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ExoClock Project. II. A Large-scale Integrated Study with 180 Updated Exoplanet Ephemerides

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Abstract

The ExoClock project is an inclusive, integrated, and interactive platform that was developed to monitor the ephemerides of the Ariel targets to increase the mission efficiency. The project makes the best use of all available resources, i.e., observations from ground telescopes, midtime values from the literature, and finally, observations from space instruments. Currently, the ExoClock network includes 280 participants with telescopes capable of observing 85% of the currently known Ariel candidate targets. This work includes the results of ∼1600 observations obtained up to 2020 December 31 from the ExoClock network. These data in combination with ∼2350 midtime values collected from the literature are used to update the ephemerides of 180 planets. The analysis shows that 40% of the updated ephemerides will have an impact on future scheduling as either they have a significantly improved precision or they have revealed biases in the old ephemerides. With the new observations, the observing coverage and rate for half of the planets in the sample has been doubled or more. Finally, from a population perspective, we identify that the differences in the 2028 predictions between the old and the new ephemerides have an STD that is double what is expected from Gaussian uncertainties. These findings have implications for planning future observations, where we will need to account for drifts potentially greater than the prediction uncertainties. The updated ephemerides are open and accessible to the wider exoplanet community both from our Open Science Framework repository and our website.

Unified Astronomy Thesaurus concepts: Transit photometry (1709); Ephemerides (464); Exoplanets (498); Amateur astronomy (35)

1. Introduction

Follow-up observations of known transiting exoplanets are important to properly plan future observations with larger facilities in order to avoid wasting part of their observing time. While the transit times of near future events are predicted with relatively good accuracy, several factors prevent accurate predictions far into the future. First, the limited amount of available data for each planet introduces biases on the ephemeris estimation (e.g., Benneke et al. 2017; Mallonn et al. 2019b). Moreover, the precision of the predicted transit times is degrading with time due to the uncertainties of the initial ephemerides (e.g., Mallonn et al. 2019b). For example, planets that were recently discovered by TESS had initial ephemerides with very high uncertainties (e.g., Dragomir et al. 2020; Zellem et al. 2020). These ephemerides were only improved by follow-up observations and data from the extended TESS mission. Other issues that might result in biases in transit times include tidal orbital decays, gravitational interactions with other bodies, or apsidal precession (e.g., Agol et al. 2005; Maciejewski et al. 2016a; Bouma et al. 2019).

Future space missions aiming to characterize exoplanets require a good knowledge of transit times in order to increase the efficiency of the mission. The Ariel mission will spectroscopically observe the atmospheres of 1000 planets in order to investigate their nature. It will observe thousands of transits so it is crucial to improve the currently known ephemerides.

The importance and efficiency of using small-sized telescopes for observing transits has been highlighted in several works (e.g., Beck et al. 2019; Kabáth et al. 2019; Mallonn et al. 2019b; Zellem et al. 2020; Edwards et al. 2021; Kokori et al. 2021). In this regard, their contribution to planning observations for future space missions is of high significance. Since Ariel will observe a large number of planets, it is necessary to provide a list with verified ephemerides before the launch of the mission.

The best use of resources can be achieved through large-scale efforts that integrate data from various sources. These sources include data from the literature, data from telescopes of any size —even small ones—and, finally, data from space for the most challenging targets. ExoClock is such a project; it is an open, integrated platform that aims to monitor the ephemerides of the Ariel candidate targets. The nature, architecture, and organization of the project are described in detail in Kokori et al. (2021).

In Kokori et al. (2021) a first round of ephemerides updates was presented for 28 planets. The ExoClock project has been in operation since 2019 September and in the course of this effort it became clear that many planets have large scatter in the $O-C$ diagrams or they do not have many observations. Therefore, such targets require continuous monitoring and a longer time coverage of observations to decrease their current or predicted uncertainties.

In this work, we present the first large-scale update to the ephemerides of 180 planets. The refined ephemerides have been derived from a combination of midtimes from both ExoClock observations and literature data. The literature research includes a collection of the majority of midtimes from previous publications for all 180 planets. The results show that a considerable number of planets have midtimes derived from only a small number of past observations, in many cases from the discovery data alone. The absence of an adequate number of observations leads to increased uncertainties in the ephemerides. This highlights the importance of the continuous monitoring provided by ExoClock. Apart from its role to support the Ariel space mission, ExoClock aims to act as a community service with reliable ephemerides to be utilized for other exoplanet research purposes.

2. The ExoClock Network

At the time of this writing, the ExoClock network includes 280 participants (80% are amateur astronomers) and 300 telescopes with sizes ranging between 6 and 40 inches (80% are smaller than 17 inches). A full list of private observatories is outlined in Table 1. We calculate the signal-to-noise ratio (S/N) for each

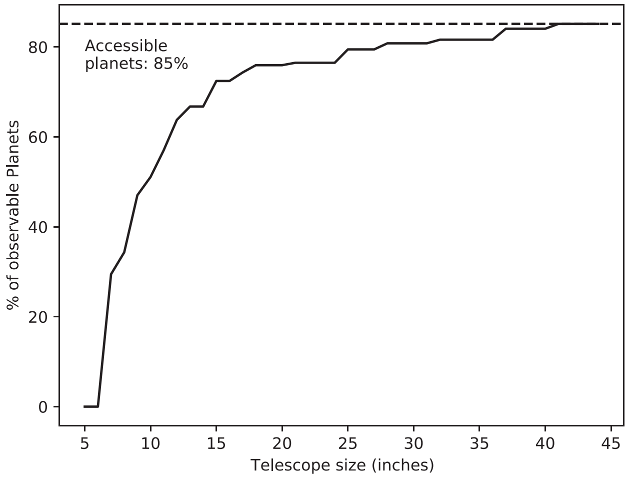

Figure 1. Cumulative percentage of observable planets as a function of the telescope size.

planet–telescope combination based on Equation (1). If S/N is higher than 15, then the planet is flagged as accessible.

$$\mathrm{S/N} = aD\sqrt{10^{\frac{12-R_{\mathrm{mag}}}{2.5}}}\frac{T_{Dp}}{\sqrt{\frac{1}{T_{Dr}}+\frac{1}{120}}} \quad (1)$$

where a is a constant, D is the telescope aperture in inches, R_{mag} is the R magnitude of the star, T_{Dp} is the transit depth in mmag, and T_{Dr} is the transit duration in minutes.

The factor a was estimated empirically based on observations acquired from the Holomon Astronomical station of the Aristotle University of Thessaloniki in Greece. The data were obtained with an 11 inch telescope, an ATIK11000 camera, and a Red (Cousins) filter. This can be considered as a representative example of a system capable of performing transit observations. Assuming that an observation starts one hour before the transit, ends one hour after the transit, has an exposure time of one minute, and has overheads of 30 s, the value of a is equal to 0.0125. In the course of the project, this factor is updated for each telescope based on the quality of the observations acquired.

Compared to Kokori et al. (2021), here we can take into account the updated number and the updated capabilities of the telescopes in our network—alongside the observability constraints (host star above 20°, transit duration shorter than 6 hr)—and better estimate the capabilities of the network as a whole. Figure 1 shows the cumulative percentage of observable planets as a function of the telescope size. The large number and the global distribution of telescopes smaller than 17 inches ensures that the majority of our targets (75%) are observable with this type of equipment. The larger telescopes can contribute an additional 10%, leading to a total of 85% of observable planets from the list of currently known planets that are candidates for Ariel (Edwards et al. 2019). Given the limited time available to larger facilities, this kind of telescope distribution is proven to be very efficient for achieving a large-scale follow-up program.

3. Data Acquisition and Evaluation

3.1. ExoClock Data

As part of the ExoClock website[48] we provide a personalized scheduler for each observer, a suggested protocol on how to acquire data, and the data analysis software[49] to perform reduction and photometry. We refer the interested reader to Kokori et al. (2021) for more details. The most important aspects of the observing protocol include the use of the Red Cousins filter, the acquisition of data from one hour before the transit start until one hour after the transit end, and the regular check of the system clock to ensure accurate time-stamping of data. The above do not constitute requirements but only suggestions, as we welcome contributions of any kind. If the uploaded data do not include uncertainties, these are estimated with a moving standard deviation.

To ensure the high quality and homogeneity of observations, we perform light-curve modeling on the ExoClock website, using our dedicated exoplanet catalog for the planet parameters (the Exoplanet Characterization Catalog) and the open source Python package PyLightcurve[50] (Tsiaras et al. 2016) for transit modeling. Again, we refer the interested reader to Kokori et al. (2021), while here we give a summary of the process. For every transit, we convert the time to $\mathrm{BJD_{TDB}}$; we then fix all the transit parameters with the exception of the planet-to-star radius ratio and the midtime, and also we calculate the limb-darkening coefficients using the ExoTETHyS[51] (Morello et al. 2020) package for the specific photometric filter used. Finally, we fit the light curve with a transit model (exposure-integrated) together with a trend model (linear with airmass, linear with time, or quadratic with time based on the chi-squared of the residuals) using the nested sampling techniques as implemented in the Nestle package.[52] After a first fit on the data, we scale the uncertainties to match the standard deviation of the residuals and re-fit. This way, we take into account any extra scatter in the observation and end up with a conservative estimate of the uncertainties in the final results.

In this work, we considered 180 planets that had at least two ExoClock observations submitted to the website before the end of 2020 and which met the required quality standards. We assess the quality of each light curve individually, based on three criteria, as listed below.

1. The fitted R_p/R_s should not differ by more than 3σ from the expected literature value. The only exceptions to this rule are planets that orbit stars with physical or projected companions (e.g., HAT-P-1b, K2-29b, WASP-77Ab, WASP-85Ab, XO2-Nb) or planets with grazing transits (e.g., WASP-45b, WASP-67b).
2. The autocorrelation and the Shapiro statistic for the normalized residuals should not differ by more than 3σ from the values for pure white noise at the same time. We estimated these limits as a function of the number of data points in a light curve from 100,000 simulated time series. The advantage of these metrics is that they are very sensitive to systematic noise and to outliers.
3. The fitted transit time should not have an uncertainty greater than 10 minutes and it should be in agreement with other observations on the same day or a few days apart (if such observations exist).

The total number of approved light curves for this data release is ∼1600, spanning the period from 2008 to 2020. For

[48] exoclock.space

[49] github.com/ExoWorldsSpies/hops

[50] github.com/ucl-exoplanets/pylightcurve

[51] https://github.com/ucl-exoplanets/ExoTETHyS

[52] github.com/kbarbary/nestle

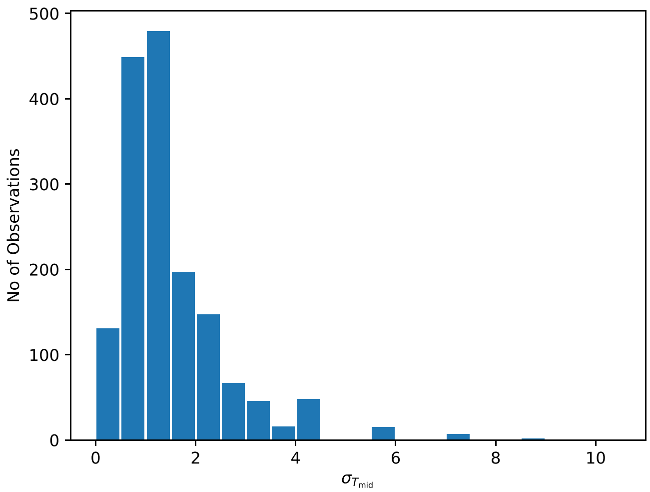

Figure 2. Distributions of the achieved uncertainties on the midtransit time from all the ExoClock observations.

the majority (∼60%) of the planets, the number of observations is lower than or equal to 10, indicating that more observations in the future are necessary. (For a discussion on the coverage achieved by our observations see Section 6.2.)

The overall precision achieved in the transit timing can be evaluated from Figure 2, where the majority of the observations (∼90%) deliver a precision better than three minutes. Additionally, Figure 3 shows the autocorrelation and the Shapiro diagnostics as a function of the light-curve length, together with the acceptable upper limit. Of these light curves, 7% fail the autocorrelation test mostly due to spot-crossing events or weather. However, these light curves pass the R_p/R_s and the Shapiro test as these events do not cause strong residuals. These light curves will be flagged in the final data product to warn anyone who wishes to use them.

3.2. Literature Data

Approximately 2350 transit midtime values were collected from the literature for the 180 planets in our sample. While collecting the literature midtimes we:

1. included individual transit-time measurements and not ephemerides, with the exception of the discovery paper,
2. included transit-time measurements with uncertainties less than 10 minutes (similarly to the restriction for the ExoClock data),
3. did not include measurements that came from the Exoplanet Transit Database (ETD, Poddaný et al. 2010) to avoid duplications, as we have started sharing data directly with the ETD collaboration (see Section 3.3) and these data will be directly linked to ExoClock, and
4. converted the reported time formats to BJD_{TDB}.

We need to note here that 35% of the planets in our sample have only one data point from the literature, related to the discovery of the planet. This statistic reveals a significant gap in the literature and highlights the need for a large-scale follow-up project like ExoClock.

3.3. ETD Data

In an effort to make the best use of all available resources, we would like to collaborate with other ground networks which have current or past observations of the Ariel candidate targets. At the moment the largest database of such observations is the Exoplanet Transit Database (ETD, Poddaný et al. 2010) run by the Czech Astronomical Society since 2009, which provides more than 10,000 transit light curves for more than 350 exoplanet systems. In this study, we included 18 observations for three planets provided by the ETD network and midtimes from these were integrated with the ExoClock and the literature data.

In order to maintain homogeneity and reliability in our analysis, we only considered observations with a data quality index lower than three which were then processed on the ExoClock website using the same methodology and validation criteria as for the ExoClock data (Section 3.1).

Despite the low number of observations used in this analysis, we value the contribution of ETD and this is the first collaborative work between the two networks. Such collaborations are critical to avoid duplications and waste of resources. We aim to continue our collaboration and gradually integrate more data from ETD in future publications.

4. Results

4.1. Updated Ephemerides for 180 Planets

Here we present updated ephemerides for 180 of the total of 370 planets that are currently in the ExoClock target list. To determine these ephemerides, we combined all the available data. First, we updated the zero epoch to the weighted average of the available epochs, and then fitted a line on the epoch versus midtransit times data. To do so, we used the MCMC algorithm as implemented in the emcee package (Foreman-Mackey et al. 2013). After a first fit, we scaled up the uncertainties so that the mean uncertainty was equal to the STD of the $O-C$ residuals and in this way we incorporate any non-Gaussian noise. While, this step did not have a significant effect on the values of the zero-epoch midtransit and the period, it was important for their uncertainties. Without scaling, the uncertainties on the final ephemerides would have been largely underestimated, leading to reduced chi-squared values larger than 1. Table 2 in Appendix B provides all the new ephemerides and references to the literature values used.

Figure 4 shows the uncertainties in the 2028 predictions before and after the updates presented in this work (σ_p and $\sigma_{p'}$, respectively). We note that all the new predictions have uncertainties lower than 10 minutes and an improvement has been achieved for 162 (90%) of them. There is a small number of planets (6) for which the prediction uncertainty has increased from ∼0.1 minute to ∼1–4 minutes. These planets were observed by Kepler/K2 but the individual midtime data were not reported in the literature, hence only the initial ephemerides were used. We plan to reanalyze and add the individual Kepler/K2 light curves in our database in our future data releases, solving the above issue. Moreover, Figure 5 shows the difference in the 2028 predictions between the new and the old ephemerides as a function of uncertainty, where 103 planets (57%) have drifts greater than their uncertainties.

4.2. Deviations from Linear Ephemerides

To assess the Gaussianity of the final $O-C$ diagrams we use the same methodology as for the individual light curves: by evaluating the autocorrelation and the Shapiro test.

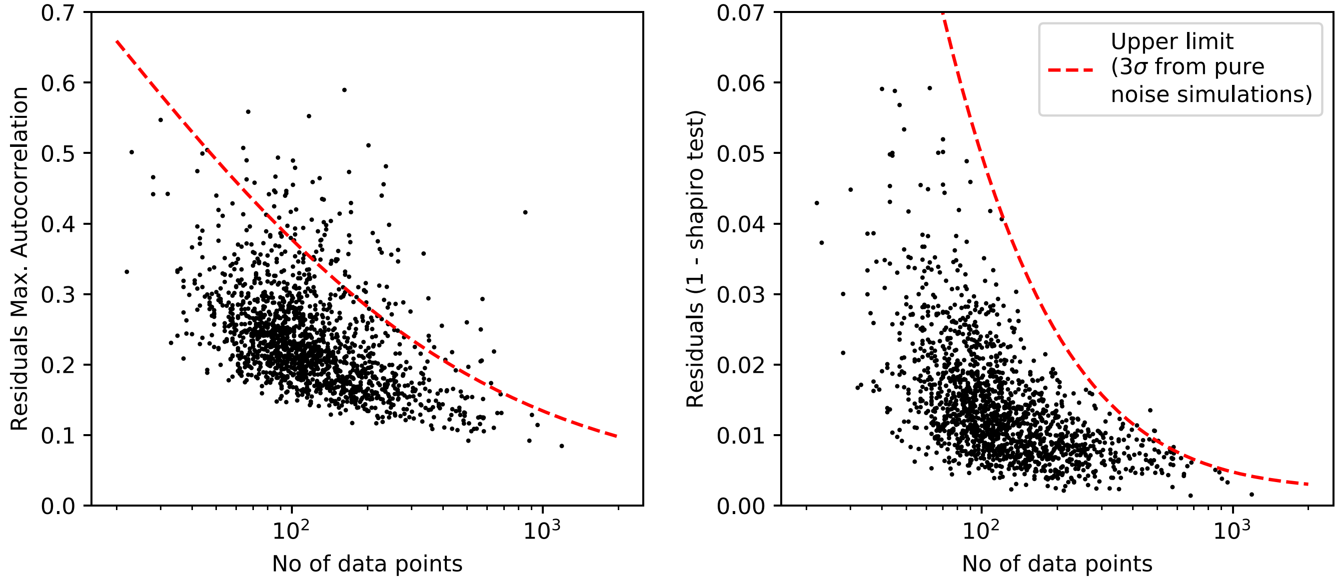

Figure 3. Residuals autocorrelation (left) and Shapiro (right) tests for all the ExoClock observations as a function of the number of data points in each light curve. The red dashed line indicates the upper acceptable limit for each metric, as calculated from time series of white noise.

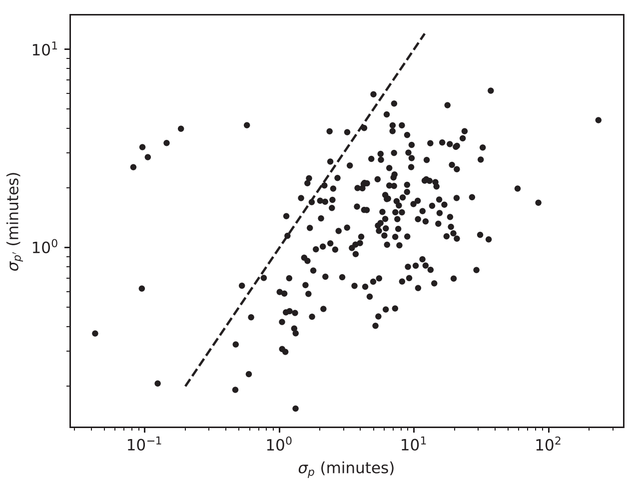

Figure 4. Uncertainties for the transit-time prediction at the end of 2028 as calculated with the old ephemerides (horizontal axis) and with the new ephemerides as estimated from ExoClock (vertical axis). The dashed line is the line of equal values, and the planets for which the prediction precision has been improved (90%) are plotted on the right of this line.

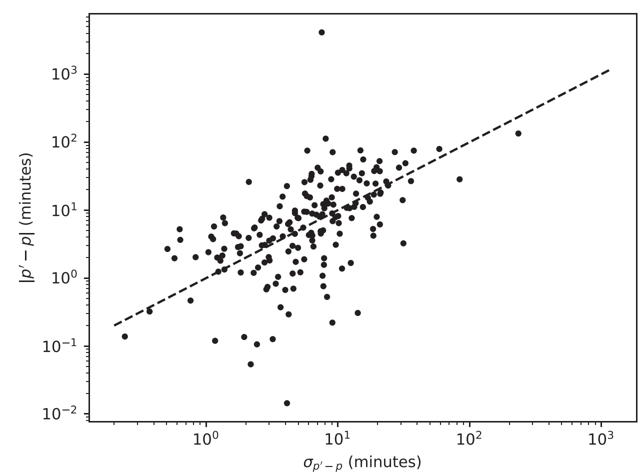

Figure 5. Difference in the transit-time prediction at the end of 2028 between the old and the new ephemerides, as a function of its uncertainty (quadratically combined). The dashed line is the line of equal values, and the planets for which the drift is greater than 1σ (57%) are plotted above this line.

From the autocorrelation test we find that three planets—WASP-12b, WASP-10b, and Qatar-2b—have a statistically significant $O - C$ autocorrelation ($>3\sigma$ deviation from Gaussian noise) that indicates a nonlinear ephemeris. WASP-12b is known to have a nonlinear ephemeris as its orbit is decaying (Maciejewski et al. 2016a; Turner et al. 2021), while for the other two planets more observations are required to verify the nonlinear nature of their ephemerides.

Additionally, the Shapiro test can help us identify high-frequency noise in $O - C$ diagrams. We find five planets that deviate significantly from pure noise based on the Shapiro test: GJ1214b, HAT-P-32b, TrES-3b, WASP-43b, WASP-79b. For the planets mentioned above, an additional noise component should be taken into account when predicting future transit events, and we have indicated this in the Catalog of ExoClock Ephemerides (Section 5.2). As far as high-frequency noise is concerned, we find the most significant deviation (15 times higher than the 3σ limit) is for TrES-3b, a planet for which there are contradicting results in the literature regarding the presence of an additional planet or not (e.g., Mannaday et al. 2020).

5. Data Release B

The second data release of the ExoClock project includes two data products: the catalog of ExoClock observations and the catalog of ExoClock ephemerides. All data products and their descriptions can be found through the Open Science Framework (OSF) repository with doi:10.17605/OSF.IO/WNA5E.

5.1. Catalog of ExoClock Observations

The new catalog of ExoClock observations contains ~1600 light curves analyzed in this work, which refer to 180 planets from the ExoClock target list. These observations were

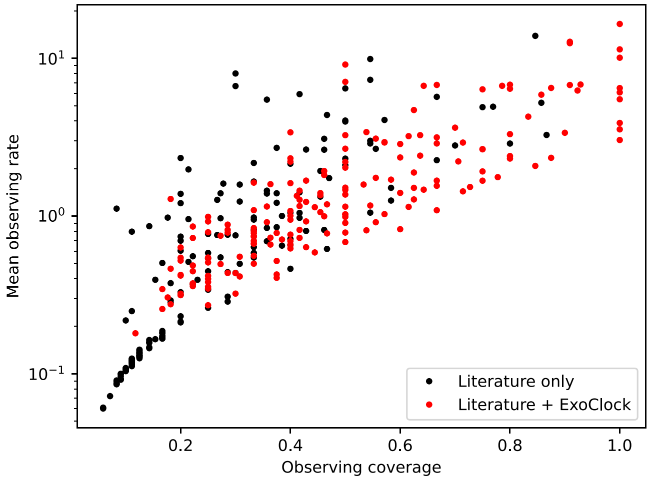

Figure 6. Comparison of the mean observing rate vs. observing coverage collected from literature data and from the combination of both literature and ExoClock data.

conducted between 2008 and 2020, submitted to the ExoClock platform before the end of 2020, and validated according to the criteria described in Section 3.1. From the ∼1600 observations in this data set, 66% were obtained by amateur astronomers and the remaining 34% by professionals.

In the online repository, each observation is accompanied by:

1. metadata regarding the observer(s), the planet observed (link to ECC), the equipment used (telescope-camera-filter), the exposure time and the time and flux formats;
2. the raw light curve filtered for outliers, converted to BJD_{TDB}, and flux formats and enhanced with the estimation for the uncertainties, the target altitude, and the airmass;
3. the fitting results, including the detrending method used and its parameters;
4. the detrended light curve, enhanced with the detrending model, the transit model, and the residuals; and
5. fitting diagnostics on the residuals (standard deviation, chi-squared, autocorrelation).

5.2. Catalog of ExoClock Ephemerides

The new catalog of ExoClock ephemerides contains the updated ephemerides for 180 planets from the ExoClock target list (see also Table 2 in Appendix B).

In the online repository, each observation is accompanied by:

1. the midtime values used to calculate the ephemeris,
2. references for the literature data used,
3. links to the ExoClock and ETD data used, and
4. flags concerning the detection of nonlinear ephemerides or high-frequency noise in the $O-C$ diagrams.

6. Discussion

6.1. Ariel-focused Implications

Ariel will observe 75% of the transit duration before and after each transit to allow for the correction of instrumental systematics. For this reason, in Kokori et al. (2021) we defined that the aim of the ExoClock project is to deliver ephemerides that can predict the transit times for the end of 2028 with a precision higher than 1/12 of the transit duration (target uncertainty).

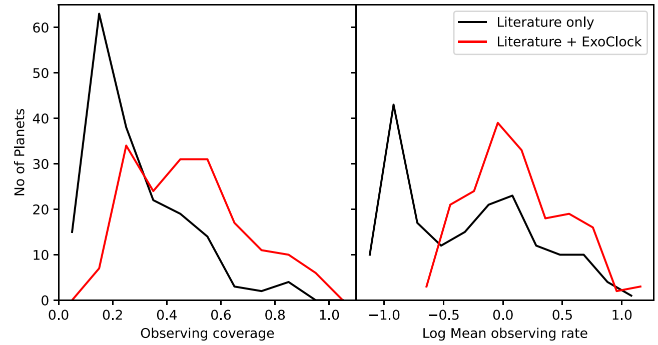

Figure 7. Distribution of planets over the observing coverage (left) and the mean observing rate (right) for the literature data and for the combination of both literature and ExoClock data.

From the results presented in Section 4, three classes of planets can be distinguished:

1. class 1: 31 planets (17%) had initial ephemerides with prediction uncertainties greater than the target uncertainties,
2. class 2: 41 planets (24%) had initial ephemerides with prediction uncertainties lower than the target uncertainties, but the new ephemerides give predictions that deviate significantly from the initial ones (more than the target uncertainties), and
3. class 3: the remaining 108 planets (60%) had initial ephemerides with prediction uncertainties lower than the target uncertainties and the new ephemerides give predictions that do not deviate significantly from the initial ones.

In total, 40% of the ephemerides that have been updated in this work are important for the planning of Ariel observations. Despite the fact that the remaining 60% of the planets had reliable initial ephemerides, the majority of them still have a limited number of observations (see Section 6.2) and drifts might appear in the future. Therefore, continued monitoring is necessary.

6.2. The Contribution from ExoClock

The overall contribution of the current work can be assessed by examining the distribution of the observations over the years for each planet. To do so, we used the following metrics:

1. mean observation rate: total number of data points divided by years since the first data point.
2. observing coverage: number of years with at least one data point divided by years since the first data point.

Figure 6 shows the mean observing rate versus the observing coverage for all 180 planets, while Figure 7 shows the distribution of planets over the two metrics. From both graphs, it is apparent that data collected as part of the ExoClock project have made a significant contribution to the follow-up of known planets, as the mean observing rate and the observing coverage have been doubled (or more) for 75% of the planets.

Certainly, there are planets that have an adequate number of observations over the years (observing coverage >0.8), such as Qatar-1 b. These planets have very reliable ephemerides and

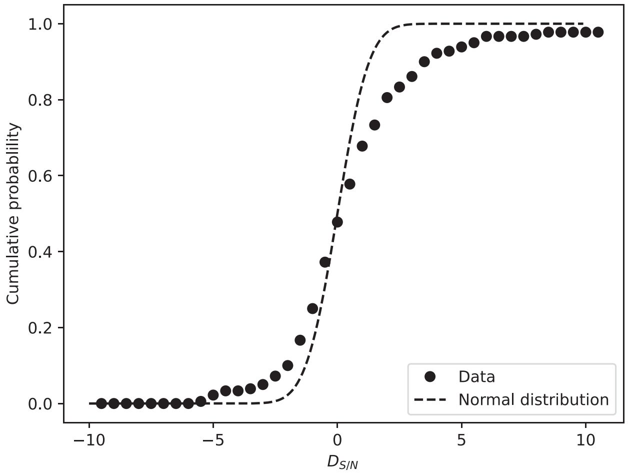

Figure 8. Cumulative probability as a function of the drift in signal-to-noise ratio and comparison with normal distribution.

they can be considered saturated. The large number of observations available for these targets is due to the fact that follow-up observations were focused on a few specific targets.

However, the saturated planets constitute a small fraction (10%) of the total sample, while half of the planets still have an observing coverage lower than 0.5 and, therefore, they might show a drift in the future. Therefore, apart from the few planets that have been observed over a long time period and that have precise ephemerides, all the remaining planets require continuous monitoring in order to increase their time coverage as well. In addition, to maximize the time coverage for all the planets, in the near future we plan to incorporate more data from ETD as well as the light curves from Kepler, K2, and TESS in our database.

6.3. General Implications for Follow-up Observations of Exoplanets

The large-scale approach to the ephemerides refinement followed in this work enables a general study of the behavior of the exoplanet ephemerides as a population. Here, we investigate the magnitude of the drifts between the predictions produced by the old and the new ephemerides (for the end of 2028) relative to their uncertainties.

One would expect that the drifts are drawn from a normal distribution with a standard deviation equal to the prediction uncertainty. However, as we can see in Figure 8 and also earlier in Figure 5, the detected drifts are systematically greater than the prediction uncertainties. More specifically, 68% of the detected drifts are within the $\pm 2\sigma$ range rather than the expected $\pm 1\sigma$ range. Previous studies had indicated a similar but weaker effect based on a smaller sample of planets (Mallonn et al. 2019b). This behavior implies that the old ephemerides were mostly underestimating the prediction uncertainties. To understand if this behavior is the result of biases in the calculation of the old ephemerides (most of which were calculated based on a small number of observations hence they could be biased more easily) or whether it is intrinsic to the follow-up strategy that is followed, it is necessary to repeat this type of evaluation regularly in the future.

7. Conclusions

The large-scale approach of this work is demonstrated to have significant implications for scheduling future observations for exoplanet characterization studies. The examination of past literature midtime values revealed that most planets lacked adequate observations while the focus of the studies was around a small number of planets. Observations provided by the ExoClock network doubled both the observing rate and coverage for half of the planets. Apart from the efficient organization of the project where all available resources are utilized under the same scope, the findings confirmed that continuous monitoring of exoplanet ephemerides is crucial for follow-up studies, because a considerable fraction of the planets studied here (40%) had highly uncertain or biased ephemerides. For this reason, we plan to continue monitoring those planets alongside other planets that have not yet been observed. A large number of observations (~600) for current and new targets has been submitted already to the ExoClock system and the results will be reported in a future study. All the results and the updated ephemerides are open to the wider exoplanet community to facilitate further research purposes in addition to Ariel.

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This work has made use of observations made by the LCOGT network, as part of the LCOGT Global Sky Partners project "ORBYTS: Refining Exoplanet Ephemerides" (PI: B. Edwards).

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All the data products and their descriptions can found through the OSF repository with doi:10.17605/OSF.IO/WNA5E.

Software: Django, PyLightcurve (Tsiaras et al. 2016), ExoTETHyS (Morello et al. 2020), Astropy (Astropy Collaboration et al. 2013), emcee (Foreman-Mackey et al. 2013), Matplotlib (Hunter 2007), Nestle, Numpy (Harris et al. 2020), SciPy (Virtanen et al. 2020).

Appendix A
List of Private Observatories

Appendix A includes Table 1, a complete list with the names of all observatories.

Table 1
List of Private Observatories Beyond the List of Affiliations

Observer(s)	Observatory
Vikrant Kumar Agnihotri, Kuldip Vora	Cepheid Observatory, Rawatbhata, India
David Bennett	Rickford Observatory, UK
Paul Benni	Acton Sky Portal Observatory, Acton, MA, USA
Emmanuel Besson	Observatoire des Loges, Buffières, France
Leon Bewersdorff	Observatory Kipshoven, Germany
Patrick Brandebourg	Observatoire du Guernet, Bretagne, France
Stephen M. Brincat	Flarestar Observatory (MPC:171), San Gwann, Malta
Mauro Caló	Cavallino Observatory, Tuscany, Italy
Roland Casali	Alto2000 Observatory, Italy
Fran Campos	Puig d'Agulles Observatory, Passatge Bosc, 1, 08759 Vallirana, Barcelona, Catalonia, Spain
Martin Valentine Crow	Burnham Observatory, UK
Bruno Dauchet	Saint Véran Observatory, France
Marc Deldem	Les Barres Observatory, Lamanon, France
Dimitrios Deligeorgopoulos	Artemis Observatory, Evrytania, Greece
Nicolas Esseiva	Saint Martin Observatory, France
Josep Gaitan	MAS MOIXA Observatory
Ferran Grau Horta	Observatori de Ca l'Ou, Sant Martí Sesgueioles, Spain
Francois Hurter	Albireo Observatory, Switzerland
Adrian Jones	I64 Observatory, Maidenhead, UK
Didier Laloum	Observatoire Privé du Mont (OPM) 40280 Saint-Pierre-du-Mont, France
Massimiliano Mannucci	Osservatorio Astronomico Margherita Hack, Italy
Antonio Marino, Andrea Tomacelli	Telescopio Remoto Colacevich c/o Osservatorio Astronomico di Capodimonte di Napoli
Mike Miller	Georgetown Observatory, Georgetown, TX, USA
Thomas Mollier	Tomastro Observatory, Italy
Nico Montigiani	Osservatotrio Astronomico Margherita Hack, Firenze, Italy
Fabio Mortari	Hypatia Observatory, Italy
Nikolaos Paschalis	Nunki Observatory, Skiathos, Greece
Valère Perroud	Observatoire de Duines, France
Mark Phillips	Forthimage Observatory, UK
Jean-Bernard Pioppa	La Roque-Esclapon, France
Manfred Raetz	Privat Observatory Herges-Hallenberg, Germany
François Regembal	HRT Observatory, Spain
Keith Rickard	Putlands Observatory, UK
Mark Roberts, Dave Shave-Wall	IMT3 Observatory, UK
Lionel Rousselot	Vierzon Observatory, France
Xesco Rubia	Stupa Observatori, Centelles, Catalonia, Spain
John Savage	Z42, Rushay Farm Observatory, Dorset, UK
Danilo Sedita	Osservatorio Sedita Castrofilippo, Italy
Nick Sioulas	NOAK Observatory L02, Greece
Vojtěch Školník	Broumov NM Observatory, Czech Republic
Dimitris Stouraitis	Galileo Observatory, Greece
Geoffrey Thurston	I67, Hartley Wintney, UK
AlbertoTomatis	Alto-Observatory, Italy
Bob Trevan	IMT3 Observatory, UK
Pierre Valeau	Observatoire de l'Aiguillon sur Mer, France
Bernhard Wenzel	Balcony Observatory Vienna, Austria
David E. Wright	Yorick Observatory, UK

Appendix B
Full List of Updated Ephemerides

Appendix B includes Table 2, a complete list with all ephemerides.

Table 2
Full List of Updated Ephemerides and References

Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
CoRoT-2b	2457347.04314 ± 0.00012	1.74299700 ± 0.00000011	1. Alonso et al. (2008a), Öztürk & Erdem (2019), Rauer et al. (2010) 2. Bruno et al. (2016) 3. Alonso et al. (2008a) 4. Chavero et al. (2010)
GJ436b	2454873.01582 ± 0.00004	2.64389751 ± 0.00000012	1. Knutson et al. (2014), Cáceres et al. (2009), Turner et al. (2016), Shporer et al. (2009b), Gillon et al. (2007a), Southworth (2008), Deming et al. (2007), Ribas et al. (2008), Alonso et al. (2008b), Gillon et al. (2007b), Bean & Seifahrt (2008), Beaulieu et al. (2011) 2. Lanotte et al. (2014) 3. Knutson et al. (2011) 4. Torres et al. (2008)
GJ1214b	2455881.579310 ± 0.000022	1.58040454 ± 0.00000004	1. Berta et al. (2011),Fraine et al. (2013), Cáceres et al. (2014), Harpsœ et al. (2013), Mallonn et al. (2019a) 2. Cáceres et al. (2014) 3. Berta et al. (2012) 4. Charbonneau et al. (2009)
HAT-P-1b	2455801.77390 ± 0.00018	4.4652992 ± 0.0000004	1. Winn et al. (2007b), Johnson et al. (2008), Turner et al. (2016) 2. Nikolov et al. (2014) 3. Nikolov et al. (2014) 4. Torres et al. (2008)
HAT-P-3b	2455694.72623 ± 0.00008	2.89973826 ± 0.00000015	1. Torres et al. (2007), Chan et al. (2011), Gibson et al. (2010), Mancini et al. (2018), Nascimbeni et al. (2011a), Sada et al. (2012) 2. Chan et al. (2011) 4. Chan et al. (2011) 4. Torres et al. (2008)
HAT-P-4b	2454740.97205 ± 0.00020	3.0565233 ± 0.0000006	1. Kovács et al. (2007), Winn et al. (2011), Christiansen et al. (2011) 2. Sada et al. (2012) 3. Christiansen et al. (2011) 4. Torres et al. (2008)
HAT-P-5b	2455705.72567 ± 0.00024	2.7884735 ± 0.0000005	1. Turner et al. (2017), Bakos et al. (2007), Southworth et al. (2012b) 2. Southworth et al. (2012b) 3. Torres et al. (2008) 4. Torres et al. (2008)
HAT-P-6b	2455260.92994 ± 0.00021	3.8529962 ± 0.0000005	1. Noyes et al. (2008), Todorov et al. (2012) 2. Noyes et al. (2008) 3. Torres et al. (2008) 4. Noyes et al. (2008)
HAT-P-7b	2455174.8326 ± 0.0003	2.2047363 ± 0.0000007	1. Pál et al. (2008), Christiansen et al. (2010), Wong et al. (2016) 2. Holczer et al. (2016) 3. Wong et al. (2016) 4. Pál et al. (2008)
HAT-P-8b	2455945.0839 ± 0.0003	3.0763433 ± 0.0000007	1. Latham et al. (2009), Mancini et al. (2013c) 2. Mancini et al. (2013c) 3. Mancini et al. (2013c) 4. Latham et al. (2009)

Table 2
(Continued)

Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
HAT-P-9b	2455473.14492 ± 0.00023	3.9228105 ± 0.0000008	1. Shporer et al. (2009a), Dittmann et al. (2012), Wang et al. (2019) 2. Wang et al. (2019) 3. Wang et al. (2019) 4. Shporer et al. (2009a)
HAT-P-11b	2455109.335119 ± 0.000021	4.8878009 ± 0.0000003	1. Murgas et al. (2019), Tsiaras et al. (2018), Deming et al. (2011), Winn et al. (2010), Bakos et al. (2010), Sada et al. (2012) 2. Holczer et al. (2016) 3. Bakos et al. (2010) 4. Bakos et al. (2010)
HAT-P-12b	2456716.53270 ± 0.00006	3.21305751 ± 0.00000017	1. Öztürk & Erdem (2019), Turner et al. (2017), Sada & Ramón-Fox (2016), Mallonn et al. (2015a), Lee et al. (2012), Sada et al. (2012), Line et al. (2013), Alexoudi et al. (2018), Hartman et al. (2009), Mancini et al. (2018), Hinse et al. (2015), Yan et al. (2020) 2. Sada & Ramón-Fox (2016) 4. Hartman et al. (2009) 4. Hartman et al. (2009)
HAT-P-13b	2455456.49826 ± 0.00016	2.9162431 ± 0.0000006	1. Nascimbeni et al. (2011b), Sada & Ramón-Fox (2016), Fulton et al. (2011), Turner et al. (2016), Bakos et al. (2009), Pál et al. (2011), Southworth et al. (2012a) 2. Sada & Ramón-Fox (2016) 4. Bakos et al. (2009) 4. Bakos et al. (2009)
HAT-P-14b	2455421.35484 ± 0.00022	4.6276623 ± 0.0000010	1. Torres et al. (2010), Nascimbeni et al. (2011a) 2. Fukui et al. (2016) 4. Fukui et al. (2016) 4. Torres et al. (2010)
HAT-P-16b	2455968.64684 ± 0.00013	2.7759677 ± 0.0000003	1. Sada & Ramón-Fox (2016), Buchhave et al. (2010), Turner et al. (2016), Pearson et al. (2014), Ciceri et al. (2013) 2. Sada & Ramón-Fox (2016) 4. Buchhave et al. (2010) 4. Buchhave et al. (2010)
HAT-P-17b	2456569.05972 ± 0.00005	10.3385346 ± 0.0000009	1. Tsiaras et al. (2018), Howard et al. (2012) 2. Howard et al. (2012) 4. Howard et al. (2012) 4. Howard et al. (2012)
HAT-P-18b	2457276.25646 ± 0.00010	5.5080300 ± 0.0000008	1. Hartman et al. (2011b), Seeliger et al. (2015), Kirk et al. (2017) 2. Seeliger et al. (2015) 4. Kirk et al. (2017) 4. Hartman et al. (2011b)
HAT-P-19b	2456899.49658 ± 0.00010	4.0087842 ± 0.0000004	1. Hartman et al. (2011b), Seeliger et al. (2015), Mallonn et al. (2015b), Baştürk et al. (2020) 2. Seeliger et al. (2015) 4. Hartman et al. (2011b) 4. Hartman et al. (2011b)
HAT-P-20b	2456705.48183 ± 0.00007	2.87531693 ± 0.00000024	1. Sun et al. (2017), Bakos et al. (2011), Granata et al. (2014), Esposito et al. (2017) 2. Bakos et al. (2011) 3 Bakos et al. (2011) 4. Bakos et al. (2011)
HAT-P-22b	2456603.79429 ± 0.00014	3.2122330 ± 0.0000003	1. Turner et al. (2016), Bakos et al. (2011), Hinse et al. (2015) 2. Bakos et al. (2011) 3. Bakos et al. (2011) 4. Bakos et al. (2011)

Table 2
(Continued)

Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
HAT-P-23b	2457575.19549 ± 0.00008	1.21288644 ± 0.00000008	1. Maciejewski et al. (2018), Sada & Ramón-Fox (2016), Bakos et al. (2011), Patra et al. (2020) 2. Sada & Ramón-Fox (2016) 3. Ciceri et al. (2015) 4. Bakos et al. (2011)
HAT-P-24b	2455800.7899 ± 0.0003	3.3552460 ± 0.0000009	1. Kipping et al. (2010), Wang et al. (2013), Kjurkchieva et al. (2016) 2. Kipping et al. (2010) 3. Kipping et al. (2010) 4. Kipping et al. (2010)
HAT-P-25b Mallonn et al. (2019b), Wang et al. (2018b), Quinn et al. (2012)	2456590.49235 ± 0.00022	3.6528162 ± 0.0000008	2. Mallonn et al. (2019b) 3. Wang et al. (2018b) 4. Quinn et al. (2012)
HAT-P-26b	2456892.59046 ± 0.00010	4.2345002 ± 0.0000007	1. von Essen et al. (2019), Hartman et al. (2011a), Tsiaras et al. (2018), Wakeford et al. (2017), Stevenson et al. (2016) 2. Stevenson et al. (2016) 3. Hartman et al. (2011a) 4. Hartman et al. (2011a)
HAT-P-27b	2456638.93852 ± 0.00012	3.03957780 ± 0.00000025	1. Béky et al. (2011), Seeliger et al. (2015), Sada et al. (2012), Anderson et al. (2011a) 2. Seeliger et al. (2015) 3. Béky et al. (2011) 4. Béky et al. (2011)
HAT-P-28b	2458124.34308 ± 0.00022	3.2572129 ± 0.0000006	1. Buchhave et al. (2011) 2. Buchhave et al. (2011) 3. Buchhave et al. (2011) 4. Buchhave et al. (2011)
HAT-P-29b	2457240.8218 ± 0.0004	5.7233710 ± 0.0000024	1. Buchhave et al. (2011), Wang et al. (2018a) 2. Mallonn et al. (2019b) 4. Wang et al. (2018a) 4. Buchhave et al. (2011)
HAT-P-30b	2455931.45837 ± 0.00018	2.8106016 ± 0.0000005	1. Maciejewski et al. (2016b), Johnson et al. (2011), Enoch et al. (2011a) 2. Maciejewski et al. (2016b) 4. Maciejewski et al. (2016b) 4. Johnson et al. (2011)
HAT-P-32b	2456209.25393 ± 0.00005	2.15000825 ± 0.00000010	1. Tregloan-Reed et al. (2018), Hartman et al. (2011c), Gibson et al. (2013a), Zhao et al. (2014), Seeliger et al. (2014), Wang et al. (2019), Mallonn & Strassmeier (2016) 2. Hartman et al. (2011c) 3. Wang et al. (2019) 4. Hartman et al. (2011c)
HAT-P-33b	2456601.47713 ± 0.00012	3.4744767 ± 0.0000003	1. Hartman et al. (2011c), Wang et al. (2017) 2. Hartman et al. (2011c) 3. Hartman et al. (2011c) 4. Hartman et al. (2011c)
HAT-P-36b	2457334.53507 ± 0.00010	1.32734682 ± 0.00000012	1. Wang et al. (2019), Bakos et al. (2012) 2. Mancini et al. (2015a) 3. Wang et al. (2019) 4. Bakos et al. (2012)

Table 2
(Continued)

Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
HAT-P-37b	2457754.21279 ± 0.00015	2.7974424 ± 0.0000004	1. Bakos et al. (2012), Maciejewski et al. (2016b), Turner et al. (2017) 2. Maciejewski et al. (2016b) 4. Maciejewski et al. (2016b) 4. Bakos et al. (2012)
HAT-P-38b	2457515.07748 ± 0.00011	4.6403288 ± 0.0000011	1. Bruno et al. (2018a), Mallonn et al. (2019b), Sato et al. (2012) 2. Mallonn et al. (2019b) 3. Sato et al. (2012) 4. Sato et al. (2012)
HAT-P-40b	2456414.9009 ± 0.0005	4.4572173 ± 0.0000017	1. Hartman et al. (2012) 2. Hartman et al. (2012) 3. Hartman et al. (2012) 4. Hartman et al. (2012)
HAT-P-41b	2458071.24389 ± 0.00012	2.6940497 ± 0.0000008	1. Hartman et al. (2012), Wakeford et al. (2020) 2. Hartman et al. (2012) 4. Hartman et al. (2012) 4. Hartman et al. (2012)
HAT-P-44b	2457284.0768 ± 0.0004	4.3011900 ± 0.0000010	1. Hartman et al. (2014) 2. Mallonn et al. (2019b) 3. Hartman et al. (2014) 4. Hartman et al. (2014)
HAT-P-49b	2457077.8963 ± 0.0005	2.6915535 ± 0.0000012	1. Bieryla et al. (2014) 2. Bieryla et al. (2014) 3. Bieryla et al. (2014) 4. Bieryla et al. (2014)
HAT-P-50b	2456526.3049 ± 0.0003	3.1220018 ± 0.0000013	1. Hartman et al. (2015b) 2. Hartman et al. (2015b) 3. Hartman et al. (2015b) 4. Hartman et al. (2015b)
HAT-P-51b	2457868.67797 ± 0.00024	4.2180226 ± 0.0000009	1. Hartman et al. (2015b) 2. Hartman et al. (2015b) 3. Hartman et al. (2015b) 4. Hartman et al. (2015b)
HAT-P-52b	2456581.8074 ± 0.0004	2.7535973 ± 0.0000013	1. Hartman et al. (2015b) 2. Mallonn et al. (2019b) 3. Hartman et al. (2015b) 4. Hartman et al. (2015b)
HAT-P-53b	2457502.7149 ± 0.0003	1.9616248 ± 0.0000004	1. Hartman et al. (2015b) 2. Hartman et al. (2015b) 3. Hartman et al. (2015b) 4. Hartman et al. (2015b)
HAT-P-54b	2458419.62257 ± 0.00019	3.7998534 ± 0.0000008	1. Bakos et al. (2015) 2. Bakos et al. (2015) 3. Bakos et al. (2015) 4. Bakos et al. (2015)
HAT-P-55b	2457720.3595 ± 0.0003	3.5852329 ± 0.0000012	1. Juncher et al. (2015) 2. Juncher et al. (2015) 3. Juncher et al. (2015) 4. Juncher et al. (2015)
HAT-P-56b	2457700.6456 ± 0.0004	2.7908235 ± 0.0000009	1. Huang et al. (2015) 2. Huang et al. (2015) 3. Huang et al. (2015) 4. Huang et al. (2015)

Table 2
(Continued)

Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
HAT-P-57b	2457159.6765 ± 0.0006	2.4652946 ± 0.0000007	1. Hartman et al. (2015c) 2. Hartman et al. (2015c) 4. Hartman et al. (2015c) 4. Hartman et al. (2015c)
HAT-P-65b	2457149.2808 ± 0.0004	2.6054485 ± 0.0000009	1. Hartman et al. (2016) 2. Hartman et al. (2016) 4. Hartman et al. (2016) 4. Hartman et al. (2016)
HATS-1b	2457901.9514 ± 0.0004	3.4464553 ± 0.0000008	1. Penev et al. (2013) 2. Penev et al. (2013) 3. Penev et al. (2013) 4. Penev et al. (2013)
HATS-4b	2457086.8394 ± 0.0003	2.5167278 ± 0.0000005	1. Jordán et al. (2014) 2. Jordán et al. (2014) 4. Jordán et al. (2014) 4. Jordán et al. (2014)
HATS- 5b	2456392.8762 ± 0.0003	4.763390 ± 0.000003	1. Zhou et al. (2014) 2. Zhou et al. (2014) 3. Zhou et al. (2014) 4. Zhou et al. (2014)
HATS-6b	2456660.36771 ± 0.00013	3.3252722 ± 0.0000025	1. Hartman et al. (2015a) 2. Hartman et al. (2015a) 3. Hartman et al. (2015a) 4. Hartman et al. (2015a)
HATS-13b	2456824.32250 ± 0.00023	3.0440546 ± 0.0000007	1. Mancini et al. (2015b) 2. Mancini et al. (2015b) 4. Mancini et al. (2015b) 4. Mancini et al. (2015b)
HATS-22b	2457768.11264 ± 0.00023	4.7228189 ± 0.0000012	1. Bento et al. (2017) 2. Bento et al. (2017) 3. Bento et al. (2017) 4. Bento et al. (2017)
HATS-24b	2458237.2874 ± 0.0005	1.3484963 ± 0.0000007	1. Bento et al. (2017) 2. Bento et al. (2017) 3. Bento et al. (2017) 4. Bento et al. (2017)
HATS-29b	2457851.8034 ± 0.0005	4.6058791 ± 0.0000024	1. Espinoza et al. (2016) 2. Espinoza et al. (2016) 3. Espinoza et al. (2016) 4. Espinoza et al. (2016)
HATS-30b	2457912.20039 ± 0.00026	3.1743516 ± 0.0000007	1. Espinoza et al. (2016) 2. Espinoza et al. (2016) 3. Espinoza et al. (2016) 4. Espinoza et al. (2016)
HATS-33b	2458090.7093 ± 0.0005	2.5495627 ± 0.0000011	1. de Val-Borro et al. (2016) 2. de Val-Borro et al. (2016) 4. de Val-Borro et al. (2016) 4. de Val-Borro et al. (2016)
HATS-35b	2457899.5875 ± 0.0003	1.8210014 ± 0.0000006	1. de Val-Borro et al. (2016) 2. de Val-Borro et al. (2016) 3. de Val-Borro et al. (2016) 4. de Val-Borro et al. (2016)

Table 2
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Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
HATS-43b	2458039.86444 ± 0.00022	4.3888499 ± 0.0000014	1. Brahm et al. (2018) 2. Brahm et al. (2018) 3. Brahm et al. (2018) 4. Brahm et al. (2018)
HD189733b	2454403.677711 ± 0.000025	2.21857519 ± 0.00000014	1. Hrudková et al. (2010), Agol et al. (2010), Baluev et al. (2015) 2. Agol et al. (2010) 3. Morello et al. (2014) 4. Torres et al. (2008)
HD209458b	2455015.49844 ± 0.00012	3.5247499 ± 0.0000003	1. Miller-Ricci et al. (2008), Deming et al. (2013) 2. Knutson et al. (2007) 3. Torres et al. (2008) 4. Torres et al. (2008)
K2-25b	2457620.11054 ± 0.00008	3.4845627 ± 0.0000009	1. Kain et al. (2020), Mann et al. (2016) 2. Mann et al. (2016) 3. Mann et al. (2016) 4. Mann et al. (2016)
K2-29b	2458508.0943 ± 0.0003	3.2588315 ± 0.0000009	1. Santerne et al. (2016) 2. Santerne et al. (2016) 4. Santerne et al. (2016) 4. Santerne et al. (2016)
K2-30b	2457395.78391 ± 0.00013	4.0984791 ± 0.0000007	1. Johnson et al. (2016) 2. Johnson et al. (2016) 3. Johnson et al. (2016) 4. Johnson et al. (2016)
K2-237b	2457861.43410 ± 0.00013	2.1805330 ± 0.0000007	1. Edwards et al. (2021), Soto et al. (2018) 2. Soto et al. (2018) 3. Soto et al. (2018) 4. Soto et al. (2018)
K2- 260b	2457836.49912 ± 0.00010	2.6266974 ± 0.0000017	1. Johnson et al. (2018) 2. Johnson et al. (2018) 3. Johnson et al. (2018) 4. Johnson et al. (2018)
KELT-1b	2456981.90516 ± 0.00014	1.21749399 ± 0.00000016	1. Beatty et al. (2019, 2020), Siverd et al. (2012), Beatty et al. (2014, 2017), Maciejewski et al. (2018) 2. Beatty et al. (2019) 3. Beatty et al. (2019) 4. Siverd et al. (2012)
KELT-3b	2456666.8880 ± 0.0004	2.7033878 ± 0.0000010	1. Pepper et al. (2013) 2. Mallonn et al. (2019b) 3. Pepper et al. (2013) 4. Pepper et al. (2013)
KELT-7b	2458343.40408 ± 0.00010	2.7347657 ± 0.0000004	1. Bieryla et al. (2015), Pluriel et al. (2020), Garhart et al. (2020) 2. Bieryla et al. (2015) 3. Bieryla et al. (2015) 4. Bieryla et al. (2015)
KELT-15b	2458564.05392 ± 0.00020	3.329475 ± 0.000004	1. Edwards et al. (2021), Rodriguez et al. (2016) 2. Rodriguez et al. (2016) 3. Rodriguez et al. (2016) 4. Rodriguez et al. (2016)
KELT-16b	2458136.78366 ± 0.00011	0.96899328 ± 0.00000019	1. Oberst et al. (2017), Maciejewski et al. (2018), Patra et al. (2020) 2. Oberst et al. (2017) 3. Oberst et al. (2017) 4. Oberst et al. (2017)

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Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
KELT-18b	2457838.3101 ± 0.0004	2.8717023 ± 0.0000019	1. McLeod et al. (2017) 2. McLeod et al. (2017) 3. McLeod et al. (2017) 4. McLeod et al. (2017)
Kepler-6b	2455006.24253 ± 0.00008	3.2346990 ± 0.0000009	1. Dunham et al. (2010), Kipping & Bakos (2011a) 2. Holczer et al. (2016) 3. Esteves et al. (2015) 4. Dunham et al. (2010)
Kepler-12b	2455004.009119 ± 0.000020	4.4379654 ± 0.0000011	1. Fortney et al. (2011) 2. Holczer et al. (2016) 3. Esteves et al. (2015) 4. Fortney et al. (2011)
Kepler-447b	2454970.26082 ± 0.00011	7.794303 ± 0.000003	1. Holczer et al. (2016) 2. Holczer et al. (2016) 3. Lillo-Box et al. (2015) 4. Lillo-Box et al. (2015)
Kepler-854b	2454966.985381 ± 0.000010	2.1446334 ± 0.0000007	1. Morton et al. (2016) 2. Gajdoš et al. (2019) 3. Morton et al. (2016) 4. Morton et al. (2016)
KPS-1b	2458678.90907 ± 0.00026	1.7063241 ± 0.0000015	1. Burdanov et al. (2018) 2. Burdanov et al. (2018) 3. Burdanov et al. (2018) 4. Burdanov et al. (2018)
Qatar-1b	2457026.47712 ± 0.00005	1.42002461 ± 0.00000007	1. von Essen et al. (2013), Püsküllü et al. (2017), Alsubai et al. (2011), Covino et al. (2013), Maciejewski et al. (2015), Collins et al. (2017) 2. Collins et al. (2017) 3. Collins et al. (2017) 4. Alsubai et al. (2011)
Qatar-2b	2457173.98591 ± 0.00003	1.33711716 ± 0.00000012	1. Dai et al. (2017), Mancini et al. (2014a), Bryan et al. (2012) 2. Močnik et al. (2017b) 3. Močnik et al. (2017b) 4. Bryan et al. (2012)
Qatar-4b	2458767.93317 ± 0.00014	1.8053646 ± 0.0000006	1. Alsubai et al. (2017), Mallonn et al. (2019b) 2. Mallonn et al. (2019b) 3. Alsubai et al. (2017) 4. Alsubai et al. (2017)
Qatar-5b	2457489.36120 ± 0.00017	2.8793002 ± 0.0000010	1. Alsubai et al. (2017), Mallonn et al. (2019b) 2. Mallonn et al. (2019b) 3. Alsubai et al. (2017) 4. Alsubai et al. (2017)
TrES-1b	2454110.97865 ± 0.00006	3.03007008 ± 0.00000010	1. Alonso et al. (2004), Charbonneau et al. (2005), Cubillos et al. (2014), Winn et al. (2007a), Narita et al. (2007), Raetz et al. (2009a), Rabus et al. (2009) 2. Sada et al. (2012) 3. Torres et al. (2008) 4. Torres et al. (2008)
TrES-2b	2455148.47118 ± 0.00003	2.47061373 ± 0.00000009	1. Öztürk & Erdem (2019), Christiansen et al. (2011), O'Donovan et al. (2006), Turner et al. (2016), Raetz et al. (2009b, 2014), Holman et al. (2007), Mislis et al. (2010), Kipping & Bakos (2011b) 2. Holczer et al. (2016) 3. Esteves et al. (2015) 4. Torres et al. (2008)

Table 2
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Planet	New T_0 (BJD$_{TDB}$)	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
TrES-3b	2457536.279521 ± 0.000018	1.30618639 ± 0.00000003	1. O'Donovan et al. (2007), Sozzetti et al. (2009), Gibson et al. (2009), Colón et al. (2010), Christiansen et al. (2011), Turner et al. (2013), Kundurthy et al. (2013), Stefansson et al. (2017), Püsküllü et al. (2017), Mannaday et al. (2020), Parviainen et al. (2016) 2. Jiang et al. (2013) 3. Christiansen et al. (2011) 4. Torres et al. (2008)
TrES-4b	2455364.6085 ± 0.0003	3.5539266 ± 0.0000008	1. Mandushev et al. (2007), Sozzetti et al. (2009), Chan et al. (2011) 2. Sozzetti et al. (2015) 3. Sozzetti et al. (2015) 4. Torres et al. (2008)
TrES-5b	2456833.60080 ± 0.00006	1.48224718 ± 0.00000009	1. Mandushev et al. (2011), Mislis et al. (2015), Sokov et al. (2018) 2. Maciejewski et al. (2016b) 3. Maciejewski et al. (2016b) 4. Mandushev et al. (2011)
WASP-1b	2455215.32701 ± 0.00015	2.51994713 ± 0.00000026	1. Shporer et al. (2007), Collier Cameron et al. (2007), Turner et al. (2016), Charbonneau et al. (2007), Simpson et al. (2011a), Albrecht et al. (2011), Granata et al. (2014) 2. Maciejewski et al. (2014) 3. Maciejewski et al. (2014) 4. Torres et al. (2008)
WASP-2b	2455097.75755 ± 0.00007	2.15222231 ± 0.00000015	1. Charbonneau et al. (2007), Southworth et al. (2010), Becker et al. (2013), Addison et al. (2019) 2. Sada et al. (2012) 3. Southworth et al. (2010) 4. Torres et al. (2008)
WASP-3b	2455554.83317 ± 0.00007	1.84683511 ± 0.00000013	1. Nascimbeni et al. (2013), Pollacco et al. (2008), Christiansen et al. (2011), Gibson et al. (2008), Tripathi et al. (2010), Sada et al. (2012), Maciejewski et al. (2010, 2013b), Montalto et al. (2012), Eibe et al. (2012), Baluev et al. (2019) 2. Christiansen et al. (2011) 3. Christiansen et al. (2011) 4. Pollacco et al. (2008)
WASP-4b	2455880.79492 ± 0.00003	1.33823144 ± 0.00000003	1. Wilson et al. (2008), Winn et al. (2009a), Southworth et al. (2009a, 2019), Sanchis-Ojeda et al. (2011), Hoyer et al. (2013), Gillon et al. (2009b), Dragomir et al. (2011), Huitson et al. (2017) 2. Southworth et al. (2019) 3. Bouma et al. (2019) 4. Wilson et al. (2008)
WASP-5b	2455017.22682 ± 0.00007	1.62843033 ± 0.00000011	1. Anderson et al. (2008), Southworth et al. (2009b), Fukui et al. (2011), Gillon et al. (2009b), Triaud et al. (2010), Hoyer et al. (2012), Dragomir et al. (2011), Moyano et al. (2017) 2. Hoyer et al. (2012) 3. Fukui et al. (2011) 4. Anderson et al. (2008)
WASP- 6b	2455591.28967 ± 0.00007	3.36100207 ± 0.00000021	1. Bouma et al. (2019), Kammer et al. (2015), Nikolov et al. (2015), Tregloan-Reed et al. (2015), Dragomir et al. (2011), Gillon et al. (2009a), Baluev et al. (2019) 2. Tregloan-Reed et al. (2015) 3. Gillon et al. (2009a) 4. Gillon et al. (2009a)

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Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
WASP-10b	2455638.24761 ± 0.00004	3.09272826 ± 0.00000010	1. Barros et al. (2013), Dittmann et al. (2010), Christian et al. (2009), Maciejewski et al. (2011a, 2011c), Krejčová & Budaj (2010), Sada & Ramón-Fox (2016) 2. Sada & Ramón-Fox (2016) 3. Johnson et al. (2009b) 4. Christian et al. (2009)
WASP-11b	2456200.28683 ± 0.00009	3.7224790 ± 0.0000003	1. West et al. (2009a), Wang et al. (2014), Sada et al. (2012), Mancini et al. (2015a) 2. Mancini et al. (2015a) 3. Wang et al. (2014) 4. West et al. (2009a)
WASP-12b	2456594.68160 ± 0.00004	1.09141964 ± 0.00000004	1. Öztürk & Erdem (2019), Maciejewski et al. (2011b, 2013a, 2016a, 2018), Collins et al. (2017), Hebb et al. (2009), Haswell et al. (2012), Sing et al. (2013), Chan et al. (2011), Stevenson et al. (2014), Kreidberg et al. (2015), Patra et al. (2017), Yee et al. (2020) 2. Collins et al. (2017) 3. Collins et al. (2017) 4. Hebb et al. (2009)
WASP-14b	2455643.79792 ± 0.00011	2.24376628 ± 0.00000024	1. Joshi et al. (2009), Johnson et al. (2009a), Blecic et al. (2013), Raetz et al. (2015), Wong et al. (2015) 2. Wong et al. (2015) 3. Wong et al. (2015) 4. Joshi et al. (2009)
WASP-15b	2455890.4286 ± 0.0003	3.7520987 ± 0.0000016	1. West et al. (2009b), Southworth et al. (2013) 2. Southworth et al. (2013) 3. Southworth et al. (2013) 4. West et al. (2009b)
WASP-16b	2455732.07584 ± 0.00022	3.1186037 ± 0.0000007	1. Southworth et al. (2013), Lister et al. (2009) 2. Southworth et al. (2013) 3. Southworth et al. (2013) 4. Lister et al. (2009)
WASP-18b	2455562.11007 ± 0.00007	0.94145254 ± 0.00000008	1. Maxted et al. (2013b), Wilkins et al. (2017), Hellier et al. (2009) 2. Triaud et al. (2010) 3. Shporer et al. (2019) 4. Hellier et al. (2009)
WASP-19b	2456688.273095 ± 0.000023	0.788839195 ± 0.000000019	1. Hebb et al. (2010), Tregloan-Reed et al. (2013), Lendl et al. (2013), Mancini et al. (2013a), Huitson et al. (2013), Sedaghati et al. (2015), Espinoza et al. (2019), Bean et al. (2013), Petrucci et al. (2020) 2. Wong et al. (2016) 3. Wong et al. (2016) 4. Hebb et al. (2010)
WASP-20b	2456367.3093 ± 0.0004	4.8996461 ± 0.0000016	1. Anderson et al. (2015a) 2. Anderson et al. (2015a) 3. Evans et al. (2016) 4. Anderson et al. (2015a)
WASP-21b	2457660.73516 ± 0.00016	4.3225038 ± 0.0000008	1. Bouchy et al. (2010), Seeliger et al. (2015), Ciceri et al. (2013), Chen et al. (2020), Alderson et al. (2020) 2. Seeliger et al. (2015) 3. Bouchy et al. (2010) 4. Bouchy et al. (2010)

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Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
WASP-23b	2456333.00703 ± 0.00008	2.94442732 ± 0.00000022	1. Triaud et al. (2011), Nikolov et al. (2013) 2. Triaud et al. (2011) 3. Triaud et al. (2011) 4. Triaud et al. (2011)
WASP-24b	2455402.12744 ± 0.00015	2.3412202 ± 0.0000003	1. Street et al. (2010), Turner et al. (2017) 2. Southworth et al. (2014) 3. Southworth et al. (2014) 4. Street et al. (2010)
WASP-25b	2456396.9176 ± 0.0004	3.7648334 ± 0.0000009	1. Enoch et al. (2011b) 2. Southworth et al. (2014) 3. Southworth et al. (2014) 4. Enoch et al. (2011b)
WASP-26b	2456631.49797 ± 0.00023	2.7565963 ± 0.0000006	1. Smalley et al. (2010), Southworth et al. (2014) 2. Southworth et al. (2014) 3. Southworth et al. (2014) 4. Smalley et al. (2010)
WASP-28b	2457683.40894 ± 0.00003	3.4088353 ± 0.0000003	1. Močnik et al. (2020), Anderson et al. (2015a), Maciejewski et al. (2016b), Petrucci et al. (2015) 2. Maciejewski et al. (2016b) 3. Maciejewski et al. (2016b) 4. Anderson et al. (2015a)
WASP-29b	2456347.98683 ± 0.00014	3.9227124 ± 0.0000004	1. Hellier et al. (2010), Dragomir et al. (2011), Gibson et al. (2013b) 2. Hellier et al. (2010) 3. Gibson et al. (2013b) 4. Hellier et al. (2010)
WASP-31b	2456183.80208 ± 0.00020	3.4058841 ± 0.0000008	1. Sing et al. (2015), Anderson et al. (2011b), Dragomir et al. (2011) 2. Anderson et al. (2011b) 3. Anderson et al. (2011b) 4. Anderson et al. (2011b)
WASP-32b	2456893.71806 ± 0.00017	2.7186631 ± 0.0000004	1. Sada et al. (2012), Maxted et al. (2010), Sun et al. (2015) 2. Sada et al. (2012) 3. Maxted et al. (2010) 4. Maxted et al. (2010)
WASP-35b	2455932.99920 ± 0.00015	3.1615699 ± 0.0000004	1. Enoch et al. (2011a) 2. Enoch et al. (2011a) 3. Enoch et al. (2011a) 4. Enoch et al. (2011a)
WASP-36b	2456526.07935 ± 0.00006	1.53736541 ± 0.00000011	1. Mancini et al. (2016b), Turner et al. (2016), Smith et al. (2012), Wong et al. (2020) 2. Mancini et al. (2016b) 3. Mancini et al. (2016b) 4. Smith et al. (2012)
WASP-37b	2457524.4596 ± 0.0003	3.5774793 ± 0.0000008	1. Mallonn et al. (2019b), Simpson et al. (2011b) 2. Mallonn et al. (2019b) 3. Simpson et al. (2011b) 4. Simpson et al. (2011b)
WASP-43b	2456047.051715 ± 0.000022	0.81347414 ± 0.00000003	1. Hellier et al. (2011), Hoyer et al. (2016), Gillon et al. (2012), Murgas et al. (2014), Chen et al. (2014), Jiang et al. (2016), Esposito et al. (2017), Sun et al. (2018) 2. Hoyer et al. (2016) 3. Hoyer et al. (2016) 4. Hellier et al. (2011)

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Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
WASP-44b	2456006.39613 ± 0.00009	2.4238107 ± 0.0000003	1. Anderson et al. (2012), Turner et al. (2016), Mancini et al. (2013b), Moyano et al. (2017), Addison et al. (2019) 2. Anderson et al. (2012) 3. Anderson et al. (2012) 4. Anderson et al. (2012)
WASP-45b	2458254.7392 ± 0.0003	3.1260777 ± 0.0000008	1. Addison et al. (2019), Anderson et al. (2012), Edwards et al. (2021) 2. Ciceri et al. (2016) 3. Ciceri et al. (2016) 4. Anderson et al. (2012)
WASP-46b	2456842.71410 ± 0.00017	1.43037222 ± 0.00000023	1. Anderson et al. (2012), Petrucci et al. (2018), Moyano et al. (2017) 2. Ciceri et al. (2016) 3. Ciceri et al. (2016) 4. Anderson et al. (2012)
WASP-47b	2456354.9460 ± 0.0003	4.1591496 ± 0.0000010	1. Hellier et al. (2012) 2. Vanderburg et al. (2017) 3. Vanderburg et al. (2017) 4. Hellier et al. (2012)
WASP-48b	2456176.98991 ± 0.00012	2.1436364 ± 0.0000003	1. Clark et al. (2018), Murgas et al. (2017), Turner et al. (2016), Enoch et al. (2011a), Ciceri et al. (2015) 2. Ciceri et al. (2015) 3. Ciceri et al. (2015) 4. Enoch et al. (2011a)
WASP-49b	2456198.14045 ± 0.00014	2.7817366 ± 0.0000005	1. Lendl et al. (2012, 2016) 2. Wyttenbach et al. (2017) 3. Wyttenbach et al. (2017) 4. Lendl et al. (2012)
WASP-50b	2457701.39451 ± 0.00023	1.9550928 ± 0.0000003	1. Gillon et al. (2011) 2. Tregloan-Reed & Southworth (2013) 3. Gillon et al. (2011) 4. Gillon et al. (2011)
WASP-52b	2456770.05972 ± 0.00004	1.74978119 ± 0.00000010	1. Öztürk & Erdem (2019), Bruno et al. (2018b), Chen et al. (2017), Louden et al. (2017), Mancini et al. (2017),Kirk et al. (2016), Hébrard et al. (2013),Baluev et al. (2015, 2019),Zellem et al. (2020) 2. Öztürk & Erdem (2019) 3. Hébrard et al. (2013) 4. Hébrard et al. (2013)
WASP-53b	2456284.48161 ± 0.00015	3.3098436 ± 0.0000005	1. Triaud et al. (2017) 2. Triaud et al. (2017) 3. Triaud et al. (2017) 4. Triaud et al. (2017)
WASP-55b	2456720.37845 ± 0.00010	4.4656299 ± 0.0000008	1. Southworth et al. (2016) 2. Southworth et al. (2016) 3. Southworth et al. (2016) 4. Hellier et al. (2012)
WASP-56b	2455841.60939 ± 0.00023	4.6170654 ± 0.0000021	1. Faedi et al. (2013) 2. Faedi et al. (2013) 3. Faedi et al. (2013) 4. Faedi et al. (2013)

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Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
WASP-57b	2456433.28630 ± 0.00010	2.8389180 ± 0.0000006	1. Southworth et al. (2015a) 2. Southworth et al. (2015a) 3. Southworth et al. (2015a) 4. Faedi et al. (2013)
WASP-58b	2457692.5406 ± 0.0004	5.0172137 ± 0.0000016	1. Hébrard et al. (2013) 2. Mallonn et al. (2019b) 3. Hébrard et al. (2013) 4. Hébrard et al. (2013)
WASP-60b	2458902.6003 ± 0.0006	4.305007 ± 0.000003	1. Hébrard et al. (2013) 2. Hébrard et al. (2013) 3. Hébrard et al. (2013) 4. Hébrard et al. (2013)
WASP-61b	2456152.57714 ± 0.00023	3.8558980 ± 0.0000010	1. Brown et al. (2017), Hellier et al. (2012) 2. Hellier et al. (2012) 3. Hellier et al. (2012) 4. Hellier et al. (2012)
WASP-62b	2458427.55327 ± 0.00004	4.4119395 ± 0.0000004	1. Hellier et al. (2012), Brown et al. (2017), Skaf et al. (2020) 2. Hellier et al. (2012) 3. Hellier et al. (2012) 4. Hellier et al. (2012)
WASP-64b	2456444.76501 ± 0.00012	1.57329025 ± 0.00000015	1. Kozłowski et al. (2017), Gillon et al. (2013) 2. Gillon et al. (2013) 3. Gillon et al. (2013) 4. Gillon et al. (2013)
WASP-65b	2456912.75129 ± 0.00019	2.3114217 ± 0.0000004	1. Gómez Maqueo Chew et al. (2013) 2. Gómez Maqueo Chew et al. (2013) 3. Gómez Maqueo Chew et al. (2013) 4. Gómez Maqueo Chew et al. (2013)
WASP-67b	2456618.05370 ± 0.00008	4.6144166 ± 0.0000004	1. Hellier et al. (2012), Mancini et al. (2014b), Bruno et al. (2018a) 2. Hellier et al. (2012) 3. Hellier et al. (2012) 4. Hellier et al. (2012)
WASP-69b	2457176.17789 ± 0.00017	3.8681390 ± 0.0000006	1. Anderson et al. (2014), Murgas et al. (2020), Tsiaras et al. (2018) 2. Anderson et al. (2014) 3. Anderson et al. (2014) 4. Anderson et al. (2014)
WASP-70Ab	2456319.4479 ± 0.0004	3.7130169 ± 0.0000012	1. Anderson et al. (2014) 2. Anderson et al. (2014) 3. Anderson et al. (2014) 4. Anderson et al. (2014)
WASP-74b	2457205.93774 ± 0.00010	2.1377516 ± 0.0000006	1. Hellier et al. (2015), Mancini et al. (2019) 2. Hellier et al. (2015) 3. Hellier et al. (2015) 4. Hellier et al. (2015)
WASP-75b	2457340.3450 ± 0.0003	2.4841987 ± 0.0000006	1. Gómez Maqueo Chew et al. (2013) 2. Gómez Maqueo Chew et al. (2013) 3. Gómez Maqueo Chew et al. (2013) 4. Gómez Maqueo Chew et al. (2013)
WASP-76b	2457273.4191 ± 0.0005	1.8098806 ± 0.0000007	1. West et al. (2016) 2. West et al. (2016) 3. West et al. (2016) 4. West et al. (2016)

Table 2
(Continued)

Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
WASP-77Ab	2456663.34757 ± 0.00012	1.36002922 ± 0.00000013	1. Maxted et al. (2013a), Turner et al. (2016), Cortés-Zuleta et al. (2020) 2. Maxted et al. (2013a) 3. Maxted et al. (2013a) 4. Maxted et al. (2013a)
WASP-78b	2456922.0975 ± 0.0003	2.1751852 ± 0.0000005	1. Brown et al. (2017), Smalley et al. (2012), Wong et al. (2020) 2. Smalley et al. (2012) 3. Smalley et al. (2012) 4. Smalley et al. (2012)
WASP-79b	2458200.47327 ± 0.00018	3.6623925 ± 0.0000021	1. Skaf et al. (2020), Smalley et al. (2012) 2. Smalley et al. (2012) 3. Smalley et al. (2012) 4. Smalley et al. (2012)
WASP-80b	2456671.49615 ± 0.00004	3.06785271 ± 0.00000019	1. Triaud et al. (2013), Mancini et al. (2014c), Fukui et al. (2014), Turner et al. (2017), Kirk et al. (2018) 2. Triaud et al. (2015) 3. Triaud et al. (2015) 4. Triaud et al. (2013)
WASP-81b	2456969.77318 ± 0.00020	2.7164835 ± 0.0000004	1. Triaud et al. (2017) 2. Triaud et al. (2017) 3. Triaud et al. (2017) 4. Triaud et al. (2017)
WASP-83b	2457121.9961 ± 0.0003	4.9712917 ± 0.0000012	1. Hellier et al. (2015), Edwards et al. (2021) 2. Hellier et al. (2015) 3. Hellier et al. (2015) 4. Hellier et al. (2015)
WASP-84b	2456422.48255 ± 0.00014	8.523499 ± 0.000004	1. Anderson et al. (2014, 2015b) 2. Anderson et al. (2014) 3. Anderson et al. (2014) 4. Anderson et al. (2014)
WASP-85Ab	2456847.472867 ± 0.000010	2.6556765 ± 0.0000004	1. Stefansson et al. (2017); Brown et al. (2014) 2. Močnik et al. (2016b) 3. Brown et al. (2014) 4. Brown et al. (2014)
WASP-88b	2458005.5181 ± 0.0006	4.9540021 ± 0.0000022	1. Delrez et al. (2014) 2. Delrez et al. (2014) 3. Delrez et al. (2014) 4. Delrez et al. (2014)
WASP-89b	2456398.33771 ± 0.00012	3.3564182 ± 0.0000005	1. Hellier et al. (2015) 2. Hellier et al. (2015) 3. Hellier et al. (2015) 4. Hellier et al. (2015)
WASP-90b	2457003.1520 ± 0.0004	3.9162624 ± 0.0000013	1. West et al. (2016) 2. West et al. (2016) 3. West et al. (2016) 4. West et al. (2016)
WASP-92b	2457627.3719 ± 0.0003	2.1746733 ± 0.0000006	1. Hay et al. (2016) 2. Hay et al. (2016) 3. Hay et al. (2016) 4. Hay et al. (2016)

Table 2
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Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
WASP-93b	2457492.2860 ± 0.0003	2.7325358 ± 0.0000007	1. Hay et al. (2016) 2. Hay et al. (2016) 3. Hay et al. (2016) 4. Hay et al. (2016)
WASP-95b	2456607.17355 ± 0.00023	2.1846688 ± 0.0000006	1. Hellier et al. (2014) 2. Hellier et al. (2014) 3. Hellier et al. (2014) 4. Hellier et al. (2014)
WASP-96b	2457128.07797 ± 0.00022	3.4252565 ± 0.0000008	1. Nikolov et al. (2018), Hellier et al. (2014) 2. Hellier et al. (2014) 3. Hellier et al. (2014) 4. Hellier et al. (2014)
WASP-97b	2457186.45400 ± 0.00015	2.0727600 ± 0.0000003	1. Hellier et al. (2014) 2. Hellier et al. (2014) 3. Hellier et al. (2014) 4. Hellier et al. (2014)
WASP-98b	2456840.00365 ± 0.00008	2.9626415 ± 0.0000004	1. Hellier et al. (2014), Mancini et al. (2016a), Kozłowski et al. (2017) 2. Hellier et al. (2014) 3. Mancini et al. (2016a) 4. Hellier et al. (2014)
WASP-100b	2458500.55730 ± 0.00012	2.8493830 ± 0.0000021	1. Hellier et al. (2014), Wong et al. (2020) 2. Hellier et al. (2014) 3. Hellier et al. (2014) 4. Hellier et al. (2014)
WASP-101b	2456297.36537 ± 0.00019	3.5857072 ± 0.0000012	1. Hellier et al. (2014) 2. Hellier et al. (2014) 3. Hellier et al. (2014) 4. Hellier et al. (2014)
WASP-103b	2457132.47094 ± 0.00004	0.92554544 ± 0.00000008	1. Delrez et al. (2018), Gillon et al. (2014), Turner et al. (2017), Southworth et al. (2015b), Maciejewski et al. (2018), Lendl et al. (2017), Patra et al. (2020) 2. Southworth et al. (2015b) 4. Southworth & Evans (2016) 4. Gillon et al. (2014)
WASP-104b	2457048.59061 ± 0.00016	1.7554060 ± 0.0000003	1. Smith et al. (2014) 2. Smith et al. (2014) 3. Smith et al. (2014) 4. Smith et al. (2014)
WASP-107b	2456680.3346 ± 0.0003	5.721488 ± 0.000003	1. Anderson et al. (2017) 2. Močnik et al. (2017a) 3. Močnik et al. (2017a) 4. Anderson et al. (2017)
WASP-113b	2457201.64037 ± 0.00004	4.542170 ± 0.000003	1. Barros et al. (2016) 2. Barros et al. (2016) 3. Barros et al. (2016) 4. Barros et al. (2016)
WASP-114b	2457242.33222 ± 0.00020	1.5487752 ± 0.0000003	1. Barros et al. (2016), Patra et al. (2020) 2. Barros et al. (2016) 3. Barros et al. (2016) 4. Barros et al. (2016)

Table 2
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Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
WASP-119b	2458924.8626 ± 0.0004	2.4998045 ± 0.0000017	1. Maciejewski (2020) 2. Maxted et al. (2016) 3. Maxted et al. (2016) 4. Maxted et al. (2016)
WASP-121b	2457404.48798 ± 0.00006	1.27492477 ± 0.00000012	1. Tsiaras et al. (2018), Delrez et al. (2016), Evans et al. (2018), Bourrier et al. (2020) 2. Delrez et al. (2016) 3. Delrez et al. (2016) 3. Delrez et al. (2016)
WASP-124b	2457173.60811 ± 0.00012	3.3726492 ± 0.0000008	1. Maxted et al. (2016) 2. Maxted et al. (2016) 3. Maxted et al. (2016) 4. Maxted et al. (2016)
WASP-126b	2457758.5601 ± 0.0006	3.2887885 ± 0.0000018	1. Maxted et al. (2016) 2. Maxted et al. (2016) 3. Maxted et al. (2016) 4. Maxted et al. (2016)
WASP-132b	2457732.5679 ± 0.0003	7.1335135 ± 0.0000018	1. Hellier et al. (2017) 2. Hellier et al. (2017) 3. Hellier et al. (2017) 4. Hellier et al. (2017)
WASP-133b	2457262.80855 ± 0.00019	2.1764231 ± 0.0000008	1. Maxted et al. (2016) 2. Maxted et al. (2016) 3. Maxted et al. (2016) 4. Maxted et al. (2016)
WASP-135b	2458606.9117 ± 0.0003	1.4013788 ± 0.0000004	1. Spake et al. (2016) 2. Spake et al. (2016) 3. Spake et al. (2016) 4. Spake et al. (2016)
WASP-140b	2457205.26576 ± 0.00022	2.2359838 ± 0.0000007	1. Hellier et al. (2017) 2. Hellier et al. (2017) 3. Hellier et al. (2017) 4. Hellier et al. (2017)
WASP-153b	2458018.1510 ± 0.0007	3.3326099 ± 0.0000020	1. Demangeon et al. (2018) 2. Demangeon et al. (2018) 3. Demangeon et al. (2018) 4. Demangeon et al. (2018)
WASP-157b	2457265.70719 ± 0.00009	3.951605 ± 0.000003	1. Močnik et al. (2016a) 2. Močnik et al. (2016a) 3. Močnik et al. (2016a) 4. Močnik et al. (2016a)
WASP-164b	2457747.6583 ± 0.0003	1.7771363 ± 0.0000006	1. Lendl et al. (2019) 2. Lendl et al. (2019) 3. Lendl et al. (2019) 4. Lendl et al. (2019)
WASP-167b	2456717.82564 ± 0.00019	2.0219570 ± 0.0000007	1. Temple et al. (2017) 2. Temple et al. (2017) 3. Temple et al. (2017) 4. Temple et al. (2017)

Table 2
(Continued)

Planet	New T_0 (BJD_{TDB})	New Period (days)	1. References for literature data used 2. Reference for the initial ephemeris 3. Reference for the transit parameters used 4. Reference for the stellar parameters used
XO-1b	2455385.51978 ± 0.00005	3.94150500 ± 0.00000018	1. Holman et al. (2006), Burke et al. (2010), Wilson et al. (2006), Raetz et al. (2009a), McCullough et al. (2006), Cáceres et al. (2009), Deming et al. (2013), Southworth et al. (2018) 2. Burke et al. (2010) 3. Torres et al. (2008) 4. Torres et al. (2008)
XO-2Nb	2456923.17711 ± 0.00015	2.61585978 ± 0.00000019	1. Burke et al. (2007) 2. Damasso et al. (2015) 3. Damasso et al. (2015) 4. Torres et al. (2008)
XO-3b	2455024.34346 ± 0.00013	3.1915250 ± 0.0000003	1. Johns-Krull et al. (2008), Turner et al. (2017), Garai et al. (2017), Winn et al. (2008, 2009b), Hébrard et al. (2008) 2. Wong et al. (2014) 3. Wong et al. (2014) 4. Johns-Krull et al. (2008)
XO-4b	2455682.20389 ± 0.00023	4.1250679 ± 0.0000006	1. McCullough et al. (2008), Narita et al. (2010), Todorov et al. (2012), Villanueva et al. (2016) 2. Narita et al. (2010) 3. Narita et al. (2010) 4. McCullough et al. (2008)
XO- 5b	2455469.7912 ± 0.0003	4.1877562 ± 0.0000006	1. Pál et al. (2009), Burke et al. (2008) 2. Smith (2015) 3. Smith (2015) 4. Burke et al. (2008)
XO-6b	2458843.93943 ± 0.00012	3.7649939 ± 0.0000013	Crouzet et al. (2017), Ridden-Harper et al. (2020) Crouzet et al. (2017) Crouzet et al. (2017) Crouzet et al. (2017)

Note. The actual values used can be found in the Data Release B.

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