Issue 9 – July 31, 2020

ExoClock Newsletter

Dear ExoClock participants,

We hope you are all well. July has been quite active after the June break where days were longer. ExoClock received around 100 observations during this month, many thanks for staying active!

We are very happy to announce that the first ExoClock publication has been submitted! Congratulations to everyone that is part of this publication, it is a great pleasure to work on this project together! For all participants that are not part of this paper, no worries, this is just the beginning. We will have more publications in the future, so stay with us.

We would like to arrange a meeting and discuss some main points resulting from this publication but we want to make sure that most of you will be able to attend. Since for many people it is holiday time now, we think that it is better to organise the next meeting at early September. You can start sending us any topics/ questions for discussion from now on to organise the meeting properly.

As a reminder, during this publication:

- More the 600 observations are included,
- 119 planets were observed from the current list
- The ephemerides of 28 planets were updated
- The ephemerides of additional 59 planets were verified.
- The remaining number of planets, had only one observation, and more are needed in order to either verify or update their ephemerides. These will be included in the second round.

The paper will be available for distribution to the community after the first review. We will keep you updated!

Website updates

We have discussed about de-trending in a few of our meeting so far. De-trending is necessary as the transit light curves usually include flux variations that are not part of the transit. These can be caused by a number of different factors from which the most common are:

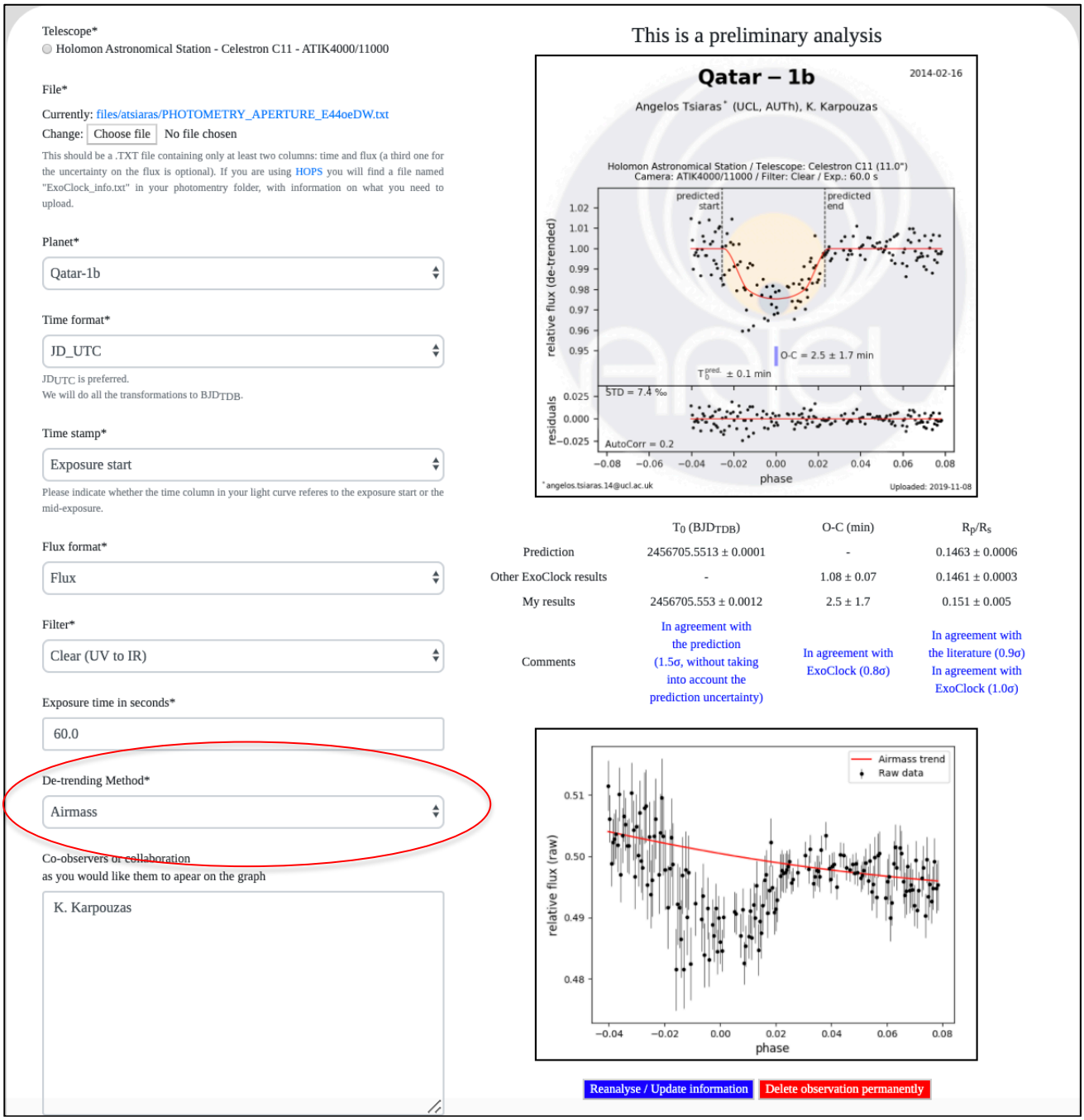
- drifting of the star on the CCD combined with poor flat field correction
- poor guiding causing star trails (or any large variations of the PSF)
- poor choice of comparison star
- weather
- light pollution

The methodology we use to correct for the trends is to fit the transit model on the data simultaneously with a model for the trends. The main update currently on the website is the option for the observers to choose the de-trending model when analysing an observation.

You are now able to choose between the following models:

1. Airmass (a 1st order polynomial of airmass)
2. Quadratic (a 2nd order polynomial of time)
3. Linear (a 1st order polynomial of time)

After you upload your observation and have the first result, you can change the model from the "De-trending method" drop-down menu (in red, below).



You can then click the “Reanalyse/Update information button” and see the new analysis, with the new de-trending model indicated in the second graph (in red, below).

Telescope*
Holomon Astronomical Station - Celestron C11 - ATIK4000/11000

File*

Currently: files/atsiaras/PHOTOMETRY_APERTURE_E44oeDW.txt
Change: Choose file No file chosen

This should be a .TXT file containing only at least two columns: time and flux (a third one for the uncertainty on the flux is optional). If you are using HOPS you will find a file named "ExoClock_info.txt" in your photomentry folder, with information on what you need to upload.

Planet*
Qatar-1b

Time format*
JD_UTC

JD_{UTC} is preferred.
We will do all the transformations to BJD_{TDB}.

Time stamp*
Exposure start

Please indicate whether the time column in your light curve referes to the exposure start or the mid-exposure.

Flux format*
Flux

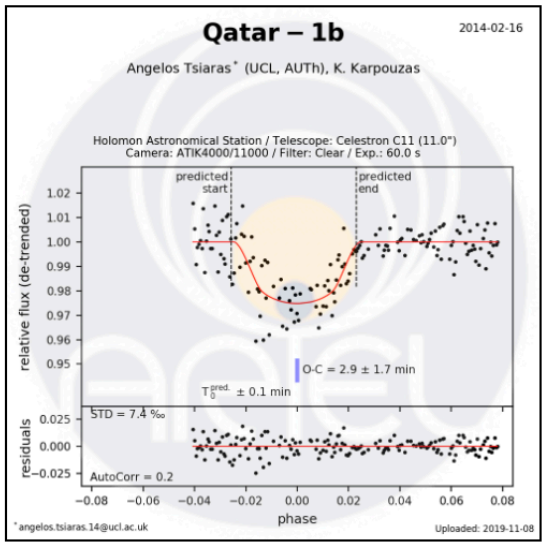
Filter*
Clear (UV to IR)

Exposure time in seconds*
60.0

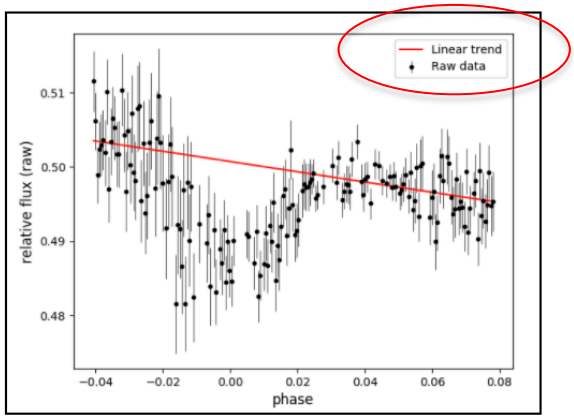
De-trending Method*
Airmass

Co-observers or collaboration
as you would like them to apear on the graph
K. Karpouzas

This is a preliminary analysis



	T_0 (BJD_{TDB})	O-C (min)	R_p/R_s
Prediction	2456705.5513 ± 0.0001	-	0.1463 ± 0.0006
Other ExoClock results	-	1.08 ± 0.07	0.1461 ± 0.0003
My results	2456705.5533 ± 0.0012	2.9 ± 1.7	0.153 ± 0.005
Comments	In agreement with the prediction (1.7σ, without taking into account the prediction uncertainty)	In agreement with ExoClock (1.1σ)	In agreement with the literature (1.3σ) In agreement with ExoClock (1.4σ)



Reanalyse / Update information | Delete observation permanently

Similarly to the choice of the comparison stars, check the diagnostics to find the best model. This is something we also check after you submit your observation, so don’t hesitate to experiment!

Highlighted observations

For July, the highlighted case was WASP-119b, which was marked as high priority target and had no observations. The first observation conducted by Phil Evans on the 9th of July and a shift of 22 minutes was identified. Immediately, the target was marked as an alert and Yves Jongen observed the planet on the 14th and the 29th of July. All observations confirm a shift of 22 minutes and the ephemeris will be updated. Congratulations Phil and Yves!

On the O-C graph below you can see how the O-C shift is larger than the current uncertainty and it leads to a 50-minutes drift in 2028, much larger than the target of 15 minutes. With an ephemeris update this will not happen!

ALERTS

Thanks to everyone who observed some of the **ALERT targets** during last month. The alert system is working perfectly and provides great results, helping us confirm unexpected shifts. *KELT-18b* was the main alert for last month and a shift of 32 minutes was identified by Carmelo Falco. Thanks to two following up observations both by him and Alessandro Nastasi, the shift has been confirmed and the target is not an alert anymore!

The most important targets with observable transits during the following months are **WASP-44b** and **HAT-P-6b**. Apart from these, the following targets (including old and new ones) are also in the current **alert system**. Please check your personalised alert schedule at:

https://www.exoclock.space/schedule/alerts

and if you get a clear sky and a long night, observe them!

- K2-30b
- WASP-56b
- KELT-15b
- WASP-31b
- WASP-83b
- WASP-26b
- WASP-13b

Slack channel

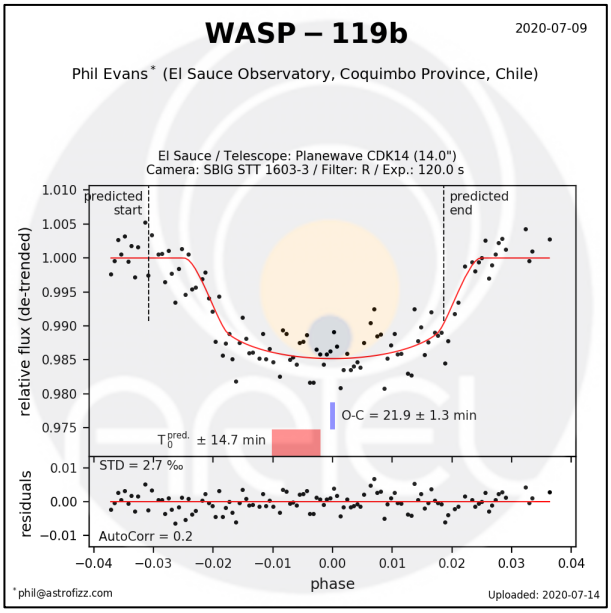
If you haven't joined our Slack Channel yet and you would like to participate, email us and we will invite you.

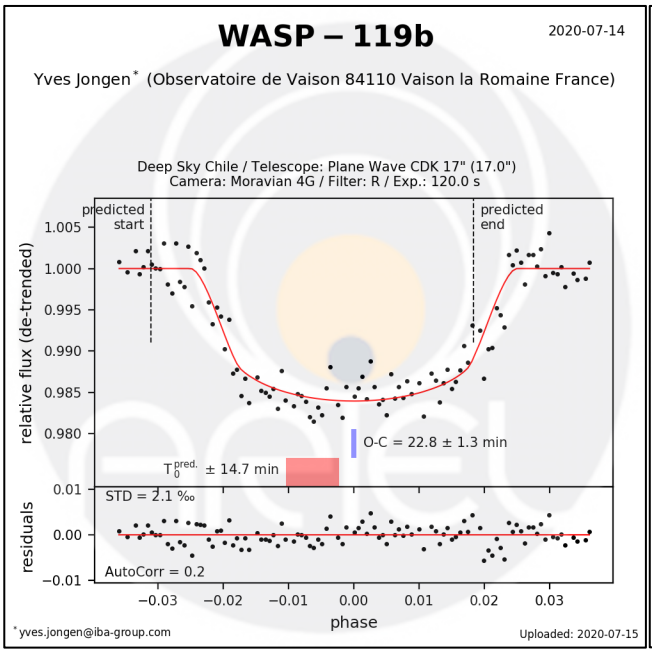
We remind you also to send us at exoclockproject@gmail.com (or through the Slack Channel from now on!):

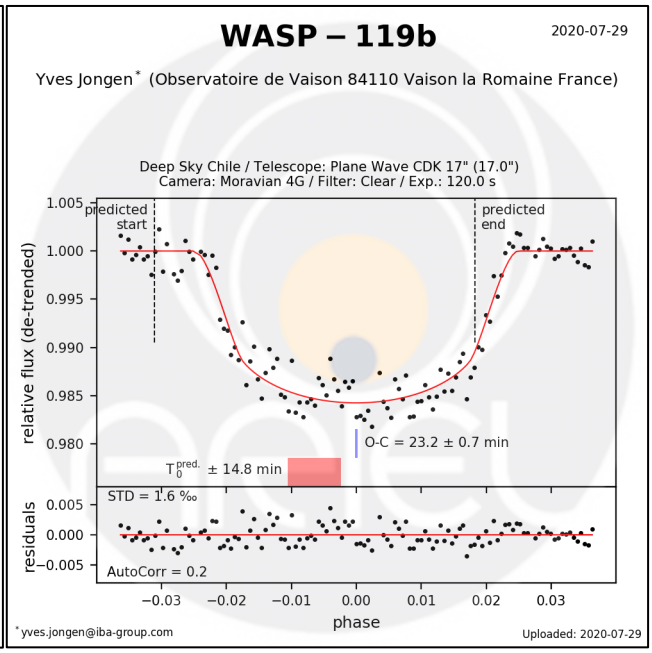
- Your feedback on the website
- Suggestions for new features
- Questions on the observations or the analysis
- Ideas for topics you would like to see in the newsletters

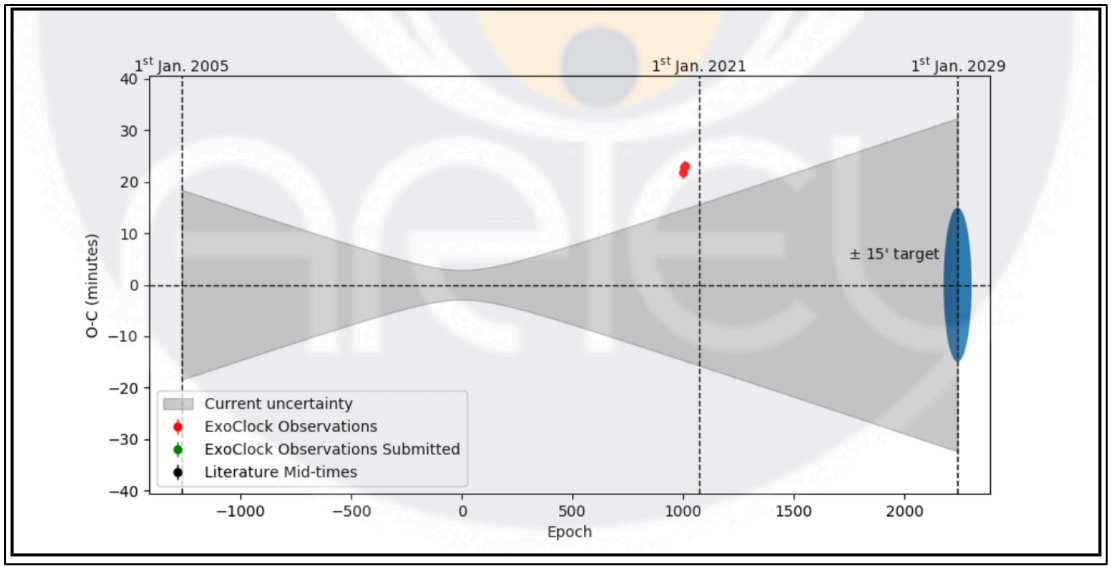
Stay well and healthy!

Clear Skies,
the ExoClock team


WASP – 119b
2020-07-09
Phil Evans* (El Sauce Observatory, Coquimbo Province, Chile)
El Sauce / Telescope: Planewave CDK14 (14.0")
Camera: SBIG STT 1603-3 / Filter: R / Exp.: 120.0 s
predicted start
predicted end
relative flux (de-trended)
O-C = 21.9 ± 1.3 min
T0pred. ± 14.7 min
STD = 2.7 ‰
residuals
AutoCorr = 0.2
phase
*phil@astrofizz.com
Uploaded: 2020-07-14


WASP – 119b
2020-07-14
Yves Jongen* (Observatoire de Vaison 84110 Vaison la Romaine France)
Deep Sky Chile / Telescope: Plane Wave CDK 17" (17.0")
Camera: Moravian 4G / Filter: R / Exp.: 120.0 s
predicted start
predicted end
relative flux (de-trended)
O-C = 22.8 ± 1.3 min
T0pred. ± 14.7 min
STD = 2.1 ‰
residuals
AutoCorr = 0.2
phase
*yves.jongen@iba-group.com
Uploaded: 2020-07-15


WASP – 119b
2020-07-29
Yves Jongen* (Observatoire de Vaison 84110 Vaison la Romaine France)
Deep Sky Chile / Telescope: Plane Wave CDK 17" (17.0")
Camera: Moravian 4G / Filter: Clear / Exp.: 120.0 s
predicted start
predicted end
relative flux (de-trended)
O-C = 23.2 ± 0.7 min
T0pred. ± 14.8 min
STD = 1.6 ‰
residuals
AutoCorr = 0.2
phase
*yves.jongen@iba-group.com
Uploaded: 2020-07-29


1st Jan. 2005
1st Jan. 2021
1st Jan. 2029
O-C (minutes)
± 15' target
Current uncertainty
ExoClock Observations
ExoClock Observations Submitted
Literature Mid-times
Epoch