



ExoClock Newsletter

Dear ExoClock participants,

Hope you are all doing well! We have several updates while we are happy to see that our community is growing further!

We would like also to welcome the new members!

We send out a newsletter like this every two to three months, 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 have a Slack channel for more direct communication and if you want to join, follow this link:

https://join.slack.com/t/exoclock/shared_invite/zt-1t5l875v6-x0s8s553kT8nbCvbyo7boA

ExoClock acts as a vehicle for research, education and outreach serving international collaborations opening exoplanet science to the entire world. Today ExoClock counts more than 2000 participants and the project receives an average of 300 observations per month. The project has been running mostly based on volunteer basis for the past 6 years. As it is now really large, we need your support to sustain its activities and service. You have the opportunity to help ExoClock continue its activities by contributing through:

<https://www.exoclock.space/donate>

In this newsletter, we discuss:

1. Announcements

- 1.1. 4th ExoClock paper - officially released!**
- 1.2. Ariel Open Conference 2026**
- 1.3. Exoplanet Hackathon**
- 1.4. Ariel school 2026 in France**
- 1.5. Spacefest in Bristol**
- 1.6. ExoClock Unlocked**

2. Tips to improve your light-curve analysis

3. Highlighted observations

4. Exoplanet CV of LTT 9779b

1. Announcements

1.1 4th ExoClock paper – officially released!

We are happy to announce the official publication of our latest paper!

This new study includes updated ephemerides for **620 exoplanets**, integrating more than **30,000 data points** from both ground-based and space-based observations. It represents a truly collaborative effort, bringing together the contributions of more than 350 ExoClock members.

The results are remarkable: **45%** of the planets required ephemeris updates, and the prediction uncertainties have been improved by an order of magnitude. The collective analysis also led to the identification of new planets exhibiting transit-timing variations (TTVs), further demonstrating the scientific value of continuous monitoring.

This publication highlights the power of coordinated, community-driven science in enhancing the effectiveness of space missions.

The paper is available here:

<https://iopscience.iop.org/article/10.3847/1538-4365/ae3238>

1.2 Ariel Open Conference 2026

This year's Ariel Open Conference will take place in **Didcot, UK**, from **17–19 March 2026**.

The deadline for registration and abstract submission for poster contributions is **28 February 2026**.

The preliminary programme has now been announced and is available on the official conference webpage:

<https://arielmission.space/index.php/ariel-open-conference-2026/>

1.3 Exoplanet Hackathon

Episode III of the Exoplanet Hackathon Series will take place **in-person in London on 21 March 2026**. This edition will explore the impact of machine learning when applied to current methods for handling large volumes of observational data. Participants will work on real-world exoplanet challenges, combining data analysis, coding, and scientific problem-solving.

University students, early-career professionals, and early-career researchers are especially encouraged to participate. If you would like to spend an enjoyable and hands-on day learning about exoplanets and coding, be sure to secure your spot soon. Places are limited, and registration closes on **23 February 2026**:

<https://www.eventbrite.co.uk/e/exoplanet-hackathon-series-episode-iii-london-edition-tickets-1980367400204>

1.4 Ariel School 2026 - France

The French Ariel School 2026 will take place between **4 - 8 May 2026** at the **Observatoire des Baronnies Provençales**.

This international school is open to Master's and PhD students, postdoctoral researchers, and early-career scientists interested in exoplanet science and the Ariel mission.

The deadline for registration is **the end of February 2026**. For further information about the programme and application process, please visit the official webpage:

<https://www.ariel-mission.fr/ares-exoclock-2026/>

1.5 Spacefest in Bristol

Aerospace Bristol will host the first **Wales & West Spacefest** on **7 March 2026**.

The programme will feature talks by expert scientists, as well as hands-on activities designed especially for children. The event is open to space enthusiasts of all ages, making it a great opportunity for families and the wider community to engage with space science and exploration.

To learn more about the event and how to attend, please visit the official website:

<https://aerospacebristol.org/wales-west-spacefest>

1.6 ExoClock Unlocked – 2026 edition

ExoClock Unlocked is our hands-on programme designed for students and citizen scientists who do not have their own observing equipment but wish to contribute to exoplanet research through real observations and data analysis.

Participants receive structured training and guidance before conducting observations using professional remote telescopes from facilities such as the **Las Cumbres Observatory** and the **TURM Observatory**. Through these remote facilities, they observe exoplanet transits while learning how to prepare and submit observing proposals and analyse exoplanet data.

The results are submitted to the ExoClock database, where they play a key role in refining the ephemerides of challenging exoplanet transits.

The 2026 edition has officially begun with 20 participants, marking another exciting year of education, collaboration, and meaningful scientific contribution.

2. Tips to improve your light-curve analysis

Partial transit observations: Partial transit observations can sometimes produce a usable result, but generally they are not as reliable or as valuable as complete observations, and will usually be returned if we already have complete observations in the database.

You can't do much about unexpected bad weather but always choose to observe transit events that are well clear of dusk or dawn twilight to ensure you have a good prospect of capturing a full hour of data before and after the transit.

If some passing cloud wipes out the start of your run, switch to a different target rather than continue with a truncated observation.

Large telescopes and short exposures: We receive quite a few observations where a large telescope (>15") has been used to observe a relatively bright 'easy' target. In some cases, a very short exposure time has been set to try to avoid saturation, and perhaps a delay introduced between exposures to keep the number of images manageable.

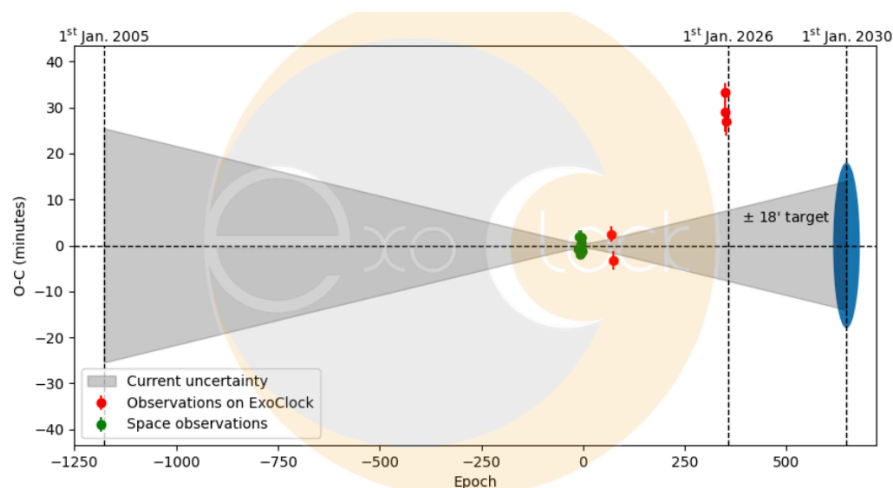
First, a plea to observers with larger telescopes: we really want you to observe the more difficult, often fainter, targets that are beyond the scope of smaller instruments. This is the best use of your telescope and where you can make the most valuable contribution to ExoClock.

For bright targets, avoid very short exposures and never introduce additional delays between exposures – it reduces the overall SNR and makes your telescope behave like a smaller one! A better approach is to defocus the telescope a little to reduce peak ADU values, allowing you to use a longer exposure (suggested > 30 sec) and to achieve lower overheads and higher SNR.

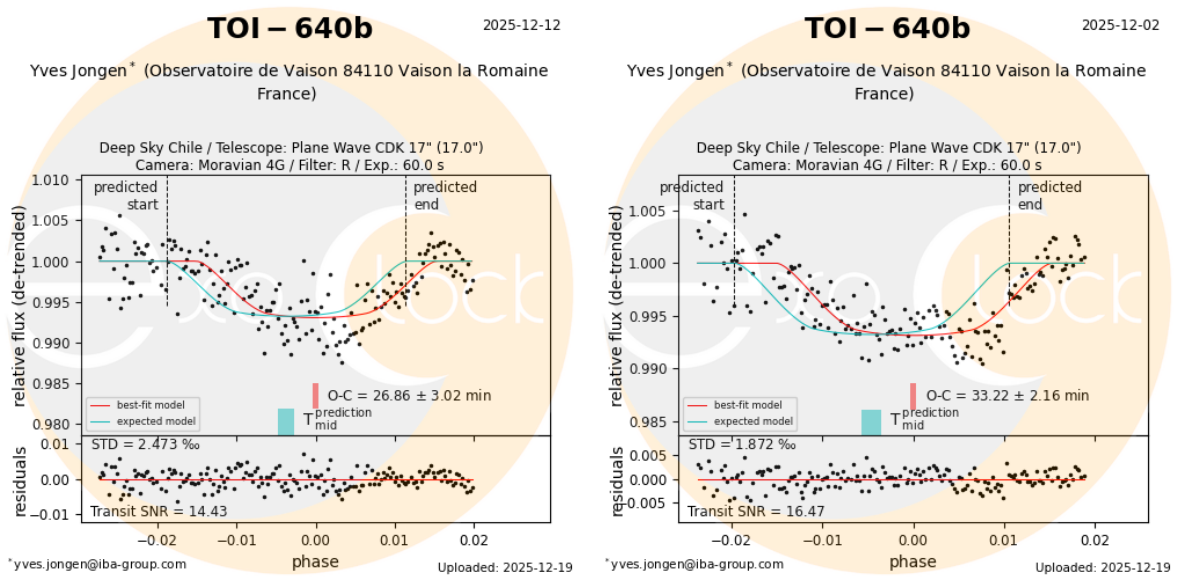
3. Highlighted Observations

We would like to thank you all for the observations you contributed during the previous months! We have selected TOI-640b and TOI-270c, two targets both flagged as alert and have time drifts detected.

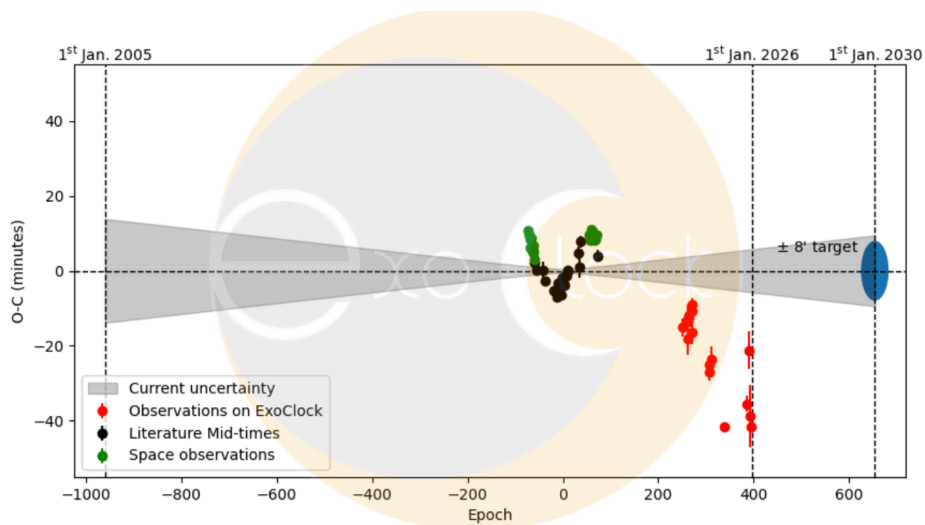
TOI-640b: This target exhibits an interesting time shift, according to observations coming from ExoClock observers. In the O-C diagram below, we can clearly see this shift in its most recent observations. It would be fascinating to follow this exoplanet to catch sight of where this time shift may lead.



A few examples of recent observations from ExoClock participants are shown below:



TOI-270c: The O-C diagram of TOI-270c below shows time shifts on the ephemeris which however have different origins. TOI-270c is part of a three-planet system for which TTVs have been detected. The recent additional observations, in approximately 2.5 years, have been impactful in tracing the target’s TTVs. The ExoClock observations (with red) clearly highlight the TTVs on this system!



4. ‘Exoplanet CV of LTT 9779b’

These CV articles aim to enrich your background knowledge on the Ariel candidates. The articles feature one exoplanet each month and are written by our literature team. This month we are featuring **LTT 9779b**. The article is attached in the next page. Enjoy!

Clear Skies,
the ExoClock team

“CV” of LTT 9779b

by Vasiliki Michalaki, *ExoClock Literature team member, University of Ioannina, Greece.*

A planet that... shouldn't exist!

[LTT9779b](#), also known as Cuancoá, orbits in what astronomers call the *Neptune Desert* - a region extremely close to a star where Neptune-sized planets are rarely found. In this intensely hot zone, a star's powerful radiation is expected to gradually strip away the planet's atmosphere. Yet, LTT9779b has somehow managed to hold on to its thick gaseous blanket envelope, surprising astronomers and challenging current models of how planetary atmospheres survive under such extreme conditions.

With a radius about 4.6 times that of Earth and a mass 29 times greater, LTT9779b is classified as a “hot Neptune” (see Figure 1). It was discovered in 2020 by Jenkins et al., using data from NASA's TESS mission, which revealed regular dips in the star's brightness as the planet passed in front of it [1].

The planet orbits a bright, Sun-like star at a distance of just 0.017 AU - nearly 60 times closer than Earth is to the Sun, and completes a full orbit in only 19 hours, so a full “year” lasts less than a single Earth day.

Because of its incredibly short orbit, LTT9779b is bombarded with extreme levels of stellar radiation. The planet's dayside reaches scorching temperatures higher than 2000°C, while the nightside remains significantly cooler [4] [5]. This contrast reveals that heat is not efficiently redistributed around the planet. Instead of being evenly circulated by atmospheric winds, much of the incoming energy remains concentrated on the star-facing hemisphere.

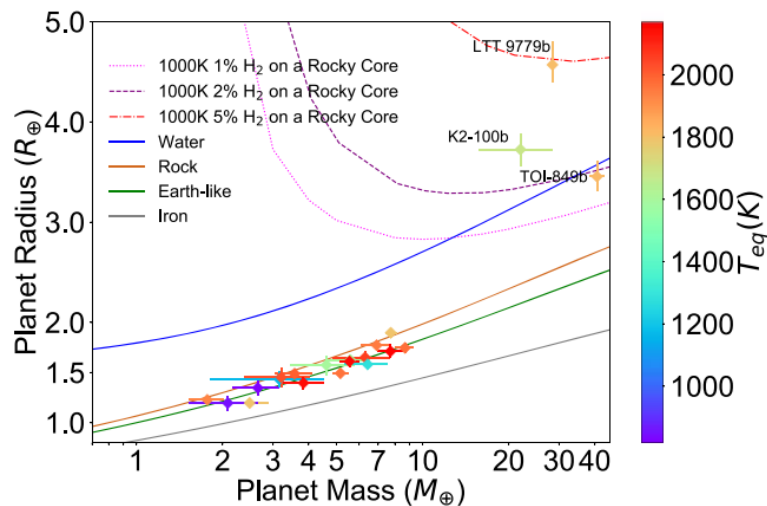


Figure 1. The measured masses and radii of ultra-short-period planets are shown alongside theoretical mass–radius models from Zeng et al. (2016), with the panel also highlighting three ultra-hot Neptunes [7].

Despite the intense radiation it receives, LTT9779b shows no clear evidence for ongoing atmospheric escape [3,4]. Observations using high-resolution transmission spectroscopy, along with data from space-based telescopes, instead suggest that the planet has a heavy, compact, metal-rich atmosphere [5].

An atmosphere composed of heavier molecules does not expand as easily when heated. The particles move more slowly at a given temperature and remain more tightly bounded by the planet's gravity. As a result, the atmosphere stays relatively compressed rather than ballooning outward - making it harder

for stellar radiation to strip it away. In other words, LTT9779 b may have survived in the Neptune Desert precisely because its atmosphere is dense and heavy enough to resist evaporation. This unexpected atmospheric resilience may explain how the planet has survived for billions of years inside the “Neptune Desert” [3].

LTT9779b is also one of the brightest exoplanets observed - having an extraordinary reflectivity. Optical secondary-eclipse observations with CHEOPS reveal a geometric albedo of about 0.7-0.8 [6]. This unusually high albedo is best explained by the presence of high-altitude silicate clouds in a super metal-rich atmosphere, capable of reflecting a large fraction of the incoming stellar radiation and significantly altering the planet’s energy budget [5].

As the first ultra-hot Neptune to be studied in such detail, LTT9779b stands out as one of the most compelling targets for future follow-up observations. Continued transit monitoring through the ExoClock project is particularly valuable, as precise timing measurements and updated orbital parameters help ensure accurate predictions of future transits (see Figure 2). This will be especially important for the upcoming Ariel mission upcoming space missions such as Ariel, which aims to probe the atmospheric composition of exoplanets like LTT9779b and further refine our understanding of these extreme worlds. Additional high-resolution spectroscopy will be essential to better characterize its atmosphere and deepen our understanding of how ultra-hot Neptunes manage to retain their gaseous envelopes in such hostile environments [3].

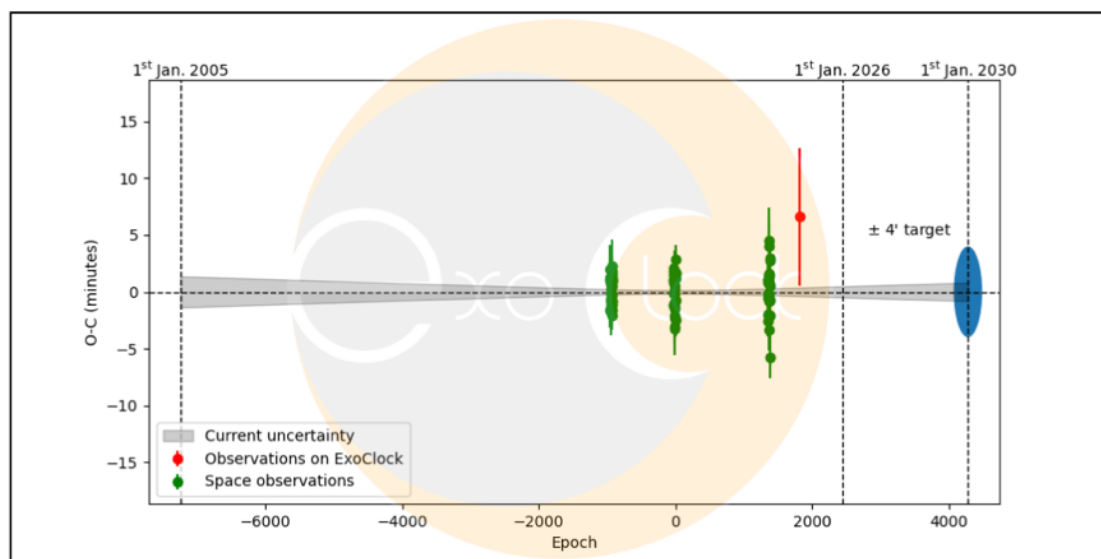


Figure 2. Transit observations of LTT 9779 b listed in the ExoClock database. To date, just one observation has been obtained using a ground-based telescope (in red color), with the rest obtained by TESS.

References

- [1] Jenkins et al.2020 <https://arxiv.org/pdf/2009.12832>
- [2] Ricker et al. 2015 <https://doi.org/10.1117/1.JATIS.1.1.014003>
- [3] Ramírez Reyes et al.2025 <https://arxiv.org/pdf/2501.17272>
- [4] Edwards et al.2023 <https://iopscience.iop.org/article/10.3847/1538-4365/ac9f1a/pdf>
- [5] Dragomir et al.2020 <https://iopscience.iop.org/article/10.3847/2041-8213/abc70/pdf>
- [6] Saha et al.2025 <https://arxiv.org/pdf/2506.17550>
- [7] Dei et al.2021 <https://iopscience.iop.org/article/10.3847/1538-3881/ac02bd/pdf>