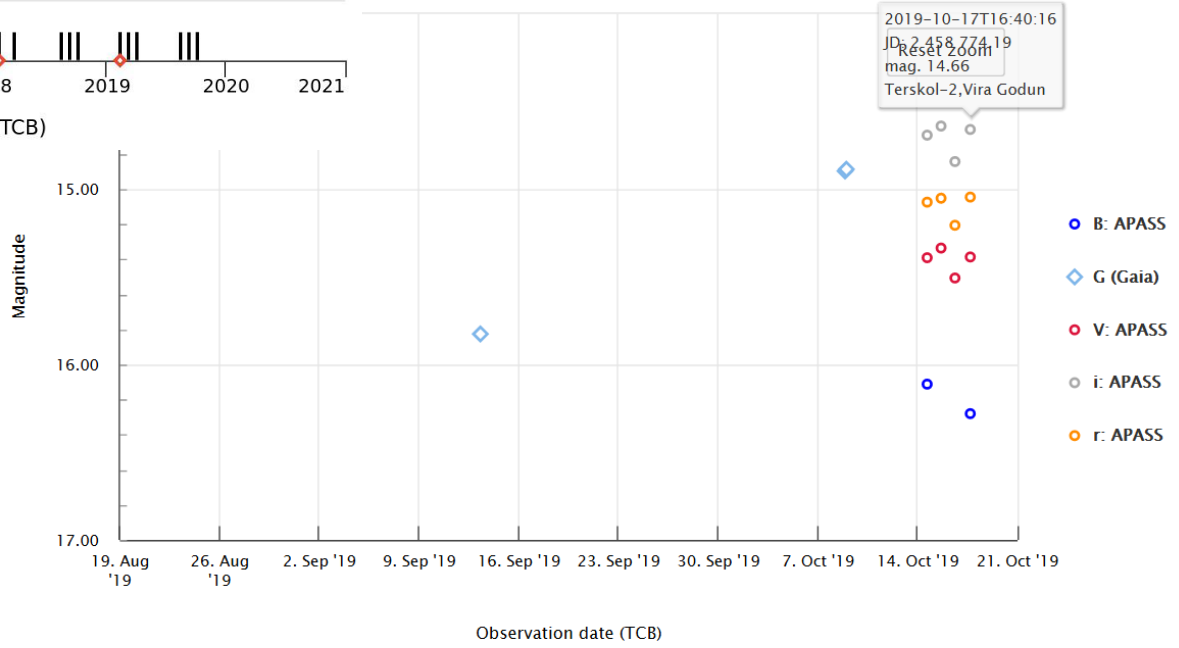
Julian date 2458765.42
Alerting magnitude 14.90

Historic magnitude 15.96

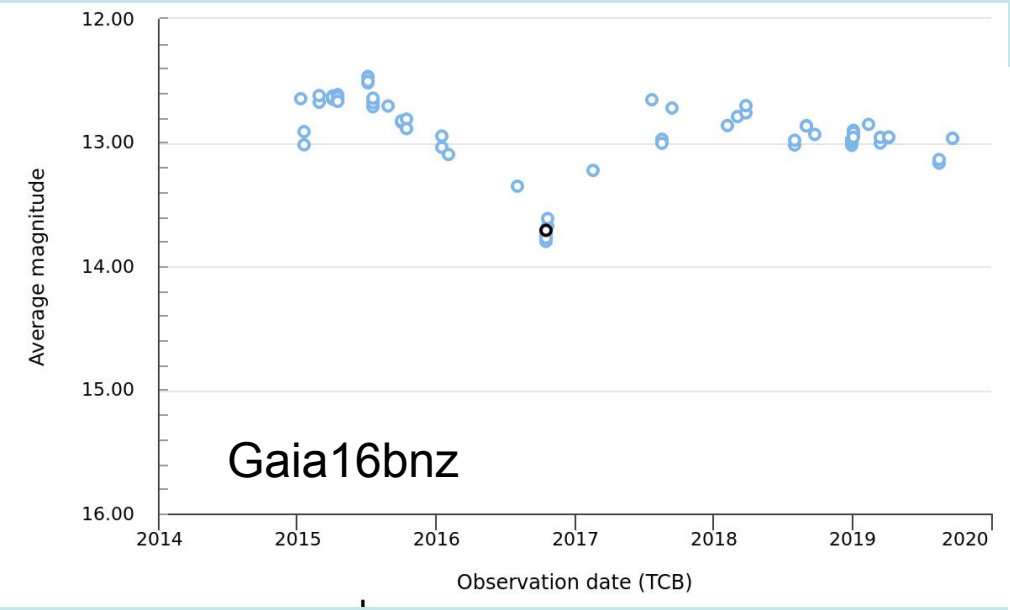
Historic StdDev 0.03

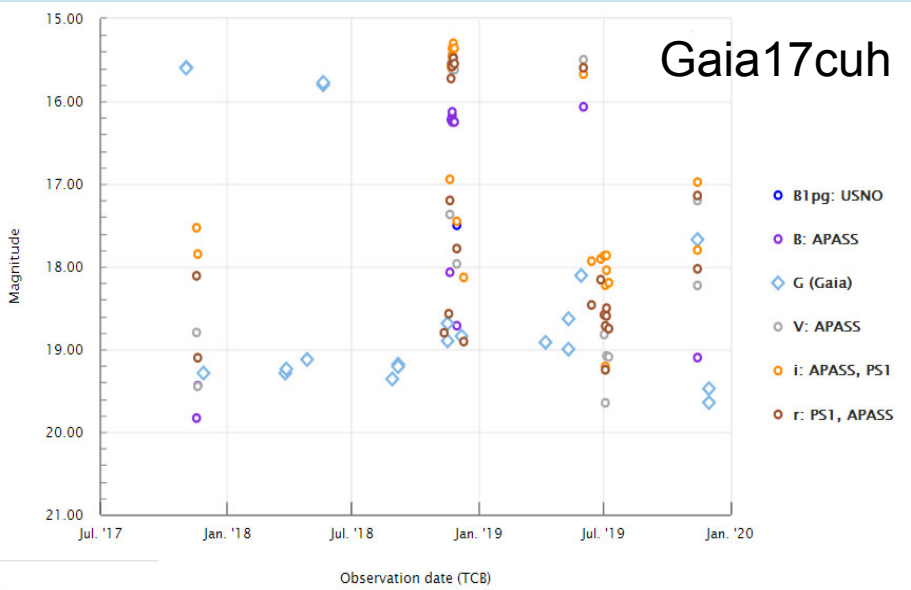
Class unknown

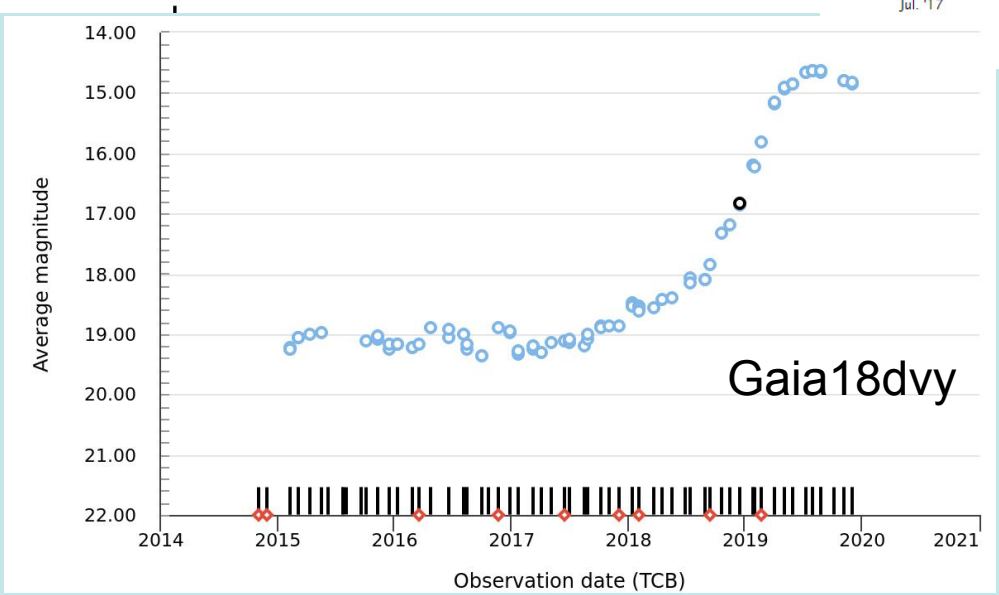
Publication date Oct. 14, 2019, 4:54 a.m.



Long-term multicolor observations







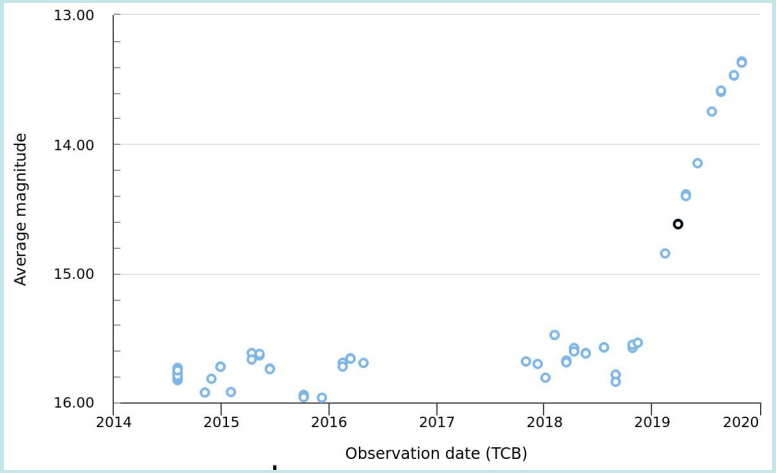
Outburst in CV candidate Gaia17cuh

ATel #12238; *A. Simon (National Taras Shevchenko University of Kyiv, Ukraine), V. Godunova (ICAMER Observatory, Ukraine), I. Izviekova (ICAMER Observatory, Ukraine), V. Kozlov (ICAMER Observatory, Ukraine), V. Vasylenko (National Taras Shevchenko University of Kyiv, Ukraine)*
*on **24 Nov 2018; 00:47 UT***
Credential Certification: Andrew Simon (skazhenijandrew@gmail.com)

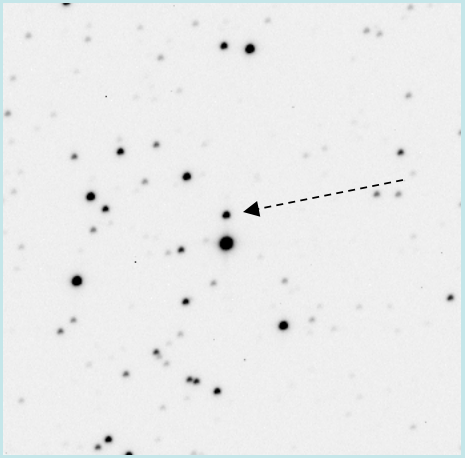
Subjects: Optical, Cataclysmic Variable, Variables

The bright blue transient Gaia17cuh/AT2017hwz on faint red Gaia source near Galactic plane was triggered on 2017-11-02 when it brightened by more than 3 mags and reached a G magnitude of 15.48. We observed this object on 2017-11-18 with the 2-m RCC telescope at the Terskol Observatory and found it to be faded (ATel #11006). Further observations of this source by Gaia revealed in May 2018 a repeated increase in its brightness that allowed us to calculate a next date this candidate CV to be appeared brighter. To prove this assumption, early November 2018 we restarted to observe Gaia17cuh using the 60-cm telescope at the Terskol Observatory (the North Caucasus) and the 70-cm telescope at the Lisnyky Observatory (near Kyiv).
The data acquired, especially R-band observations, indicated that the object's brightness was continuously increasing from 2018-11-11. Amplitude of the outburst is more than 3 mags. On 2018-11-22 we detected small variations in R-band with amplitude of about 0.1 mag (Fig.1). The light curve plotted with the aid of Cambridge Photometry Calibration Server (CPCS) is shown on the Fig.2. Further observations are encouraged.
We acknowledge ESA Gaia, DPAC and the Photometric Science Alerts Team (http://gsaweb.ast.cam.ac.uk/alerts).

Multicolor photometric behavior of Gaia19bpg

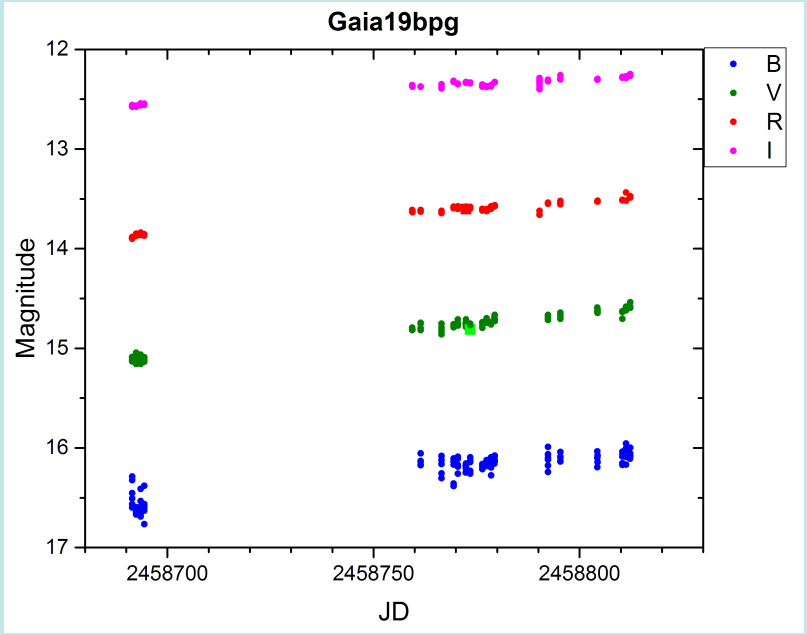


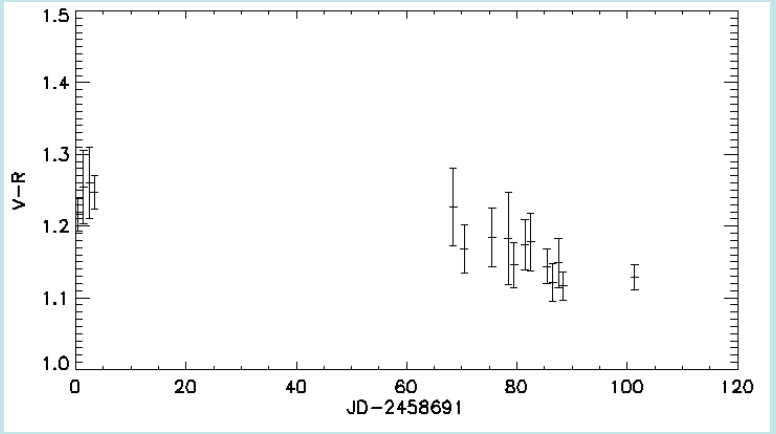
Galactic coords.
95.93564 -0.71611
Alerting date
2019-04-01 21:25:25
Julian date: 2458575.39
Alerting magnitude:14.62
Historic magnitude 15.68
Historic StdDev 0.20
Class:unknown
Publication date
April 29, 2019, 2:22 p.m.
Comments:red Galactic plane source brightens by 1.5 mag over 8 months



10 Dec 2019
Gaia19bpg
B~16.00
V~14.59
R~13.50
I ~ 12.30
G~13.30

TYC 3603-2837-1
B~10.85
V~10.65
G~10.60





Changes in V-R color of Gaia19bpg in July-November 2019

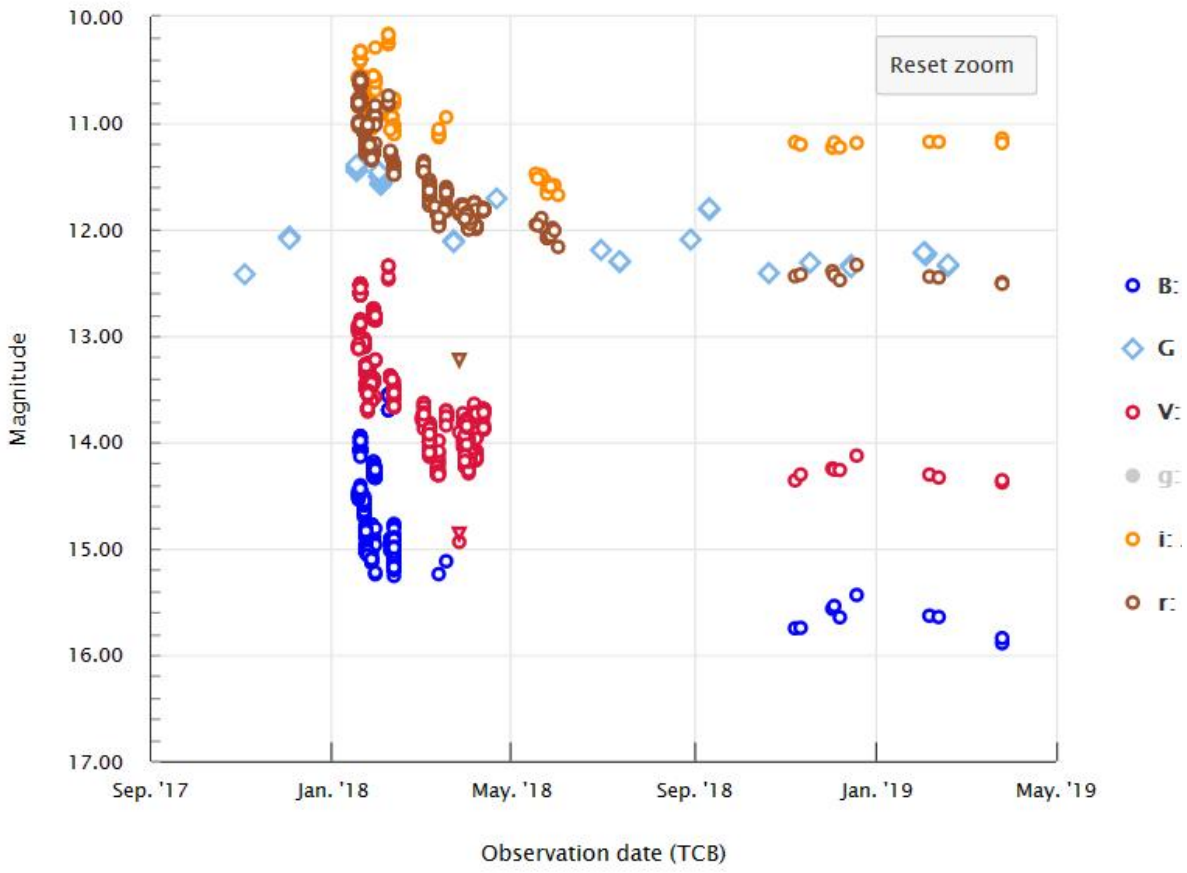
Multi-band observations of Gaia19bpg in 2019

So far, the revealed variability does not allow the unambiguous classification of Gaia19bpg; it is assumed to be a YSO or a microlensing event.

Gaia 18aen

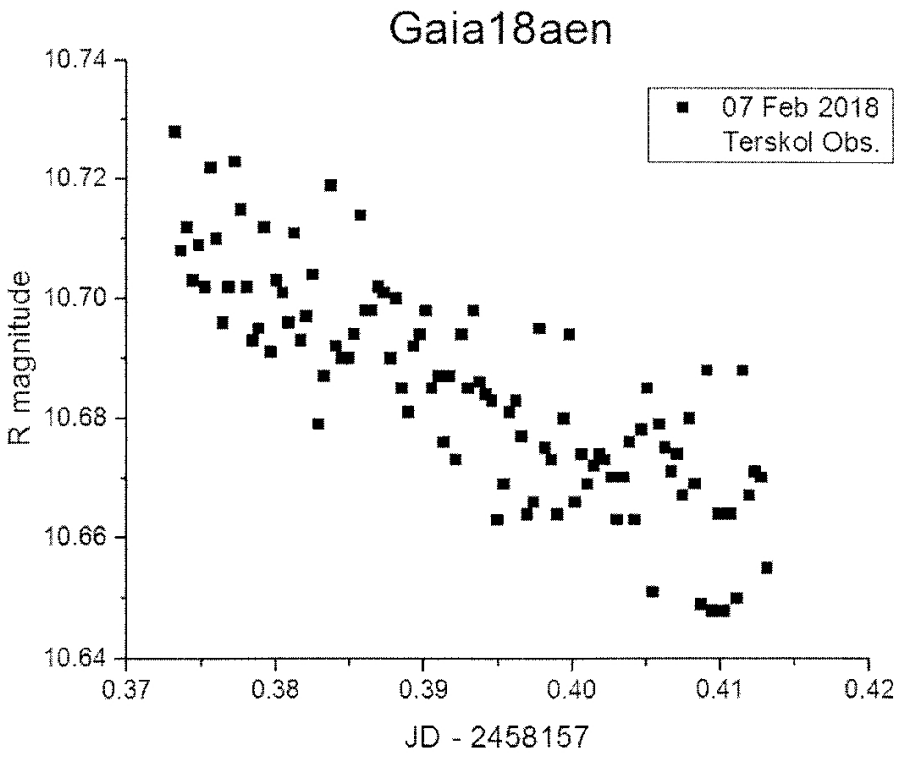
A ~1 mag increase in brightness of this object was detected by Gaia on 2018-01-17, when its G magnitude reached 11.33. This bright emission line star in the Galactic plane apparently did not show any significant variability until December 2017. Moreover, it was indicated as WRAY15-136.

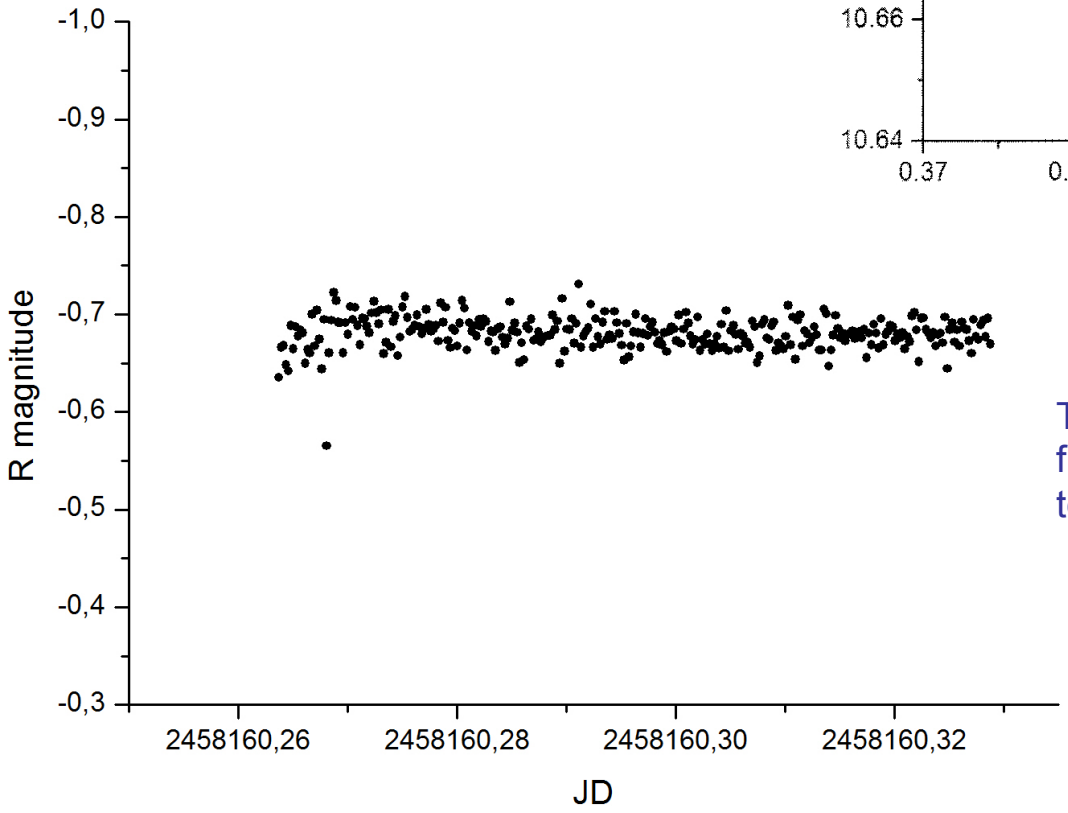
BVRI photometry of Gaia18aen has been performed at Terskol with the 0.6-m telescope. All the follow-up data points were uploaded to the Cambridge Photometric Calibration Server. Figure shows multi-band observations of Gaia18aen, which were acquired in 2018-2019 by Gaia and by the four ground-based observers. The light curve demonstrates the decaying oscillations on a time scale of months, with the general decline of the object's brightness to the baseline.



(Image from http://gsaweb.ast.cam.ac.uk/alerts)

Observations of the variable star Gaia18aen in February 2018

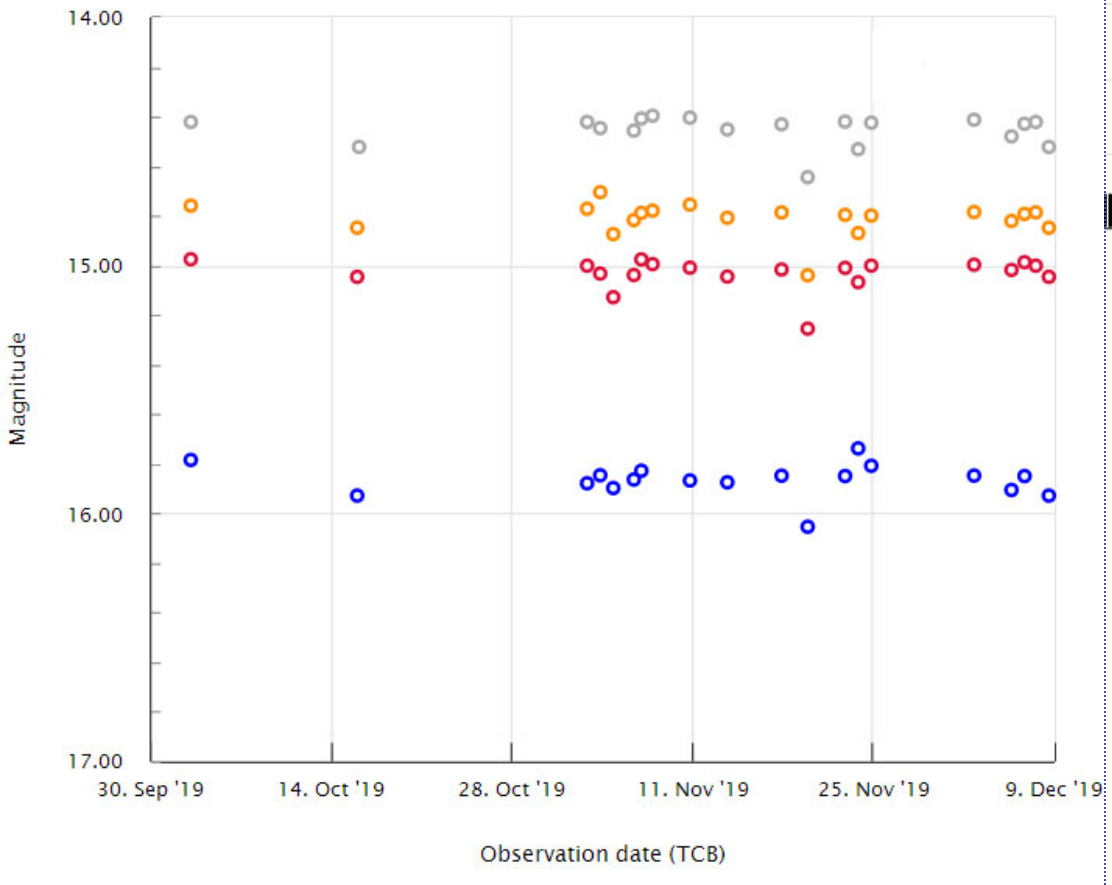


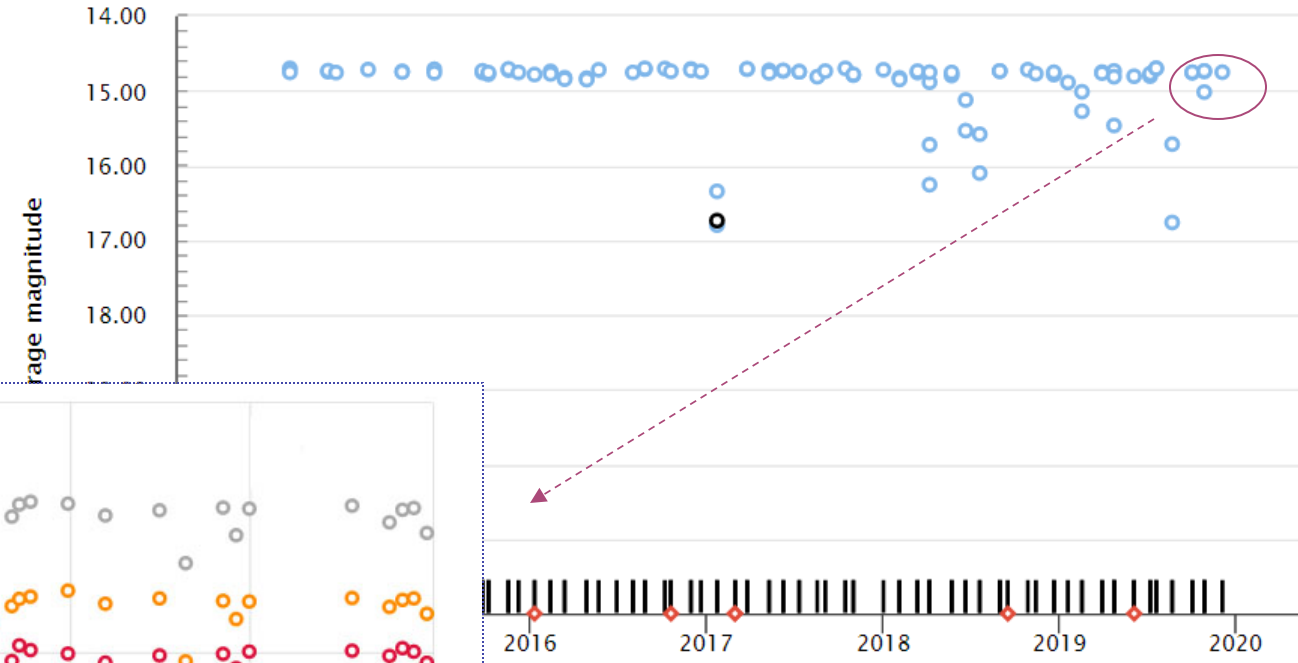


The light curves of Gaia18aen obtained from R-band observations with the 0.6-m telescope on 2018, February 07 and 10.

Gaia17agj

Galactic coords.: 104.68557 0.1837
Alerting date: 2017-01-24 10:17:31
Julian date: 2457777.93
Alerting magnitude: 16.74
Historic magnitude: 14.72
Historic StdDev: 0.04
Class:unknown
Publication date Jan. 28, 2017, 11:09 p.m.
Comments:
deep eclipse with significant reddening





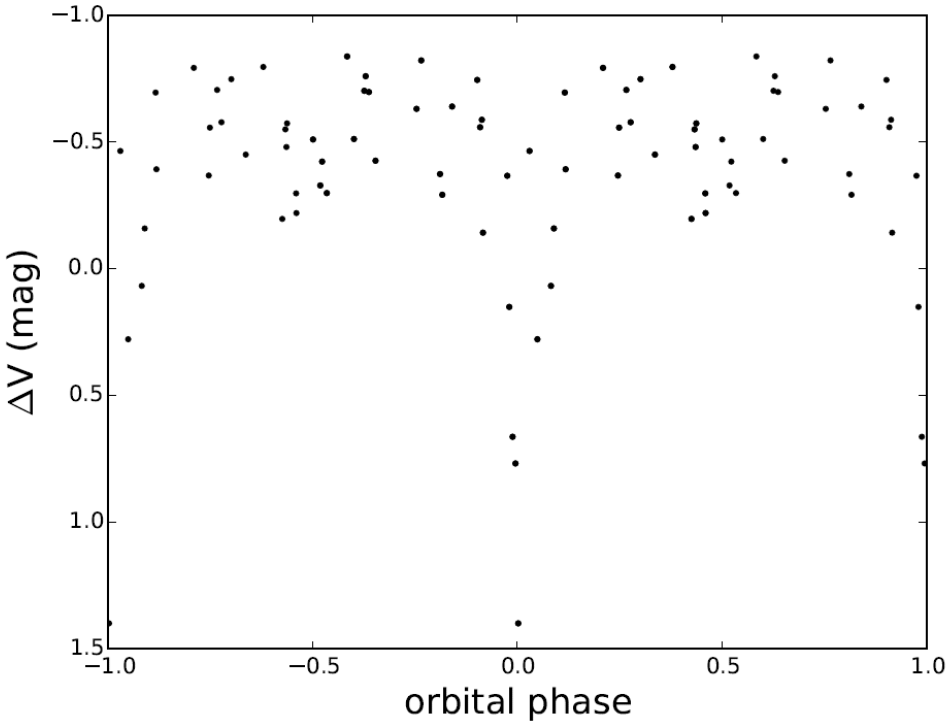
The <u>double periodic variable stars (DPV)</u> were discovered just in recent years. They are close binary stars of intermediate mass, the majority of the studied DPV are in a semi-detached stage undergoing mass transfer, and show a second photometric variability . <...>
To date, it has been observed that the more involved star is generally of the A/F/G spectral type, while the companion is always of B spectral type surrounded by an optically and geometrically thick accretion disk <...>
[Rosales, J.A. & Mennickent, R.E., 2019]

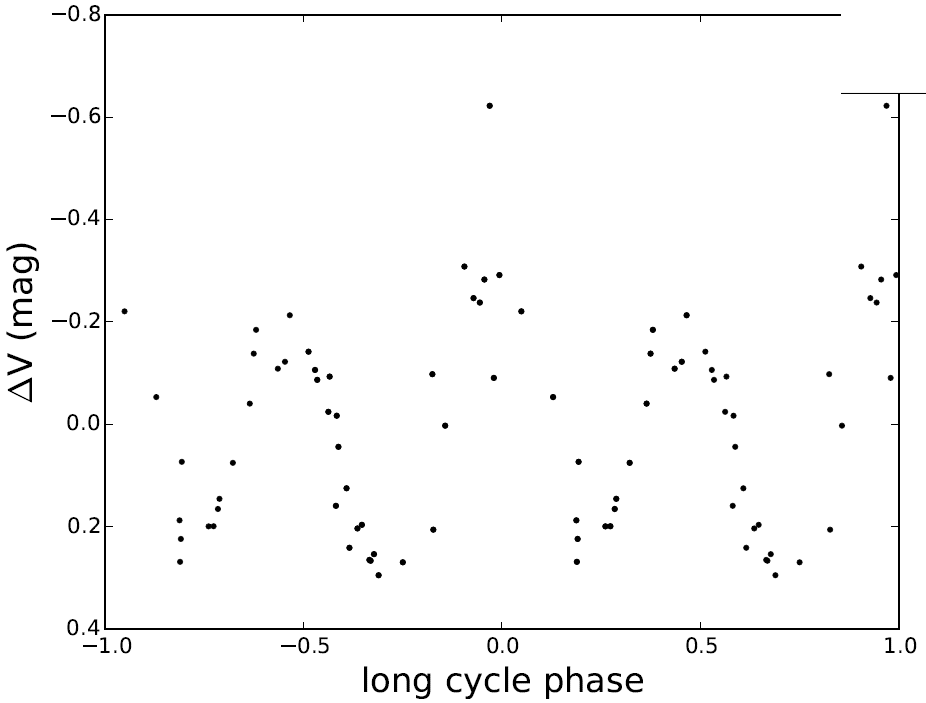
Gaia17agj

Orbital cycle
Period ~ < 4 days
Epoch = 2457777.929

Long cycle
Period ~ 105 days
Epoch = 2457626.385

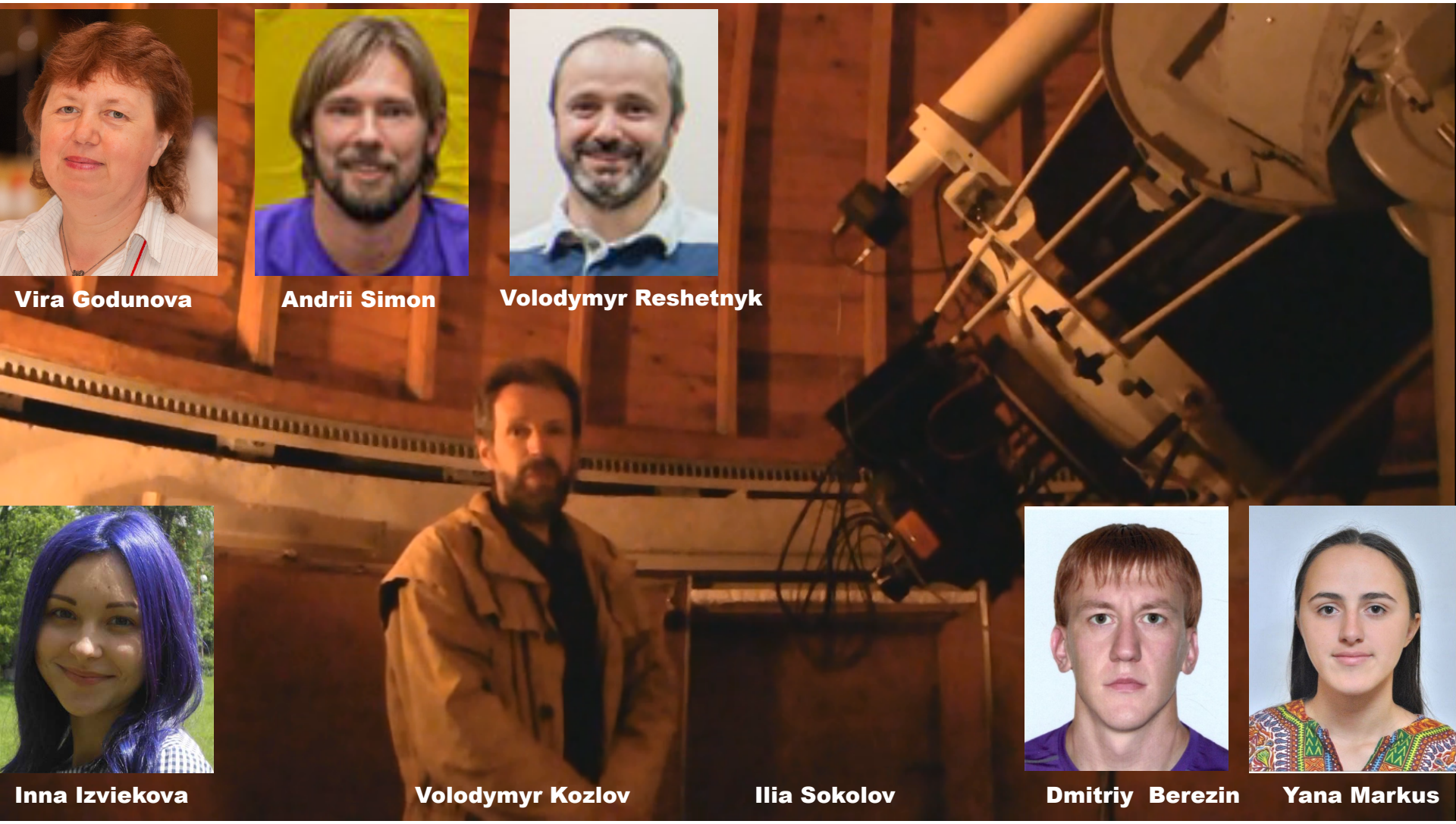
*in collaboration with
Jaime Rosales Guzman (Chile),
personal communication





The number of the studied DPV is not large ➔
each individual study is important (long-term photometric observations and spectroscopy)

Research Group



We acknowledge the use of the Cambridge Photometric Calibration Server (http://gsaweb.ast.cam.ac.uk/followup) developed and maintained by Lukasz Wyrzykowski, Sergey Koposov, Arancha Delgado, and Pawel Zielinski,

We acknowledge ESA Gaia, DPAC and the Photometric Science Alerts Team (http://gsaweb.ast.cam.ac.uk/alerts).


Thank you for attention!
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