



ExoClock Newsletter

Dear ExoClock participants,

Hope you are all doing well! As we are approaching the Summer Solstice, we would like to wish you a happy summertime with nice clear skies!

We would like to welcome the new members!

We send out a newsletter like this at the beginning of every month, while you can read the past newsletters, watch the past meetings, and have access to other educational material at:

www.exoclock.space/users/material

We also organise meetings dedicated to new ExoClock members. These meetings are held just after our regular monthly meeting. The beginner's meeting will no longer be fixed on the Friday after our regular meeting, because we would like to facilitate participants with different schedules. In these meetings, newcomers have the opportunity to ask questions of any level related to the operation of the website, observations of transits, data analysis etc. Note that these meetings are not recorded.

Finally, we have a Slack channel for more direct communication and if you want to join, please send a request at exoclockproject@gmail.com.

In this newsletter, we discuss:

1. Announcements

1.1. Next ExoClock paper update – paper finished!

1.2. CHEOPS observing time awarded for ExoClock!

1.3. CMOS working group update

1.4. Synchronous Observations campaign -NEW

2. Highlighted observations

3. ALERTS

1. Announcements

1.1 Next ExoClock paper - status and results!

The final analysis allowed us to update the ephemerides for 450 planets! The results have been derived from totally **~18500 data points** (ExoClock network, literature, space data, ETD)

We would like to thank you all for contributing to this effort with your observations. Special thanks also to all the working groups that assisted our efforts (review team, literature team, space data working group, ETD working group). Co-authors have already been contacted. Congratulations everyone! We aim to submit to the *ApJS* and we will keep you updated about the progress of the paper.

Some indicative results are shown in the following table. The significantly improved and drifting categories constitute a 45% of planets that their ephemerides were improved with this study. We will also organise a separate meeting to present the results in detail after the submission and acceptance of the paper. Another important outcome is that the ExoClock network helps with the expansion of the observing coverage and therefore we manage to have a complete picture of data.

Ephemerides	vs ExoClock II (180 planets)	vs initial (450 planets)
Significantly improved	0.0%	31.8%
Drifting	1.1%	12.7%
Improved	29.4%	40.9%
TTVs	3.9%	4.2%
No change	65.5%	10.4%

1.2 CHEOPS observing time awarded for ExoClock!

While the majority of targets within the ExoClock database can be, and have been, followed-up with telescopes from the ground, some are simply too faint, shallow, or long. In these cases, a space-based facility is required. **CHEOPS** (the CHAracterising ExOPlanets Satellite) is one space-based telescope that could help us in our mission and every year the facility asks the community for observational proposals for time on the telescope. Therefore, this year we submitted a proposal to observe 9 planets which we believed were difficult, or impossible, from the ground or with TESS.

CHEOPS orbits the Earth roughly every 100 minutes and this is the unit of time that is used for awarding observing time. **We are pleased to announce we were awarded 130 orbits of time on the spacecraft (~215 hours) to observe 6 targets.** Each target will have 2 or 3 transits acquired over the next year or so. For the 3 other targets, it was deemed that either TESS or ground-based telescopes could follow them up. The planet for which ground-based data should easily be obtainable, in the view of the TAC, was NGTS-11 b so we set you this target as a challenge this year! The depth is relatively large (11 mmag, with star mag of 12.2) but the planet only transits every 35.455 days. Hopefully on the few nights it is observable, we will have good weather!

We also have a second successful proposal to follow-up candidates from TESS which are potentially excellent targets for atmospheric characterisation. This proposal focuses on long period planets in an attempt to make sure that, when they are added to the ExoClock database, the transit uncertainties are of the order of minutes, not hours! Hopefully these observations will ensure that we don't see large O-Cs when they are first observed by ExoClock participants. For this proposal, **we have received an additional 132 orbits (~218 hours) to study 7 targets.**

1.3 CMOS group update

During our recent meeting an update was provided regarding the testing of CMOS. The main outcomes are:

- Testing moves into final phases
- QHY 268: Appears to be suitable for precise photometric work. Medium sized sensor makes it useable for most situations with decent correct field.
- QHY 600 Pro: Is still being tested but has proven to have a number of problems with Ascom driver, Maxim and USB3 stability. This has mostly been resolved now. Working on using with fibre optic frame grabber which greatly speeds up its use (perhaps 0.5 sec for 120MB download). Field quite big so need well-corrected optics.
- QHY 2020: It shows problems with random noise and the group has asked to test the new 533model and the company will send it for testing.
- QHY 4040: The model has condensation problems and it is still being tested.

Overall, the camera that is recommended seems to be the 268 unless one has specific needs such as larger field, very fast downloads, etc.

A kind request from the coordinator of the group Roland Casali: If you have purchased a CMOS using the ExoClock member offer, please inform Roland via sending an email: mrcas62@gmail.com

1.4 Synchronous observations campaigns

Recently, we decided to open-up the efforts of the synchronous observations working group to the entire ExoClock community. Thank you for joining this work, we hope to continue this research and see what results we can get. We will run this kind of campaigns once every two or three months and we will be keeping you updated. We already performed campaigns for two targets and here we announce the third one.

The next campaign is about the transit of **HD191939b** which is happening on Tuesday the 14th of June. The observation is expected to start at 21:01 UTC and end at 02:06 UTC. If you have a telescope between 8 and 16 inches, you can give it a try and observe the transit.

<https://www.exoclock.space/database/planets/HD191939b/>

Note that this transit will NOT appear in your scheduler so you will need to organise your observation yourself. You can check the ExoworldsSpies scheduler to see if the transit is observable from your location (you should use a telescope aperture of 30 inches otherwise the planet will not appear).

<https://www.exoworldsspies.com/en/scheduler/>

As the star is relative bright (8th magnitude) you need to be careful to not use very short exposure time. Remember that the exposure time should be longer than your overheads (dead time between exposures). To be able to have a decent exposure time you may need to use a filter - preferably Red Cousins- or to defocus your telescope. You wouldn't need to do anything special in terms of the analysis, just upload the observations to ExoClock in the normal fashion. Please indicate in the comment section that the observation is "part of the synchronous observations campaign".

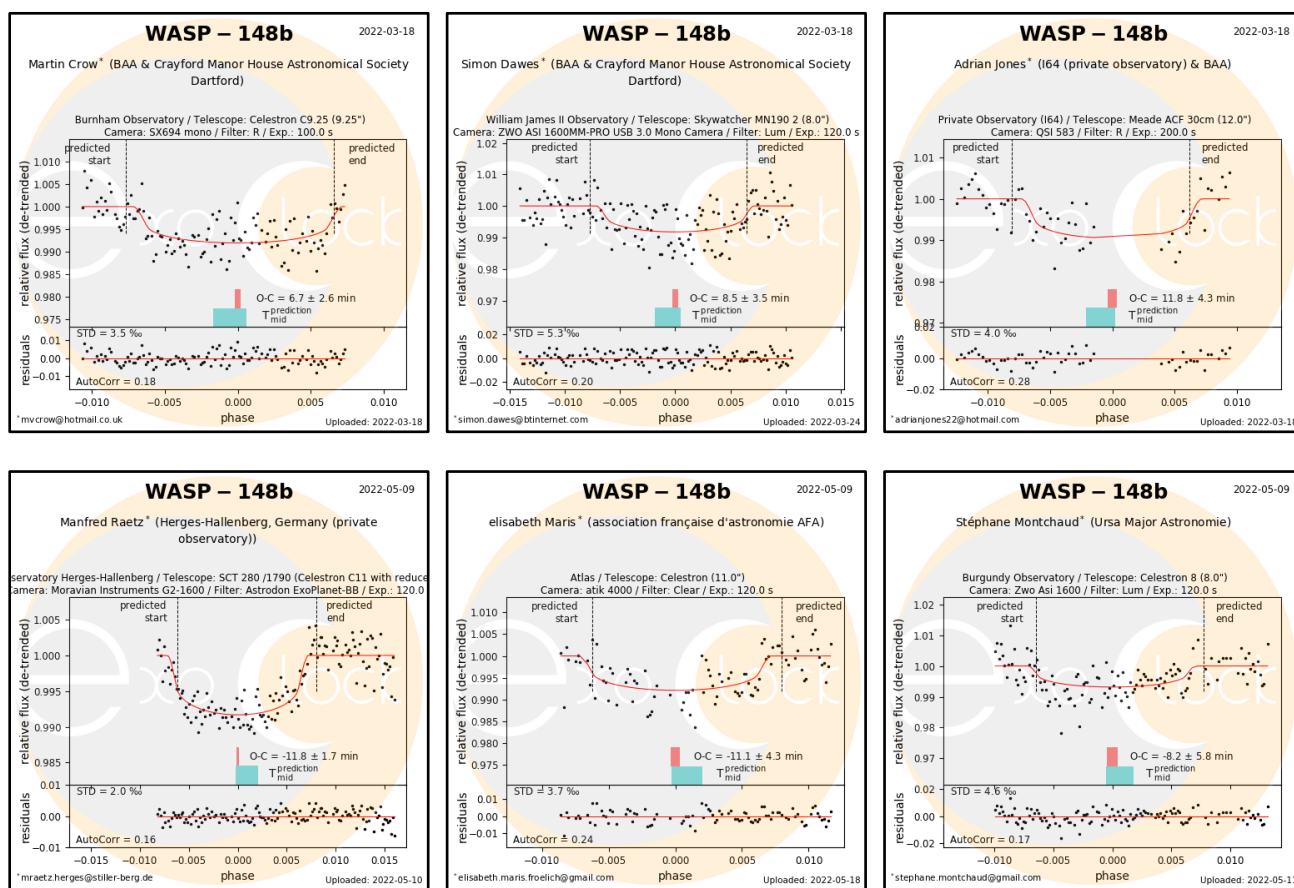
We will also send a reminder on the day.

2. Highlighted observations

We would like to thank you all for the observations you contributed in May!

We have selected **WASP-148b**, a high priority target for which a shift of ~10 minutes was initially identified by three different observations by Adrian Jones, Simon Dawes and Martin Crow on the 18th of March 2022. This drift was confirmed by more observations in May by Manfred Raetz, Elisabeth Maris and Stéphane Montchaud.

Congratulations for your efforts!



3. ALERTS

Thank you all for observing the alert targets! Please check your personalised alert schedule at:

www.exoclock.space/schedule/alerts

for the **ALERT** planets and if you get a clear sky and a long-enough night, you can try observing them!

The following targets remain in the current **alert system**:

- WASP-38b
- K2-238b
- WASP-192b
- WASP-185b
- WASP-7b
- WASP-68b

Please remember that many targets were not in the alert list, before an unexpected shift was identified by you, the ExoClock participants. This highlights the importance of observing targets that are also of low and medium priorities.

Clear Skies,
the ExoClock team