



OPTICON AND TIME-DOMAIN ASTRONOMY

ŁUKASZ WYRZYKOWSKI *pron: woo-cash vi-zhi-kov-ski*

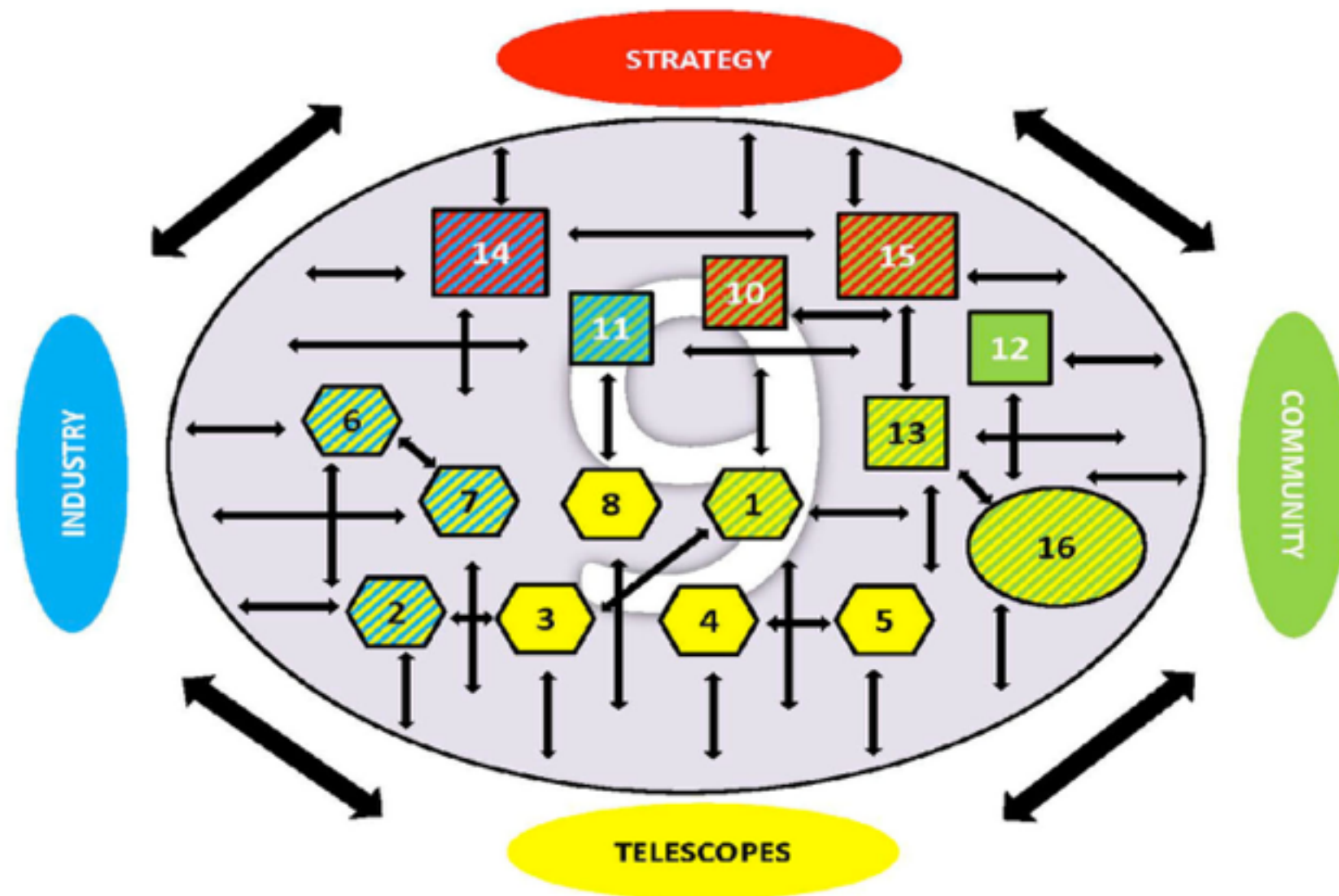
Warsaw University Astronomical Observatory, Poland

Optical Infrared Coordination Network for Astronomy

- ▶ FP5 (2002-2005)
- ▶ FP6 (2005-2008)
- ▶ FP7 (2009-2012)
- ▶ FP7 (2013-2016) - time-domain astronomy added
- ▶ H2020 (2017-2020) - time-domain astronomy expanded
- ▶ *HE (2021-2024) - further expansion of TDA*

OPTICON – STRUCTURE

Our H2020 ambition: a culture of cooperation and synergy - delivering and disseminating new ideas, ambitions and proposals



WP1 Adaptive Optics
WP2 Fast Cameras
WP3 Fast Detectors
WP4 Freeform Mirrors
WP5 Additive Manufacturing
WP6 Astrophotonics

WP7 Light sensitive Materials
WP8 Next generation instruments
WP9 Management
WP10 Adaptive Optics Network
WP11 Interferometry Network

WP12 Training Schools
WP13 Time-Domain Astronomy
WP14 Technology Foresight
WP15 Community sustainability
WP16 TNA access



OPTICON

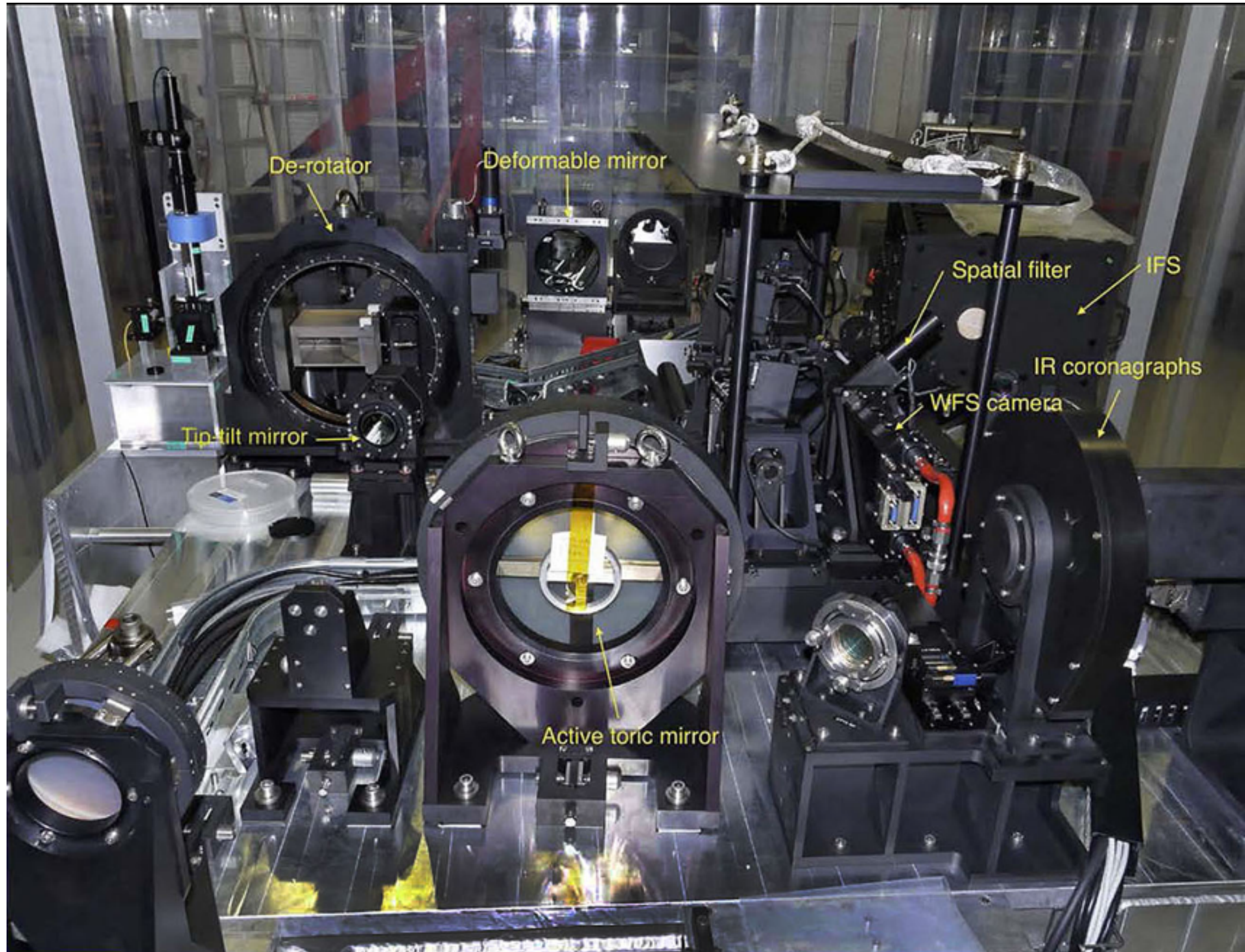
Trans-national Access Programme



OPTICON – TRAINING

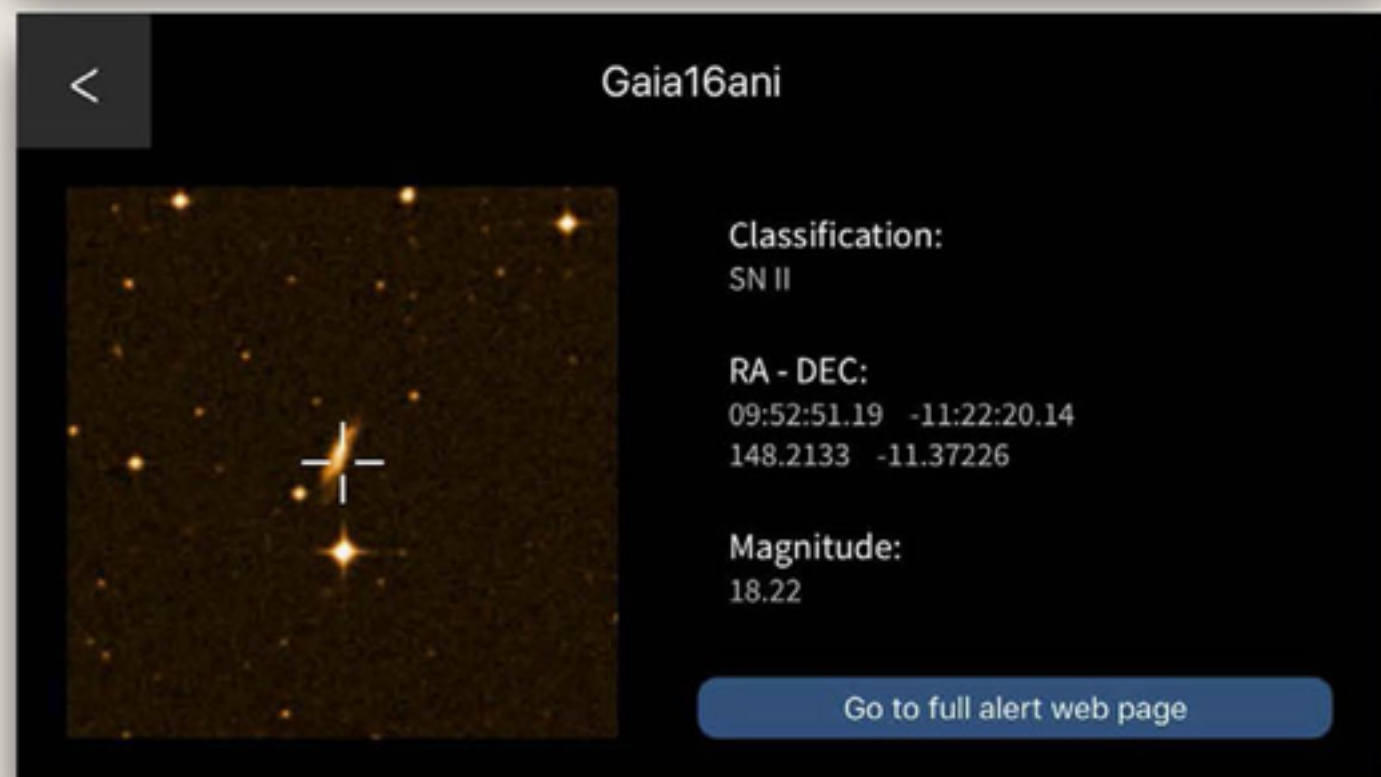
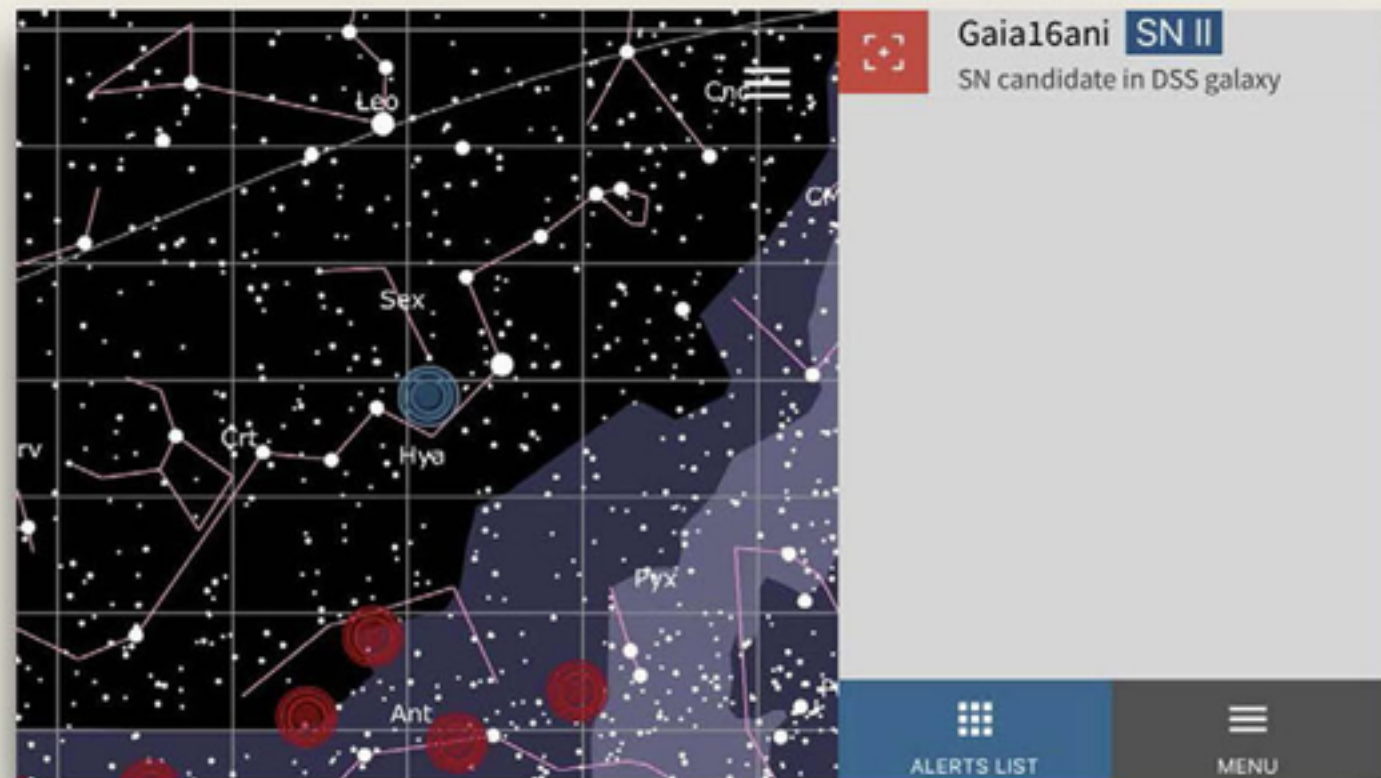


OPTICON – NEW TECHNOLOGY



OPTICON – DEVELOPMENT OF TOOLS

GaiaAlerts apps



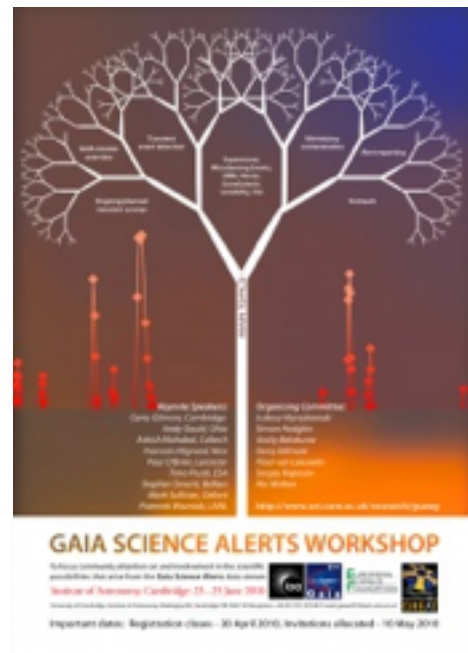
OPTICON – TIME-DOMAIN ASTRONOMY (TDA)

- ▶ networking (workshops)
- ▶ coordination of scientific goals in time-domain (e.g. observations of interesting time-domain objects)
- ▶ support in observations and data processing for the network of European telescopes (robotic and manual), including observing trips
- ▶ development and implementation of an automatic software for photometric data processing: from an image to a calibrated light curve from multiple observatories
- ▶ development of SPRAT-lite new spectrograph (Liverpool)

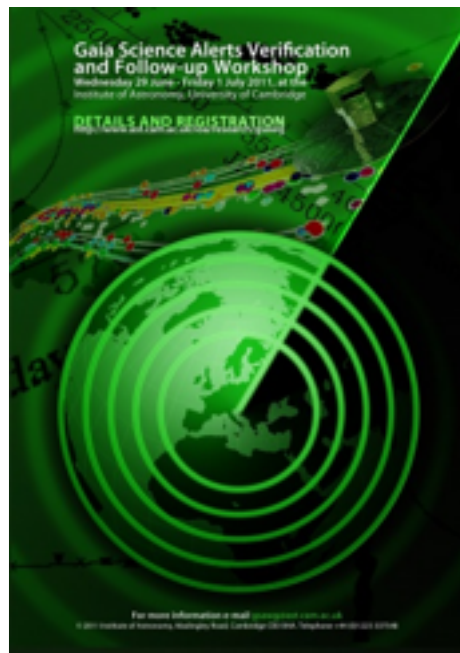
WORKSHOPS SINCE 2010



2010-
Cambridge



2011-
Cambridge



2012-Bologna



2013-Paris



2014-Warsaw



2015-Liverpool



2016-Utrecht



2017-Warsaw



2018-Vipava



ARCHIVE OF SLIDES AND VIDEOS: [HTTP://WWW.AST.CAM.AC.UK/IOA/WIKIS/GSAWGWiki](http://www.ast.cam.ac.uk/IOA/WIKIS/GSAWGWiki)

OPTICON – TIME-DOMAIN ASTRONOMY (TDA)

NETWORK OF ACTIVE TELESCOPES



OPERATIONS OF THE FOLLOW-UP NETWORK FOR THE ALERTS

Gaia Science Alerts Working Group #10 - Photometric Follow-up

- ▶ data from Gaia arrives, alert candidates published
- ▶ interesting targets identified (microlensing, TDEs)
- ▶ visibility check
- ▶ information on the mailing list (GSAWG-10)
- ▶ follow-up observations (**YOU**) going to the Calibration Server

Gaia17ddi

Details

Follow-up



Other surveys detections
None

Comments
slowly rising galactic plane transient, candidate microlensing event

ATels
None

TNS ID
AT2017ism

RA - DEC
295.10007 28.10117
19:40:24.02 28:06:04.21

Galactic coords.
63.26867 2.77035

Alerting date
2017-12-02 19:35:49

Julian date
2458090.32

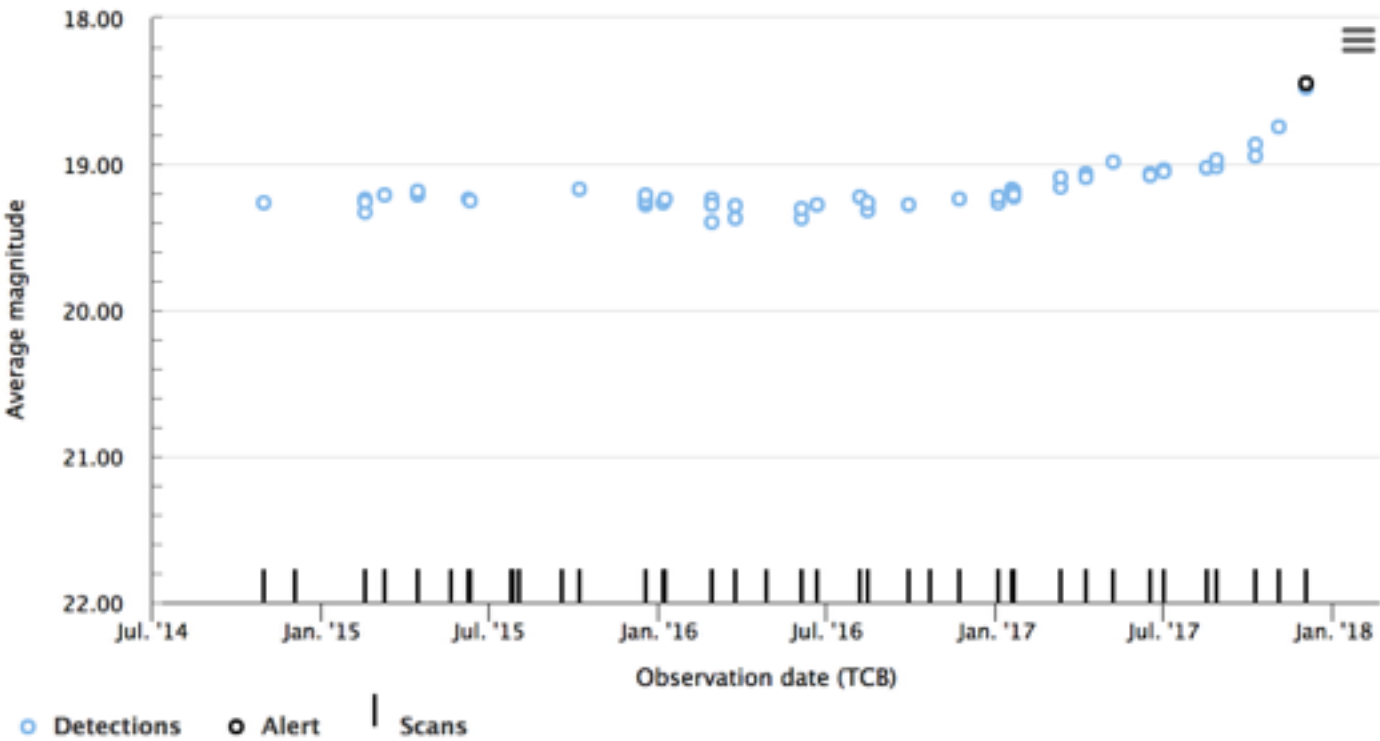
Alerting magnitude
18.45

Historic magnitude
19.18

Historic StdDev
0.13

Class
unknown

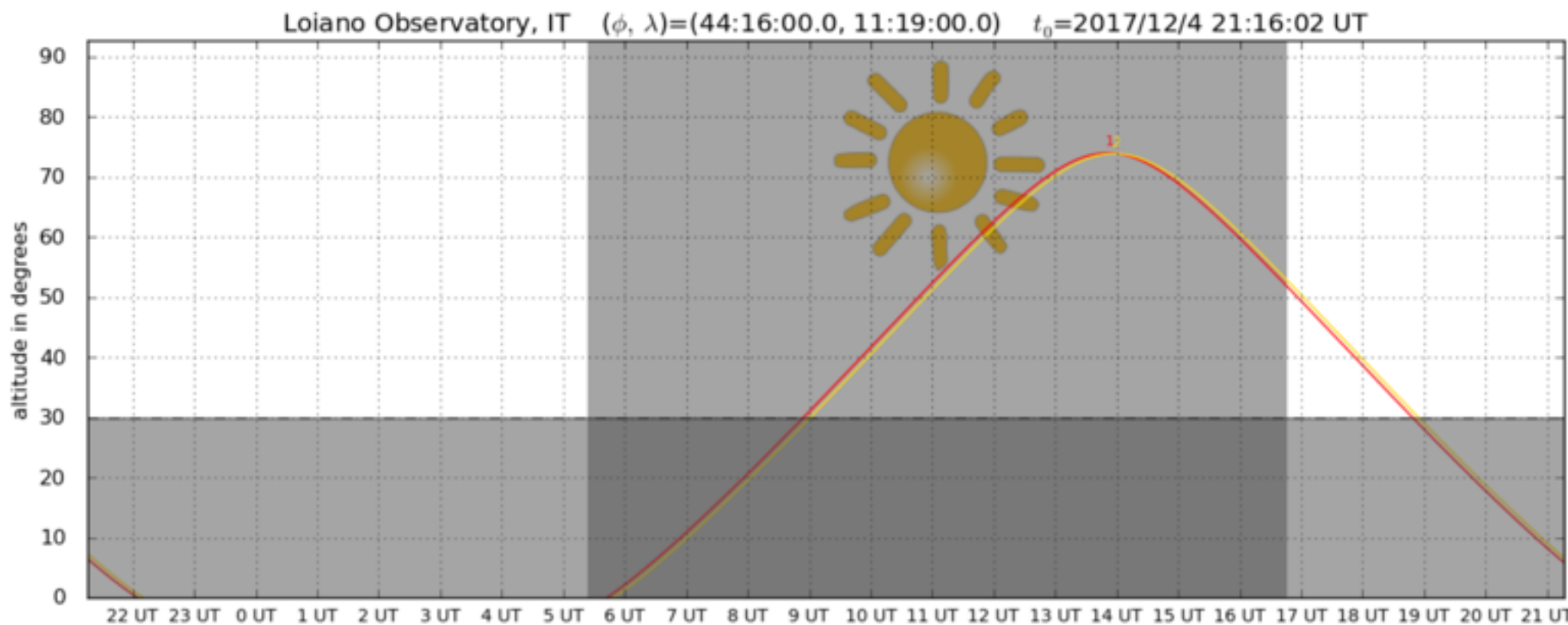
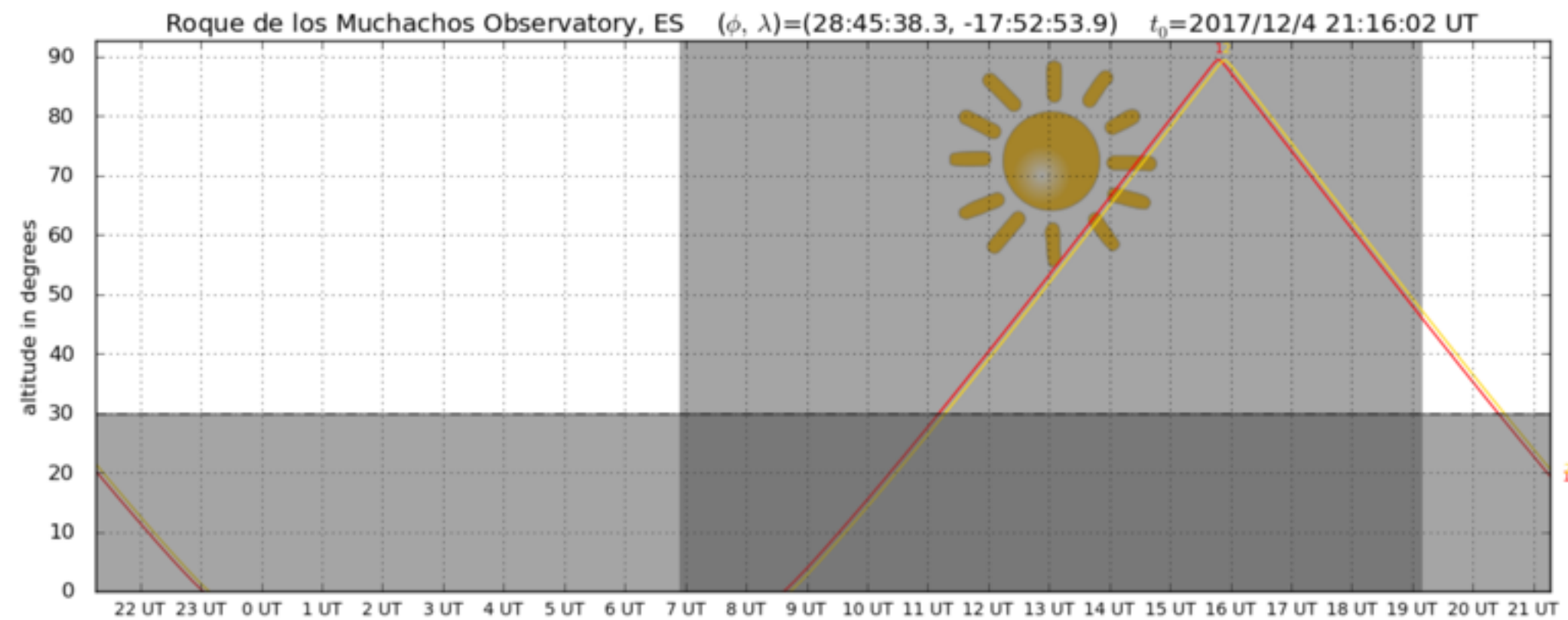
Publication date
Dec. 4, 2017, 8:06 p.m.




Get lightcurve data




1) ddp d293.58517 28.20143 2) ddi d295.10007

Modify parameters and recalculate

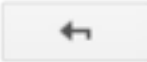







MAILING LIST







Groups

 **POST REPLY**  Actions ▾

1 of 90 (4)    

[GSAWG10 Photometric Follow-up](#) ›
Targets for September and later
2 posts by 1 author ▾

 **me** (Lukasz Wyrzykowski [change](#))

5 Sep  ▾

★ Dear Group,

The nights are getting longer, let's use them for some nice follow-up. Gaia is recently finding many new microlensing candidates, here is an updated list of currently interesting ones:

North and low South:
Gaia16aye - old friend, spare him some observations to see if completely flat, about 16 mag
Gaia18chm (Cham) - dec -15 18 mag
Gaia18chq (Cheque) - dec -12, 18 mag
Gaia18cib - dec-16, 18.5 mag
Gaia18cik - dec -3, 18.5mag - this one looks interesting, please try!
Gaia18cjk (Chinese,Japanese, Korean) - dec -3, 17 mag - high priority!!
Gaia18clv (Clavier) - dec +10, 18 mag - new and interesting!
Gaia18axl (Axletree) North 14 mag, bright and almost gone
Gaia18arn (Arnica) dec +50 17 mag - important!
Gaia18ajz (Ajzensztadt) Dec -8, 17 mag, very nice one
Gaia18aip (Aipysurus) dec +5, 19 mag, is possible

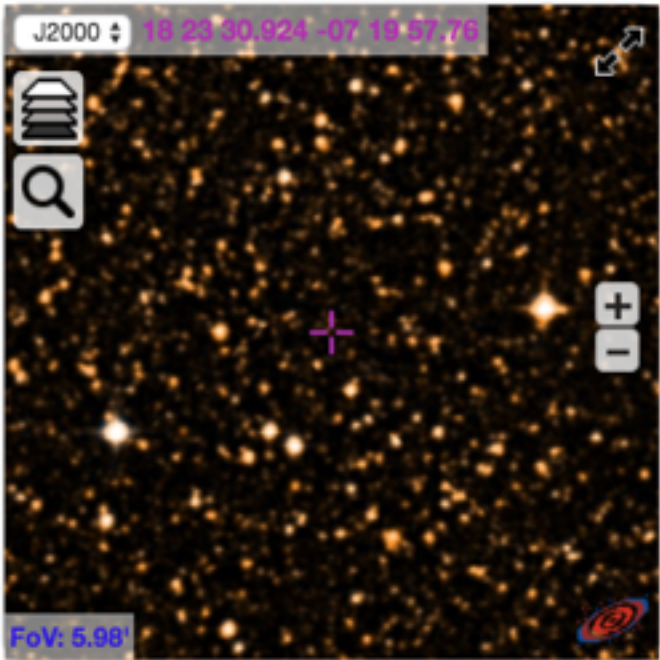
Very South:
Gaia18aje (Ajena) 17 mag
Gaia18bmt - 15 mag - our favourite currently!
Gaia18cbf (Continental BreakFast) - 19 mag - very long, promising black hole, but faint.
Gaia18clg (Colgate) 18.5 mag nice but faint

Please observe whatever you can, ideally two sets of gri or VRI per night or two. I wanted to remind you that your data will be more useful if you observe only one target every night but over a long period of time (months) instead of all these targets but only once. The long consistent light curves are most useful.

Gaia18cnm

Details

Follow-up



Other surveys detections
None

Comments
red Galactic plane star brightens by 0.6 mag.
Candidate microlens.

ATels
None

TNS ID
AT2018gcs

RA - DEC
275.87885 -7.33271
18:23:30.92 -07:19:57.76

Galactic coords.
23.21634 2.81329

Alerting date
2018-09-05 21:30:11

Julian date
2458367.40

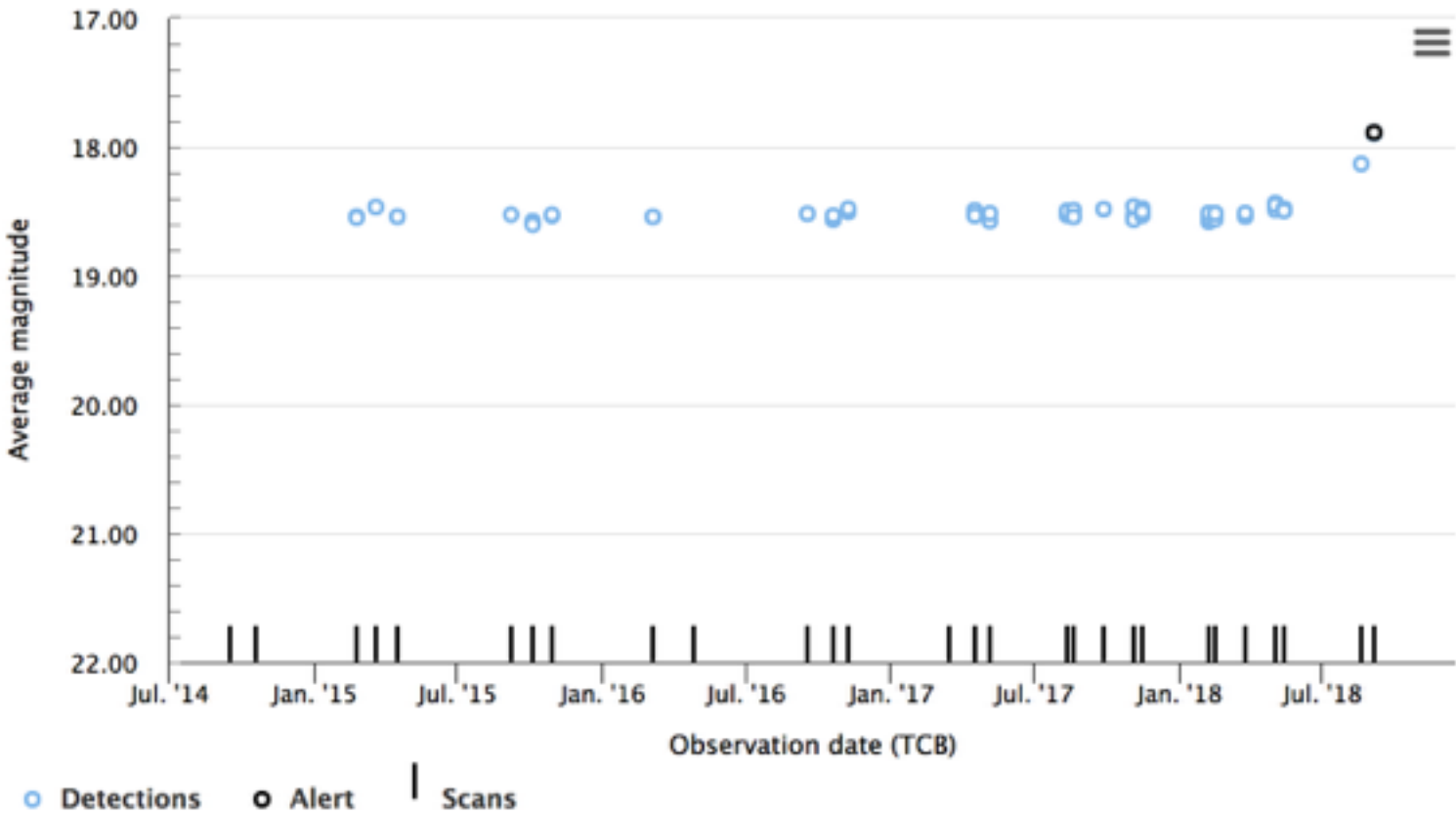
Alerting magnitude
17.89

Historic magnitude
18.51

Historic StdDev
0.07

Class
unknown

Publication date
Sept. 10, 2018, 9 a.m.



Get lightcurve data

gsaweb.ast.cam.ac.uk/followup/

Welcome to the Cambridge Photometry Calibration Server (CPCS)

Logged as admin

[Login](#) into the system
[List](#) of alerts ([observed only](#))
[List](#) of followup data
[List](#) of observatories
[Upload](#) new followup data
[Enter](#) new event
[Delete](#) a followup point from the system

Admin stuff

[Add](#) a new user into the system
[Update](#) the coordinates of an alert

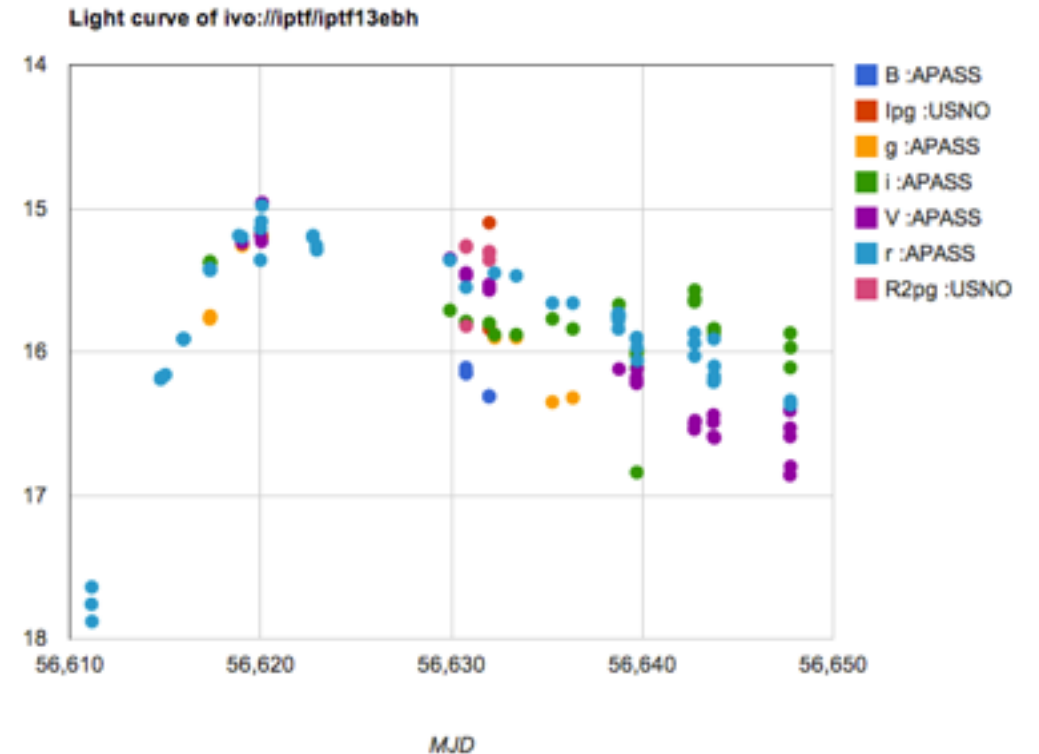
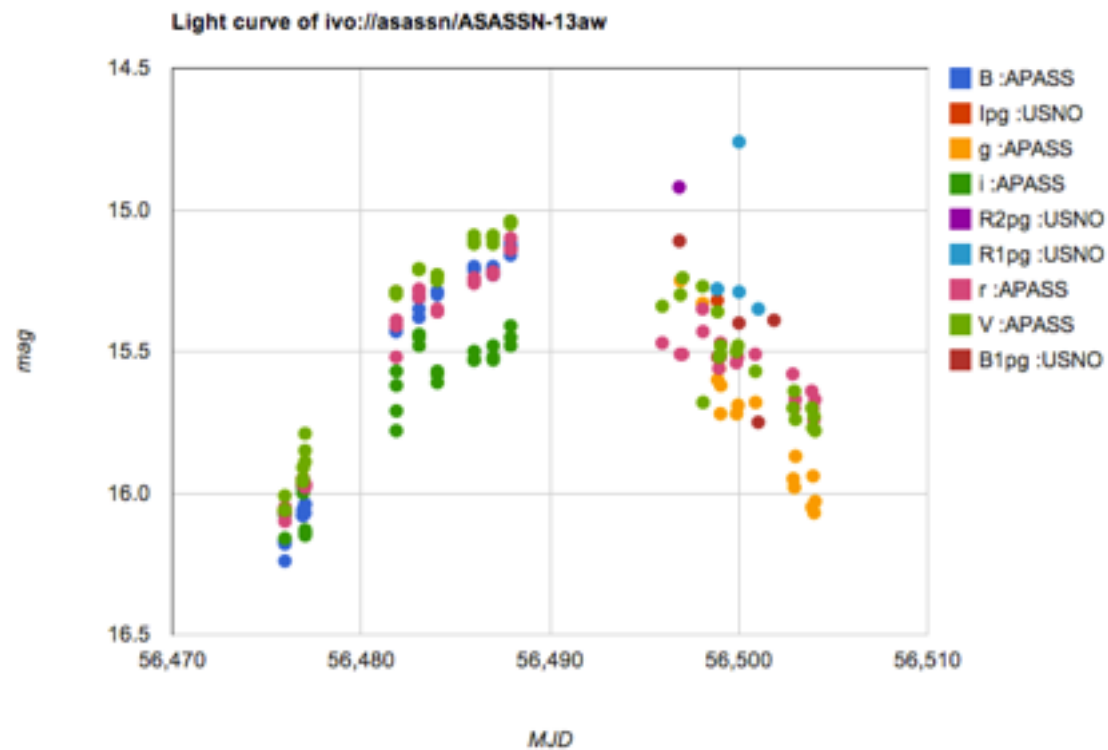
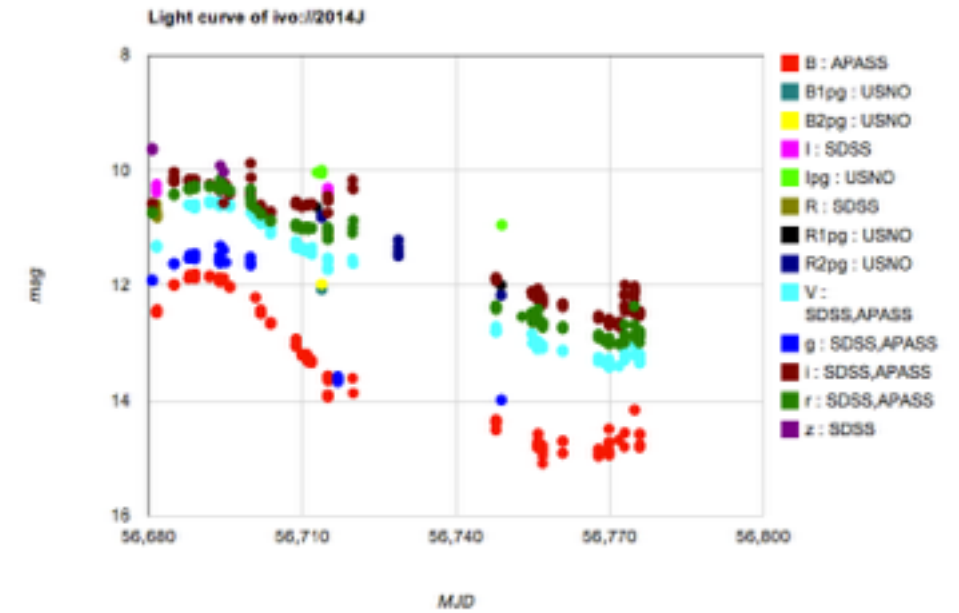
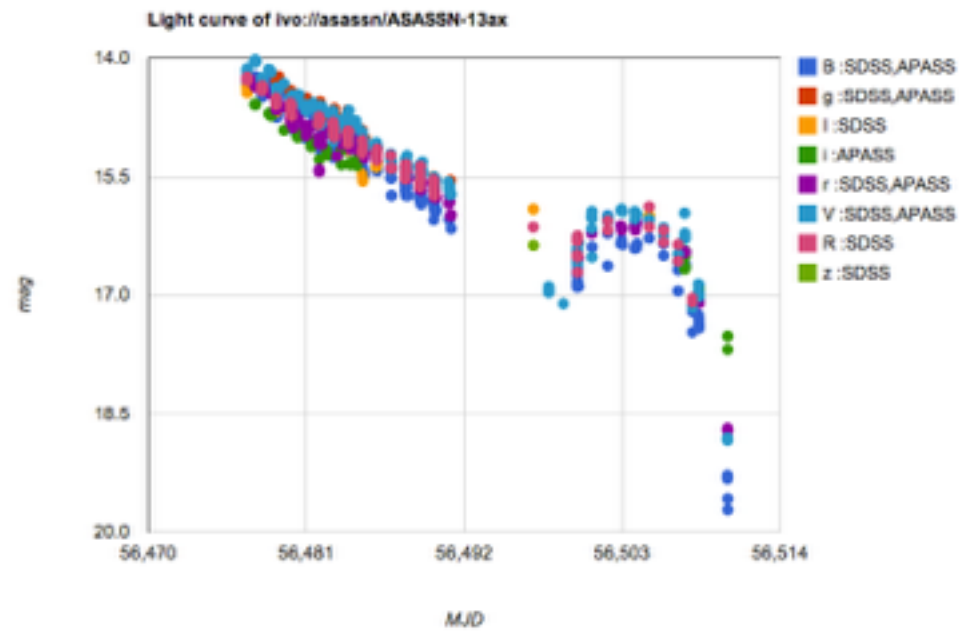
Last data upload was done on Thu Aug 14 15:47:16 2014 for ivo://asassn/ASASSN-14bb

[Logout](#)

[Manual](#)

CALIBRATION SERVER

gsaweb.ast.cam.ac.uk/followup/

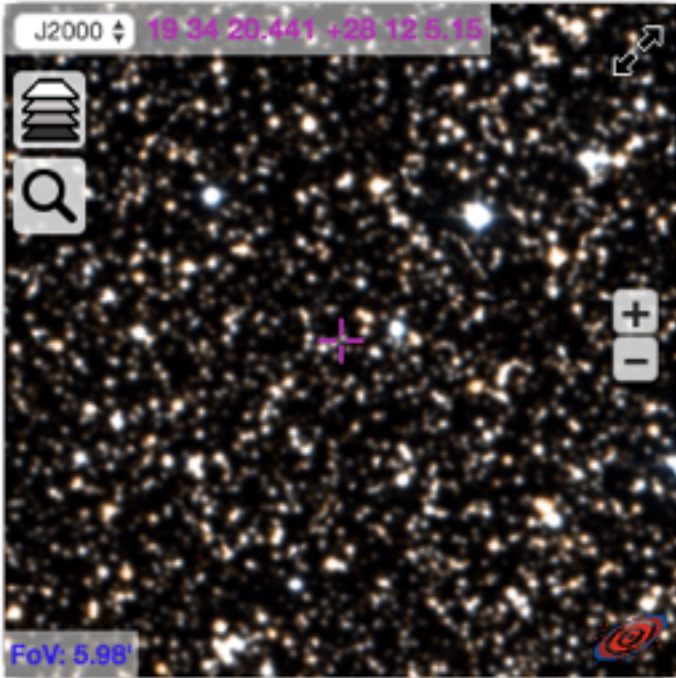


CALIBRATION SERVER

<< previous next >>

Gaia17ddp

DetailsFollow-up



Other surveys detections
None

Comments
Gaia source near Galactic plane rises by more than 1 mag and gets redder

ATels
None

TNS ID
AT2017isp

RA - DEC
293.58517 28.20143
19:34:20.44 28:12:05.15

Galactic coords.
62.70548 3.98609

Alerting date
2017-12-02 19:37:02

Julian date
2458090.32

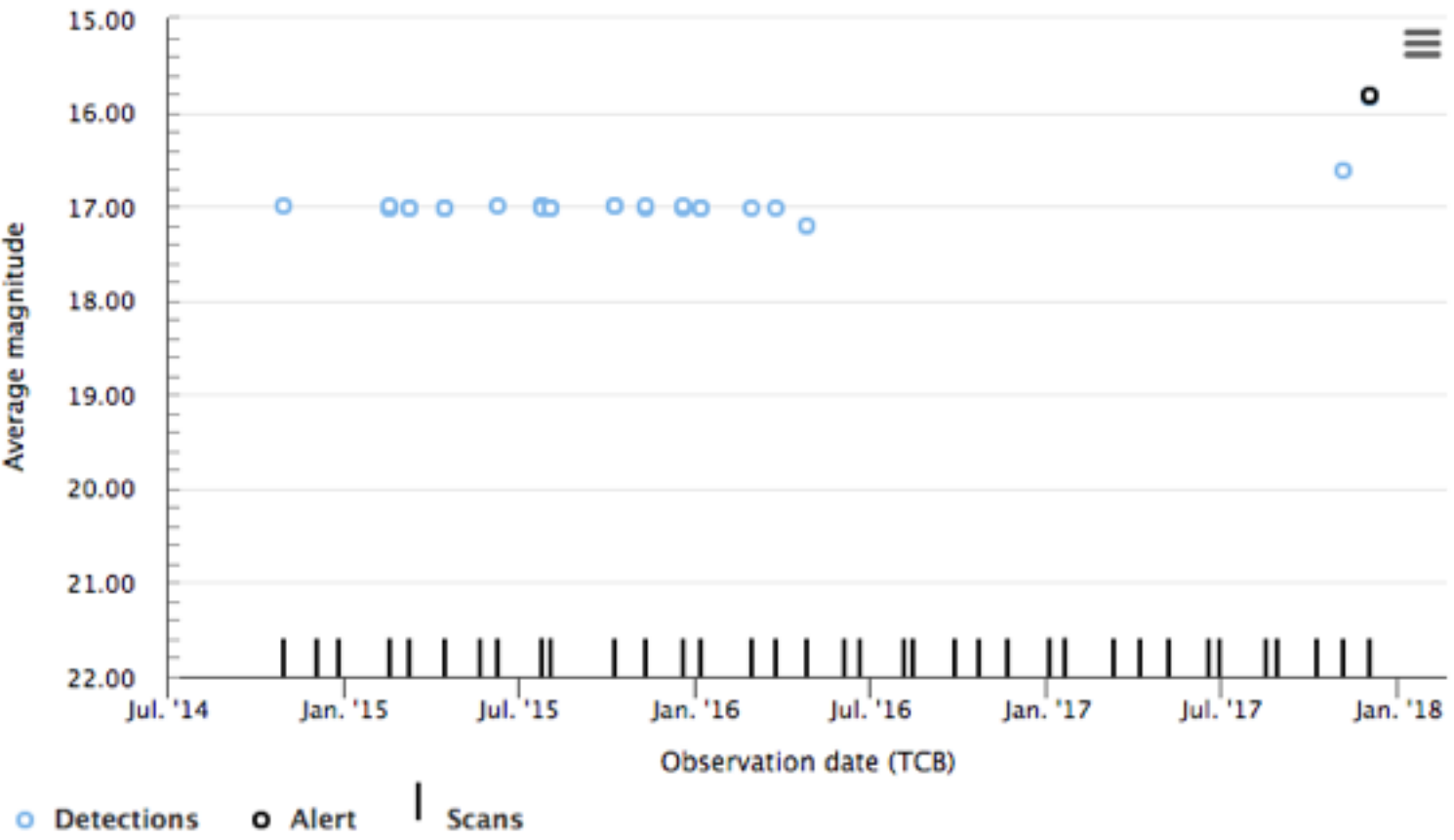
Alerting magnitude
15.83

Historic magnitude
17.00

Historic StdDev
0.09

Class
unknown

Publication date
Dec. 4, 2017, 8:46 p.m.



Get lightcurve data

CALIBRATION SERVER

[<< previous](#) [next >>](#)

Gaia17ddp

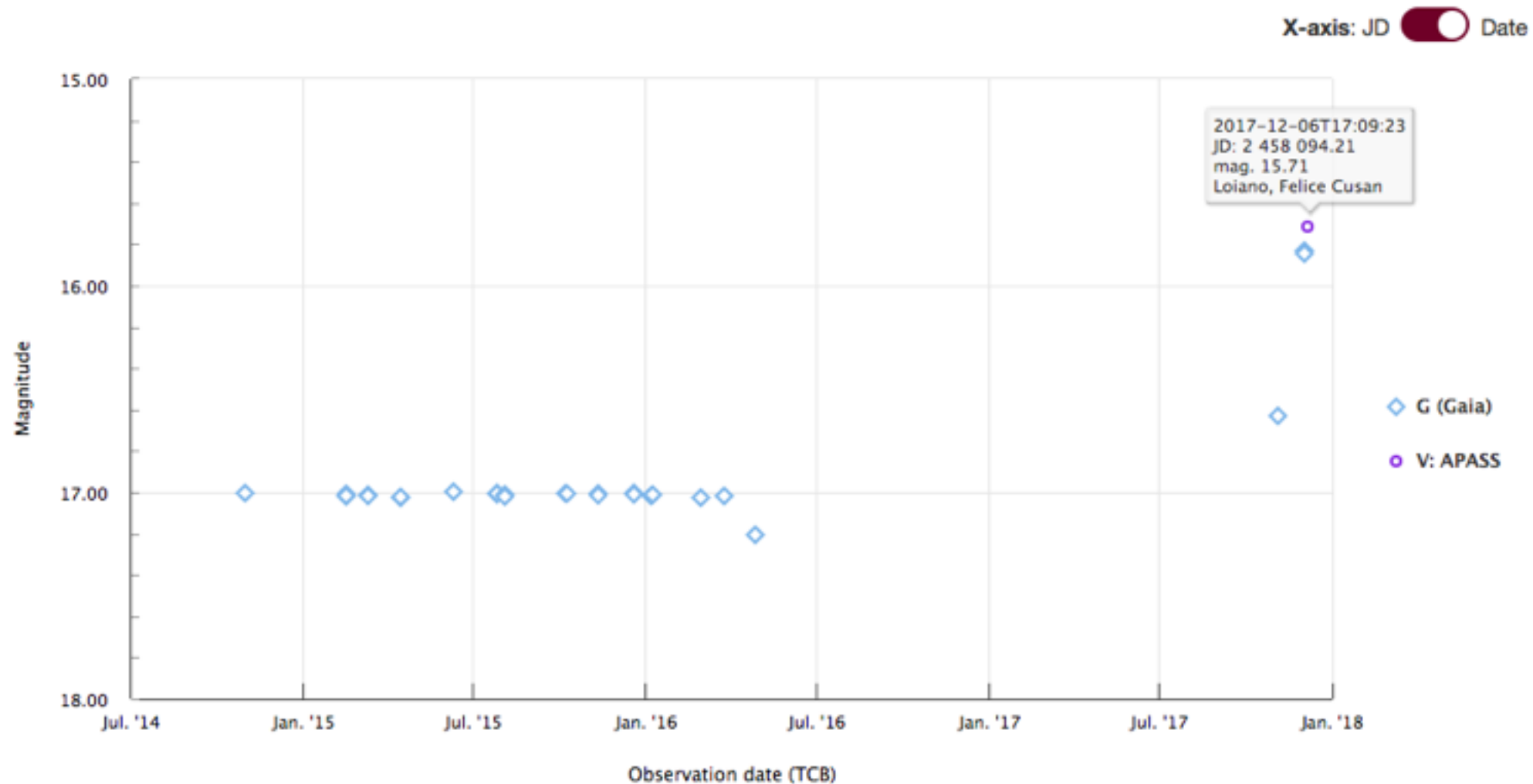
Details

Follow-up

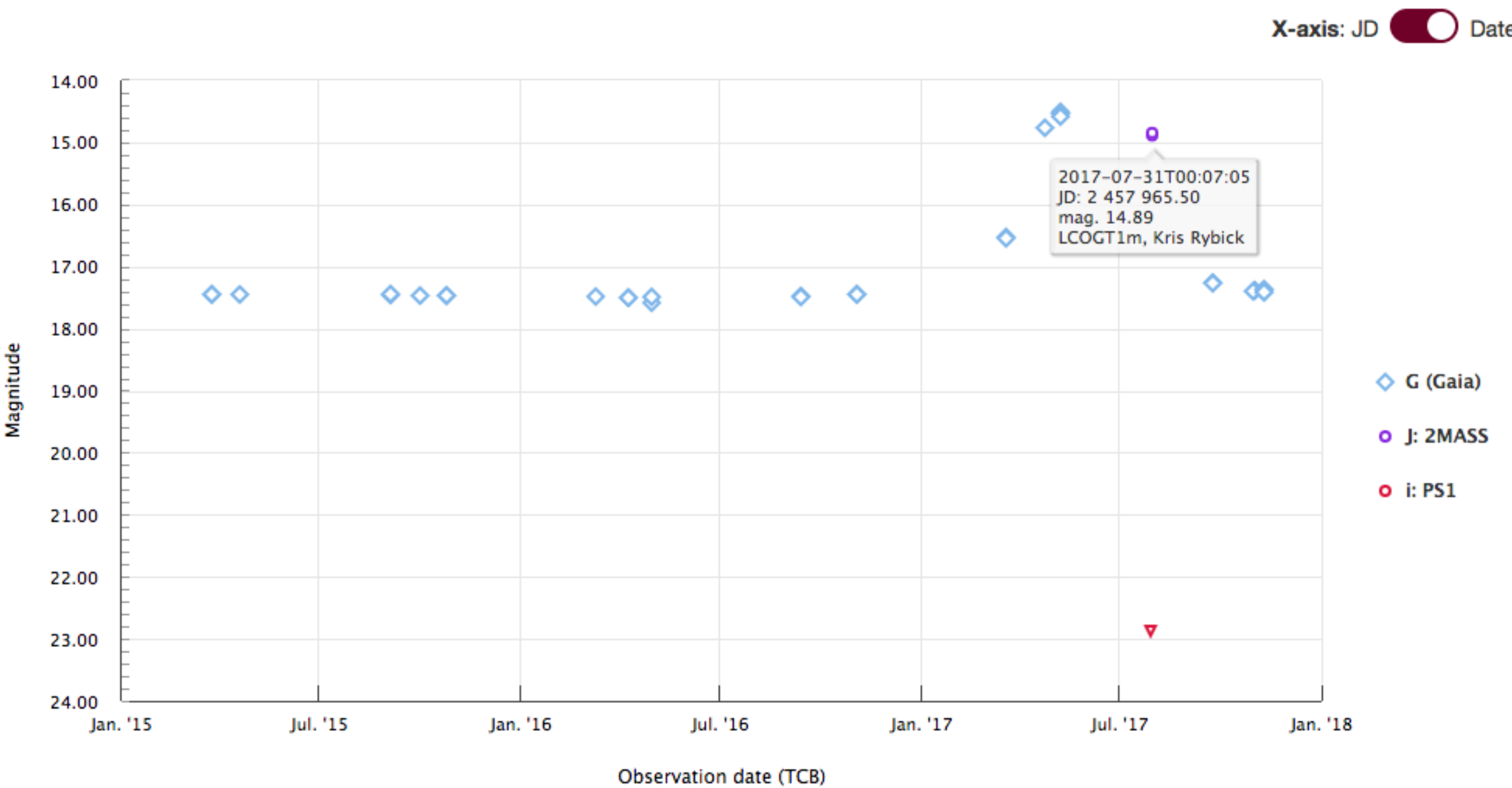
The figure shows the Gaia lightcurve combined with photometric follow-up photometry generously provided by the astronomical community using the [Cambridge Photometry Calibration Server \(CPCS\)](#). Multiple filters are shown in one figure and can be toggled on/off using the legend on the side. Click and drag in the chart to zoom in. Clicking on datapoints provides additional information of the observation.

Access to these photometric data may be requested from the individuals who took the data. Please contact us if you would like to ask for access and we will pass on your request.

Warning: The follow-up data is obtained using rough calibrations and we can not guarantee its complete correctness at this stage.

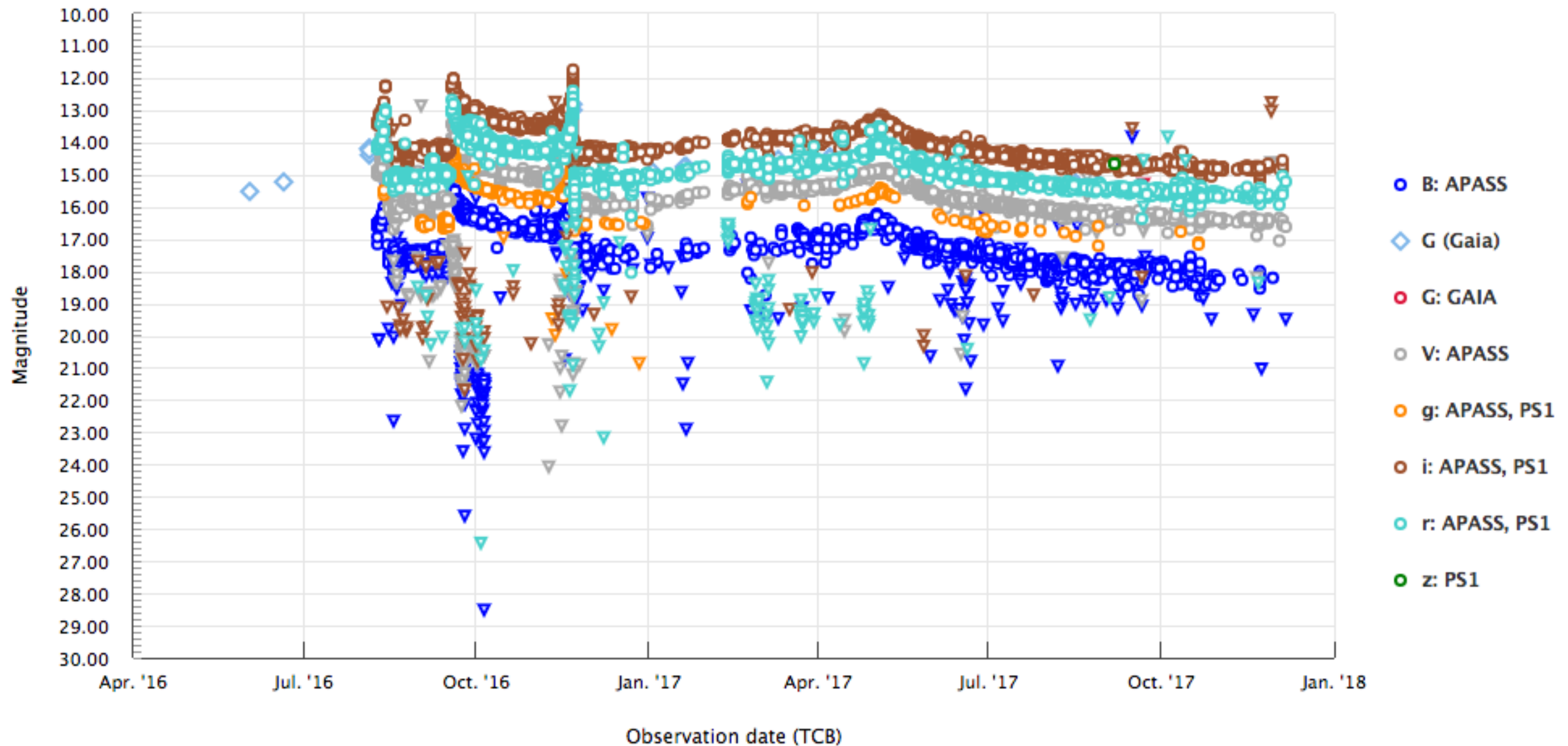


Gaia17bej - not enough data points!



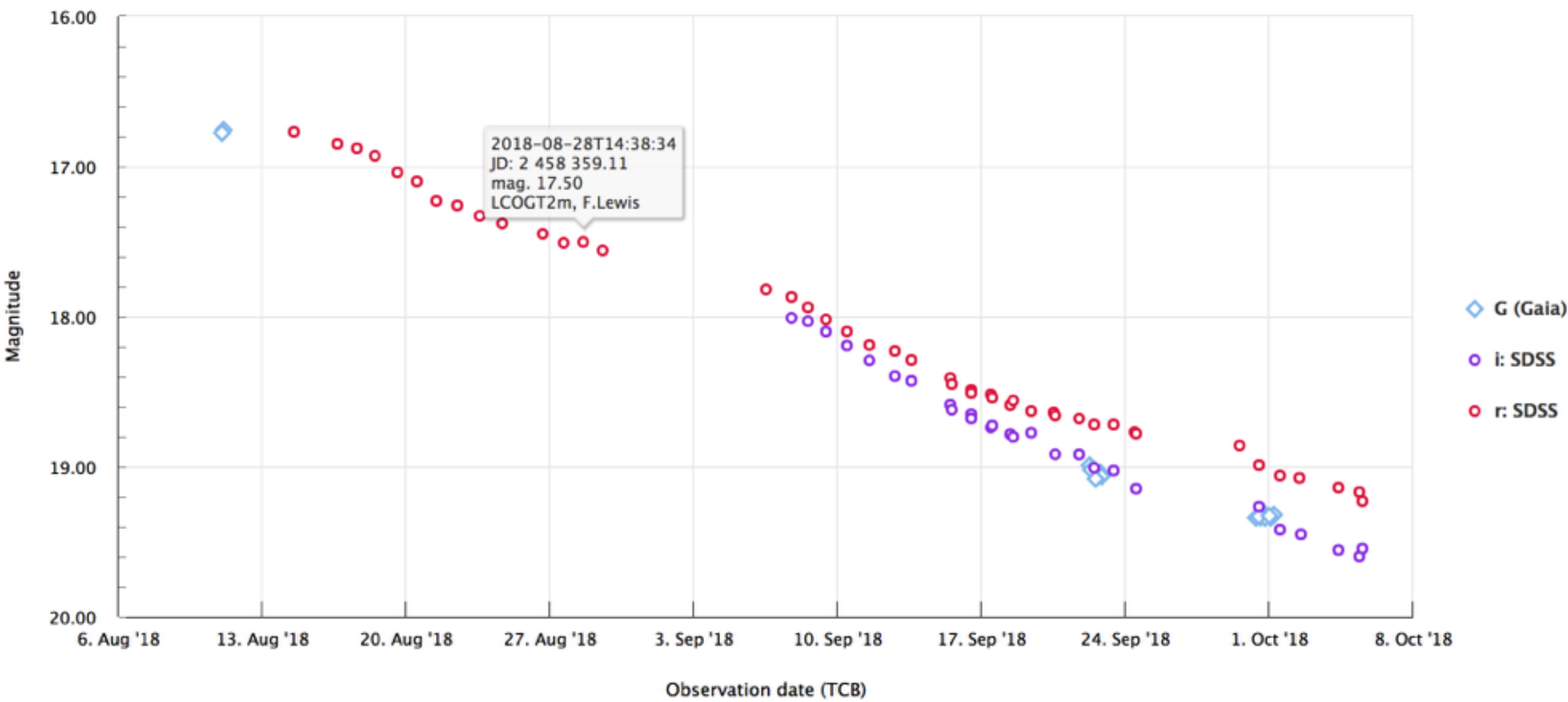
>20,000 data points over 2 years!

COLLECTION OF SUCH DATA NOT POSSIBLE WITH ANY PROPOSALS NOR PROJECTS!



AIMING TO PUBLISH BY THE END OF 2018

GAIA18CCW – OBSERVATIONS BY SCHOOLS (2M TELESCOPE)



YOUR INVOLVEMENT

- ▶ wait for requests for time-domain observations
- ▶ or/and check Gaia Marshall (Simon's talk)
for currently on-going alerts (requests for photometry)
- ▶ observe when possible
- ▶ standard data reductions (bias, flat)
- ▶ NOW: do your own photometry and submit to the CPCS 1.0
- ▶ SOON: submit the images to CPCS 2.0 (Pawel's talk)
- ▶ many more observations needed!

DATA POLICY – PROPOSAL FOR DISCUSSION

- ▶ data stored on the Calibration Server are available for everyone who has a hashtag (i.e. also contributes)
- ▶ Minimum when using Calib.Server data - acknowledgment:

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, Pawel Zielinski, Kris A. Rybicki funded by the European Union's Horizon 2020 research and innovation programme under grant agreement No 730890 (OPTICON).

- ▶ You might also want to add the acknowledgment for the individual observatories, e.g.:

We thank the observers from pt5m and Omicron2CPU telescopes for making their data publicly available.

- ▶ If data is crucial for the publication, please contact the observers and include them as co-authors.

DATA POLICY – EXAMPLE PAPERS

- ▶ Gaia14aae: Campbell et al. 2015
- all observers included
- ▶ Gaia16aye: Wyrzykowski+100 authors in prep.
- all who contributed to the observations will co-author
- ▶ Gaia16apd, Kangas et al. 2017, observers included
- ▶ YSO Gaia17afn=V555 Ori : data shared, no co-authorship,
- ▶ ATELS (Mikolajczyk, Palaversa) - report on photometric data collection, also with use of CPCS
- ▶ TNS reports (limited to supernovae)

ADS

ADS

JOB ADVERT

- ▶ “Polish-Lithuanian hunt for black holes”
- ▶ Teams in Poland (Warsaw) and Lithuania (Vilnius)
- ▶ Gaia alerts: microlensing black holes follow-up
- ▶ tasks:
proposals, observations, photometry, publications
- ▶ benefits:
get involved in the Warsaw Gaia Alerts group
get familiar with the space mission Gaia
coordinate large number of observatories
- ▶ start: January 2019, for 3 years