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Radial velocity follow-up of GJ1132 with HARPS*,**

A precise mass for planet b and the discovery of a second planet

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ABSTRACT

The source GJ1132 is a nearby red dwarf known to host a transiting Earth-size planet. After its initial detection, we pursued an intense follow-up with the HARPS velocimeter. We now confirm the detection of GJ1132b with radial velocities alone. We refined its orbital parameters, and in particular, its mass ($m_b = 1.66 \pm 0.23 M_{\oplus}$), density ($\rho_b = 6.3 \pm 1.3 \text{ g cm}^{-3}$), and eccentricity ($e_b < 0.22$; 95%). We also detected at least one more planet in the system. GJ1132c is a super-Earth with period $P_c = 8.93 \pm 0.01$ days and minimum mass $m_c \sin i_c = 2.64 \pm 0.44 M_{\oplus}$. Receiving about 1.9 times more flux than Earth in our solar system, its equilibrium temperature is that of a temperate planet ($T_{eq} = 230-300$ K for albedos A = 0.75 - 0.00), which places GJ1132c near the inner edge of the so-called habitable zone. Despite an a priori favorable orientation for the system, Spitzer observations reject most transit configurations, leaving a posterior probability <1% that GJ1132c transits. GJ1132(d) is a third signal with period $P_d = 177 \pm 5$ days attributed to either a planet candidate with minimum mass $m_d \sin i_d = 8.4^{+1.7}_{-2.5} M_{\oplus}$ or stellar activity. Its Doppler signal is the most powerful in our HARPS time series but appears on a timescale where either the stellar rotation or a magnetic cycle are viable alternatives to the planet hypothesis. On the one hand, the period is different than that measured for the stellar rotation (\sim 125 days), and a Bayesian statistical analysis we performed with a Markov chain Monte Carlo and Gaussian processes demonstrates that the signal is better described by a Keplerian function than by correlated noise. On the other hand, periodograms of spectral indices sensitive to stellar activity show power excess at similar periods to that of this third signal, and radial velocity shifts induced by stellar activity can also match a Keplerian function. We, therefore, prefer to leave the status of GJ1132(d) undecided.

Key words. techniques: radial velocities - stars: late-type - planetary systems

^{*} Based on observations made with the HARPS instrument on the ESO 3.6 m telescope under the program IDs 191.C-0873(A), and 198.C-0838(A), at Cerro La Silla (Chile).

^{**} Radial velocity data are only available at the CDS via anonymous ftp to cdsarc.u-strasbg.fr (130.79.128.5) or via http://cdsarc.u-strasbg.fr/viz-bin/qcat?J/A+A/618/A142

1. Introduction

The source GJ1132 is an M dwarf of our solar neighborhood with a known transiting planet detected by the MEarth survey (Berta-Thompson et al. 2015). Owing to the small size, low mass, and low temperature of the parent star (~0.21 R_{\odot} , 0.18 M_{\odot} , and 3 300 K), the 1.6-day periodic, 2.6 mmag dips observed in its photometric light curves imply that the planet has a size comparable to that of Earth (~1.2 R_{\oplus}) and a warm equilibrium temperature (~400-600 K). Being 2–3 mag brighter than most other Earth-size planet hosts detected with Kepler, for example, GJ1132 is an appealing system for follow-up characterization (Morley et al. 2017; Southworth et al. 2017).

The discovery paper already includes a radial-velocity (RV) time series collected with the HARPS spectrograph. With an orbital model composed of a single planet and a fixed zero eccentricity, we measured an orbital semi-amplitude of $2.76 \pm 0.92 \text{ m s}^{-1}$, corresponding to a planetary mass of $1.62 \pm 0.55 M_{\oplus}$ (Berta-Thompson et al. 2015). Although this favors a rocky composition, the constraint is loose given the large mass uncertainty to the point that even a gaseous composition remains possible in a 3σ range. In addition to bulk composition, the mass of the planet is also an important parameter for determining the scale height of the atmosphere and constrain transmission spectroscopy observations (Schaefer et al. 2016; Southworth et al. 2017).

If a better mass measurement already makes a strong case for pursuing an intensive RV follow-up, searching for additional planets is an equally good motivation. With a known transiting planet, we know the system is favorably aligned, and that additional planets have a high chance of being detected in transit as well (Gillon et al. 2011, 2017). The source GJ1132 has recently been used in simulations as an illustrative example of such a strategy (Cloutier et al. 2017b).

This paper reports on our RV follow-up campaign on GJ1132 with the HARPS spectrograph. We identify a first component with period $P_d = 177 \pm 5$ days that we attribute to either an outer planet with mass $m_d \sin i = 8.4^{+1.7}_{-2.5} M_{\oplus}$ or stellar activity. After subtracting this first signal, we show that GJ1132b is now identified with the sole RV data. Our time series then reveals another planet with mass $m_c \sin i_c = 2.7 \pm 0.4 M_{\oplus}$ and period $P_c = 8.92 \pm 0.01$ days. With an equilibrium temperature of 230–300 K, this super-Earth is located near the habitable zone. Matching our ephemeris with *Spitzer* observations from Dittmann et al. (2017a), we found that unfortunately, transits of planet c are largely excluded.

2. Data

From June 6, 2015 (BJD = 2457180.5) to June 21, 2017 (BJD = 2457925.5), we collected 128 observations with the HARPS spectrograph (Mayor et al. 2003; Pepe et al. 2004), including the 25 measurements previously published in Berta-Thompson et al. (2015). We chose the high-resolution mode (R = 115000), and used the scientific fiber for the target and the calibration fiber for the sky. In practice, the sky brightness is low enough and the second fiber is not used by our pipeline. It only serves as a potential a posteriori diagnostic. Exposure times were fixed to 40 min, except for one exposure on June 26, 2016 (BJD = 2457566.5), which was shortened to 1700 s. We also note that we discarded a 129th measurement that is found in ESO archives. It measured only 5 s and was taken on June 11, 2015 (BJD = 2457185.5).

The online pipeline produces extracted spectra that are calibrated in wavelength (Lovis & Pepe 2007). It also computes RVs through cross-correlation with a numerical mask (Baranne et al. 1996; Pepe et al. 2002). We used this initial estimate to shift all spectra to a common reference frame, and we coadded them to build a reference spectrum with a high signal-to-noise ratio (S/N). We then refined the RV determination by finding the best-fit Doppler shift between this reference template and individual spectra (e.g., Howarth et al. 1997; Galland et al. 2006; Anglada-Escudé & Butler 2012; Astudillo-Defru et al. 2015).

The RV uncertainties were evaluated by measuring the Doppler information content in the $\chi^2(RV)$ profile, using the formalism of Bouchy et al. (2001); Boisse et al. (2010). This formalism quantifies the RV uncertainty thorugh a weighted sum over the spectral elements with more weight given to the spectral elements with a higher derivative. Because the derivative of a spectrum has a higher variability against noise than the spectrum itself, we instead directly applied the formula to the $\chi^2(RV)$ profile, whose S/N is a few hundred times higher. For GJ1132, a V = 13.5 mag star, we estimate that photon noise contributes with 2–3 m s⁻¹ to the precision of individual measurements.

In addition to RVs, we also measured several activity proxies such as spectroscopic indices (H_{α} , H_{β} , calcium S index, and Na; see Astudillo-Defru et al. 2017). Spectroscopic indices can reveal and trace inhomogeneities at the surface of the star, which, animated by the stellar rotation, can contribute to an apparent Doppler shift that is unrelated to the presence of planets (Bonfils et al. 2007; Robertson et al. 2014). Our time series for the RVs, their uncertainties, and the time series for the activity proxies are reported in Table A.1.

3. Analysis

3.1. Iterative periodogram analysis

We started with the RV time series (Fig. 1a) and computed its generalized Lomb–Scargle periodogram (Fig. 1b; Press et al. 1992; Zechmeister & Kürster 2009). We chose a normalization such that a power of 1 at a given period means that a sin-wave fit to the data is a perfect fit ($\chi^2 = 1$), and a power of 0 means that a sin-wave fit does not improve the χ^2 over that of a fit by a constant. We identify several peaks with a high power: one at the period of the known planet GJ1132b (~1.63 day), one near the period 8.9 day, and, the strongest, around 171 days. They have a power p = 0.25, 0.26, and 0.30, respectively.

To evaluate the significance as a function of the power excess that is measured, we created synthetic data illustrative of time series with noise alone. To preserve the sampling, the simulated time series had the same dates as the original. To preserve the distribution of RVs around their mean, the values were picked by randomly shuffling the original time series. We computed the periodogram of simulated time series and measured their power maxima. After many trials, we built a distribution of power maxima that served as comparison with the power values measured in the original time series. We found that over 10 000 trials, no simulated time series has power maxima equal to or higher than p = 0.30, meaning that the peak detected around P = 177 day has a false-alarm probability (FAP) lower than $1/10\,000 = 0.01\%$; it is equivalent to a significance >3.8 σ .

We note that Berta-Thompson et al. (2015) found a rotation period of 125 days and that a sampling rate of ~ 1 yr could produce an alias at the period 190 day, which is indistinguishable from the 171-day peak. Nevertheless, the signal appears well



Fig. 1. Iterative periodogram analysis. *Left column:* RV times series before any subtraction (*panel a*), after subtracting a one-Keplerian fit (*panel d*) and after subtraction of a two-Keplerian fit (*panel g*). *Middle column:* periodograms for each RV time series in the left column. *Right column:* RV time series shown in the left column phase-folded to the period of maximum power shown in the periodograms of the middle column. The best sine fit is superimposed. Dash-dotted (resp. dotted) lines in *panels b*, *e*, and *h* are placed at a power level corresponding to a false-alarm probability of 1% (resp. 0.1%).

sampled when phased with a period of 177 or 190 days, and the 177-day peak is therefore probably not an alias.

We next reproduced the same periodogram analysis with spectroscopic indices. Figure 2 shows these periodograms for Ca (blue), Na (green), H_{β} (red), and H_{α} (cyan). The period of the stellar rotation is shown with the vertical full line, and the periods of the three Doppler signals discussed in this paper are shown with vertical dashed lines. Broad power excess is visible between 80-300 day, with a highest peak at the period of the stellar rotation (~125 day). Peaks of power are also visible near 175 day, calling for caution in interpreting the corresponding Doppler signal. If it is not due to stellar rotation, a magnetic cycle can also induce periodic variations (Gomes da Silva et al. 2011). In Sect. 3.2, we perform a more detailed modeling using Markov chain Monte Carlo (MCMC) and Gaussian processes algorithms. By statistically comparing models, we show that the signal is best described by a Keplerian, not by correlated noise. Nevertheless, since stellar activity can produce RV variations that match a Keplerian (Bonfils et al. 2007), we do not consider this comparison to clearly favor the planet interpretation.

We fit and removed a Keplerian component from the RVs and studied the residuals (Fig. 1d). The most prominent peak is now that of GJ1132b, and the RV residuals are well modeled by a Keplerian with period P = 1.63 day (Fig. 1f). The peak itself has an FAP lower than 0.01%. The detection is now significant even without prior knowledge of the period from the photometric transits. GJ1132b is therefore confirmed based on RV data alone.

We continued with a model composed of two Keplerian orbits. The residuals now show strong power excess around P = 8.9 days (FAP < 0.01%; Fig. 1g), which is also well modeled with an additional Keplerian (Fig. 1i).

The rotation measured for GJ1132 is clearly distinct from the last two RV periodicities. This meas that stellar activity is probably not responsible for these two short-period signals. We attribute them instead to two orbiting planets, namely, GJ1132b and c.

3.2. Joint modeling of planets and correlated "noise"

Here, we apply a second, complementary analysis to the data using al non-parametric Gaussian process (GP) regression model of the correlated RV residuals. GP regression modeling works within a Bayesian framework and provides a distribution of functions that model the correlations between adjacent RV measurements following the removal of a mean planetary model containing up to three planets in our analysis. This technique has recently been used in the literature to model stellar RV activity, thus facilitating the detection and precise characterization of planets around active stars (e.g., Haywood et al. 2014; Rajpaul et al. 2015; Donati et al. 2016; Cloutier et al. 2017b; Bonfils et al. 2018). A complete description of the techniques used to simultaneously model the RV variations with a GP plus Keplerian orbital solutions can be found in Cloutier et al. (2017a). Here, we briefly summarize the key steps and assumptions used in this work.



Fig. 2. Periodogram of spectral indices measured on HARPS spectra. Ca, Na, H_{β}, and H_{α} Are shown from *top to bottom*. The period of the stellar rotation is shown with a vertical full line, and the periods of the three Doppler signals attributed to GJ1132b, GJ1132c, and GJ1132(d) are shown with vertical dashed lines.

We described above that the broad peak centered around \sim 175 days in the LS periodogram of the RVs spans the stellar photometric rotation period of 125 days (Dittmann et al. 2017a). Therefore, the stellar activity might be modulated at approximately the stellar rotation timescale. Thus, we adopted a quasiperiodic covariance kernel for the GP activity model of the form

$$k_{i,j} \propto \exp\left[-\frac{|t_i - t_j|^2}{2\lambda^2} - \Gamma^2 \sin^2\left(\frac{\pi|t_i - t_j|}{P_{\rm GP}}\right)\right],\tag{1}$$

where t_i is the *i*th BJD in the time series for i, j = 1, ..., 128. The GP hyperparameters a, λ, Γ , and P_{GP} describe the amplitude of the correlations, the exponential decay timescale, the coherence scale of the correlations, and the periodic timescale ($P_{\text{GP}} = P_{\text{rot}}$ in photometry), respectively. Because the GP is intended to only model the stellar activity, the posterior probability density functions (PDFs) of the four hyperparameters are trained through an MCMC on a training set that is independent of planetary signals. For this purpose, we used emcee (Foreman-Mackey et al. 2013), a python implementation of the affine-invariant ensemble MCMC sampler (Goodman & Weare 2010). We opted for a training set using the MEarth photometry presented in Berta-Thompson et al. (2015) that was used in Cloutier et al. (2017b) to model the stellar RV activity using a GP. Here, a well-defined solution is easily found, whose periodic term is the photometric rotation period. The resulting marginalized posterior PDFs of the GP hyperparameters λ , Γ , and P_{GP} are then used as priors when next we jointly modeled the RVs simultaneously with planetary signals and a quasi-periodic GP. The posterior PDFs of these three hyperparameters from training are each approximated by a one-dimensional kernel density estimation, which can then be sampled during the RV

Table 1. Maximum $\ln \mathcal{L}$ ratios for various competing models.

Model	In-likelihood ratio		
3 Keplerians 2 Keplerians + GP 3 Keplerians 3 Keplerians + GP	VS. VS. VS. VS.	2 Keplerians 2 Keplerians 2 Keplerians + GP 2 Keplerians + GP	9e17 (>8 σ) 7e13 (7.6 σ) 1e4 (3.9 σ) 1e5 (4.4 σ)
3 Keplerians	vs.	3 Keplerians + GP	$1.34~(0.3\sigma)$

modeling. The covariance amplitude a was left as an effectively unconstrained free parameter in the RV modeling.

We then modeled the RVs with one of four potential planetary models. The first model contained the two planets GJ1132b and GJ1132c. The second model contained the same two planets plus the quasi-periodic GP. The third model assumed three planets, GJ1132b, GJ1132c, and GJ1132(d). The fourth model contained the same three planets plus the quasi-periodic GP. In each considered model, the orbital period and time of mid-transit of GJ 1132b were assigned Gaussian priors based on the transit results from Berta-Thompson et al. (2015). The orbital period of the putative GJ1132c (GJ1132(d)) was assigned a uniform prior between 8.8 and 9.0 days (between 120 and 220 days). We adopted uninformative Jeffreys priors between 0-10 m s⁻¹ on the semi-amplitude of each planet. This choice of prior was modified and not found to significantly affect the results. The eccentricities e of each planet were sampled indirectly via the jump parameters $h = \sqrt{e} \cos \omega$ and $k = \sqrt{e} \sin \omega$, where ω is the argument of periastron. This choice reduces bias toward high eccentricities (Ford 2006).

Next, we conducted a model comparison using time-series cross-validation (Arlot & Celisse 2010). This procedure is computationally less expensive than computing the fully marginalized Bayesian likelihood and is independent of the choice of model parameter priors. The unique model parameters for each model, including the GP hyperparameter, were optimized for each of the 107 training sets, which contained between 20 and the full dataset size, less 1 (i.e., 127), chronologically spaced RV measurements. For each split of the data, the testing set was the single measurement taken after the final measurement in the training set. The ln-likelihood $(\ln \mathcal{L})$ of the testing data given each model optimized on the training set were then computed. Over the 107 splits of the data, we computed the median and median absolute deviation per measurement of each model $\ln \mathcal{L}$. Table 1 reports the resulting $\ln \mathcal{L}$ ratio for various pairs of competing models, where each model $\ln \mathcal{L}$ is calculated by scaling the median $\ln \mathcal{L}$ per measurement from cross-validation to the full dataset size of 128 measurements. We find that the threeplanet model is greatly favored over the two-planet model with a $>8\sigma$ greater ln \mathcal{L} . Furthermore, the three-planet + GP model has a marginally better $\ln \mathcal{L}$ than the three-planet model (i.e., 0.3σ higher $\ln \mathcal{L}$). We, therefore, conclude that the more simplistic model with three Keplerian signals and no GP is most strongly favored based on the data. Although it favors the planet interpretation for GJ1132(d), we refrain from a definitive conclusion. As shown for previous examples from our survey, activity-induced Doppler shifts can indeed match a Keplerian signal (Bonfils et al. 2007).

The resulting RV model parameters, assuming that the observed RV variations are due to three planets plus residual stellar activity, which we modeled with a non-parametric GP, are reported in Table 2. GJ1132(d) is presented with parentheses around its d letter to stress that it is not accepted as a planet detection.

Table 2. Model parameters.

Maximum a posteriori values with 16th and 84th percentiles						
	0.181 ± 0.019					
$0.2105^{+0.0102}_{-0.0085}$						
0.00438 ± 0.000034						
3270 ± 140						
	$122.3^{+0.0}_{-5.0}$					
-	35078.8 ± 0.8					
	$-0.18^{+1.12}_{-1.32}$					
	$7.01^{+1.37}_{-1.31}$					
	$1.8^{+2.4}_{-5.4}$					
	$4.81^{1.79}_{1.61}$					
	$0.19^{+0.63}_{-0.04}$					
GJ1132b	GJ1132c	GJ1132(d)				
1.628931 ± 0.000027	8.929 ± 0.010	176.9 ± 5.1				
7184.55786 ± 0.00031	7506.02 ± 0.34	$7496.8^{+14.4}_{-8.6}$				
2.85 ± 0.34	2.57 ± 0.39	$3.03^{+0.58}_{-0.88}$				
0.05 ± 0.13	$-0.12^{+0.28}_{-0.25}$	$-0.10^{+0.27}_{-0.28}$				
-0.12 ± 0.25	0.14 ± 0.24	-0.05 ± 0.29				
0.0153 ± 0.0005	0.0476 ± 0.0017	0.35 ± 0.01				
< 0.22	< 0.27	< 0.53				
1.66 ± 0.23	-	-				
1.66 ± 0.23	2.64 ± 0.44	$8.4^{+1.7}_{-2.5}$				
6.3 ± 1.3	-	_				
12.9 ± 2.2	-	_				
13.6 ± 1.0	-	-				
570 ± 0	300 ± 5	111 + 2				
329 ± 9 409 + 7	300 ± 3 232 + 4	111 ± 2 86 + 1				
	$GJ1132b$ 1.628931 ± 0.000027 7184.55786 ± 0.00031 2.85 ± 0.34 0.05 ± 0.13 -0.12 ± 0.25 0.0153 ± 0.0005 < 0.22 1.66 ± 0.23 1.66 ± 0.23 1.66 ± 0.23 1.66 ± 0.23 1.66 ± 1.0 529 ± 9 409 ± 7	$\begin{array}{c} 0.181 \pm 0.019 \\ 0.2105^{+0.0102}_{-0.0085} \\ 0.00438 \pm 0.00034 \\ 3270 \pm 140 \\ 122.3^{+6.0}_{-5.0} \\ 35078.8 \pm 0.8 \end{array}$ $\begin{array}{c} -0.18^{+1.12}_{-1.32} \\ 7.01^{+1.37}_{-1.31} \\ 1.8^{+2.4}_{-5.4} \\ 4.81^{-7.9}_{-1.61} \\ 0.19^{+0.63}_{-0.04} \\ \end{array}$ $\begin{array}{c} GJ1132b \\ GJ1132b \\ CJ1132b \\ CJ1132c \\ \end{array}$ $\begin{array}{c} 8.929 \pm 0.010 \\ 7184.55786 \pm 0.00027 \\ 2.85 \pm 0.34 \\ 2.85 \pm 0.34 \\ 2.85 \pm 0.34 \\ 2.57 \pm 0.39 \\ 0.05 \pm 0.13 \\ -0.12^{+0.28}_{-0.25} \\ -0.12 \pm 0.25 \\ 0.14 \pm 0.24 \\ \end{array}$ $\begin{array}{c} 0.0153 \pm 0.0005 \\ <0.0476 \pm 0.0017 \\ <0.22 \\ <0.27 \\ 1.66 \pm 0.23 \\ -1.29 \pm 2.2 \\ -13.6 \pm 1.0 \\ -12.9 \pm 2.2 \\ -12.2 \\ -12.2 \\ -13.6 \pm 1.0 \\ -12.9 \pm 2.2 \\ -12.2 \\ -13.6 \pm 1.0 \\ -12.9 \pm 2.2 \\ -12.2 \\ -13.6 \pm 1.0 \\ -12.9 \pm 2.2 \\ -12.9 \pm 2.2 \\ -12.9 \\ -12.9 \pm 2.2 \\ -12.9 $				

Notes. Maximum a posteriori and 68.3% confidence intervals. Planets b and c are considered robust detections, but planet (d) is considered a planet candidate, but may also be the result of stellar activity. ^(a)Upper limit, 95th percentile of the posterior PDF. $M_{\odot} = 1.98842 \times 10^{30}$ kg, $R_{\odot} = 6.95508 \times 10^8$ m, $M_{\oplus} = 5.9736 \times 10^{24}$ kg, and $R_{\oplus} = 6.378$ 137 m. ^(b)Assuming a planetary radius of $1.13 \pm 0.056 R_{\oplus}$ (Dittmann et al. 2017a).

In the MCMC from which these results were derived we initialized 200 walkers and ran each chain for a duration of approximately 20 autocorrelation times to ensure adequate convergence of the chains. The steps corresponding to the first ~10 autocorrelation times were treated as the burn-in phase and discarded. The results are broadly consistent with the results from the iterative periodogram analysis of Sect. 3.1. The resulting marginalized posterior PDFs of the model parameters are shown in Fig. A.1.

As a complement, Figs. 3 and 4 show phase-folded RVs and residuals without the GP regression. The uncertainties are not rescaled. After removing the mean GP model and the best-fit Keplerians for GJ1132b and GJ1132c, the residual rms is 2.74 m s^{-1} .

4. Discussions

4.1. GJ1132b in context

Compared to the discovery paper, we revise the RV semi-amplitude from 2.76 ± 0.92 to 2.85 ± 0.34 m s⁻¹. This is

a faster gain in precision than expected from the larger number of RVs (0.92/0.34 > $\sqrt{128/25}$). We surmise this is because a three-planet model is a more adequate description of the data. This improves the mass precision by ~2.4× from 1.62 ± 0.55 to 1.66 ± 0.23 M_{\oplus} . Together with the radius of GJ1132b measured by Dittmann et al. (2017a), its bulk density then becomes 6.3 ± 1.3 g cm⁻³ and thus confirms its rocky nature.

The mass-period diagram (Fig. 5) places GJ1132b in context and compares its mass and radius with other transit detections and with theoretical curves for different bulk compositions (Zeng & Sasselov 2013). The density of GJ1132b appears compatible with a rocky or a denser compositions. With such a diagram, Rogers (2015) observed that below ~1.6 R_{\oplus} , planets are predominantly rocky, that is to say, they are preferentially found below the mass-radius curves that include significant water or lighter elements in their composition. The largest planet that is more than 1 σ away from the rocky curve is indeed Kepler-60b, with a radius of 1.7 R_{\oplus} (Steffen et al. 2013; Jontof-Hutter et al. 2016).



Fig. 3. Phase-folded RV decomposition for the three-planet model without GP regression.



Fig. 4. RV residuals (O–C) as a function of time.

Conversely, a similar threshold can now be observed with mass: with the exception of three planets with very large uncertainties (Kepler -11b, -11f, and -177b; Lissauer et al. 2011, 2013; Xie 2014), no planet is seen to lie not on the rocky curve by more than 1σ below a mass threshold of $\sim 3 M_{\oplus}$.

4.2. GJ1132c, a temperate super-Earth

With a host star luminosity $L_{\star} = 0.00438 \pm 0.00034 L_{\odot}$ (Dittmann et al. 2017b) and a semi-major a = 0.048 AU, GJ1132c receives about 1.9 times as much flux as Earth from our Sun. Its equilibrium temperature ranges from 232 K for a Bond albedo equal to that of Venus (A = 0.75) and up to 328 K for a Bond albedo A = 0.

The most recent works that delineated the habitable zone around M dwarfs (e.g., Kopparapu et al. 2016) place the inner edge for GJ1132 at about 1.6 times the stellar radiation received by Earth. GJ1132c would thus be considered significantly too irradiated to have liquid water on its surface. The planet still remains of considerable interest in the context of habitability. The concept remains poorly understood and will remain so until inhabited worlds are actually found. The inner edge of the habitable zone is thus subject to change with future works. Moreover, if future instrumentation were able to reach sufficient contrast for resolving the planet from its parent star, probing for an atmosphere would tell us how resilient this atmosphere can be against stellar irradiation, and thus would more generally constrain the habitability of M-dwarf planets regardless of the habitability of GJ1132c itself. At a distance of 12 parsec, however (Berta-Thompson et al. 2015), transmission and occultation spectroscopy are probably the only methods able to resolve such an atmosphere, meaning that GJ1132c would be required to transit.

4.3. Transit search for planet c

The source GJ1132c orbits at a distance of about $49 \pm 3 R_{\star}$ from its host star, and without prior knowledge on the system orientation, the probability of detecting the planet in transit at inferior conjunction would be ~1/50. We nevertheless have prior knowledge on the system orientation since GJ1132 is already known to host a transiting planet with a measured orbital inclination of $88.68^{+0.40}_{-0.33}$ degrees (Dittmann et al. 2017a). Considering only this nominal value (88.68 degrees), additional planets with strictly coplanar orbits would be seen to transit up to separations of ~43 R_{\star} , and would be missed beyond. This limit is most probably inside the orbit of GJ1132c, and at first, the prior knowledge we have from GJ1132b might be thought to nullify the probability of observing any transit for GJ1132c. This neglects both the uncertainty on the orbital inclination of GJ1132c and possible deviations from perfect coplanarity, however.

We can instead include both uncertainty and non-coplanarity in our prior. Using the formalism of Beatty & Seager (2010), we distributed inclinations centered around 88.68 degrees with various standard deviations. In Fig. 6, we show that the prior probability that GJ1132c undergoes transit quickly jumps to ~43% for inclinations distributed with only a small standard deviation of 1 degree.

From our analysis in Sect. 3, we derived an ephemeris for the passage of GJ1132c at inferior conjunction (BJD = 2457506.02 ± 0.34). Figure 7 shows that this falls inside the long 100 h monitoring made by Dittmann et al. (2017a) with *Spitzer*, which covers epochs between BJD = 2457502.5 and 2457506.8 almost without interruption and a sensitivity down to planets smaller than Mars (Dittmann et al. 2017a). Possible transits of GJ1132c are largely ruled out with a <1% chance that an existing transit was missed.

The prior probability combined with the probability left by the incomplete coverage of the transit-time window gives a posterior probability $\leq 0.43\%$ that GJ1132c undergoes transits¹. GJ1132c transits are almost completely ruled out.

4.4. Stellar activity or a cold planet

Based on activity diagnostics, we were not able to rule out stellar activity as the main cause of the 170 d RV periodicity. However, if later observations were to confirm the planetary nature of this signal, GJ1132(d) would have a minimum mass $m_d \sin i = 8.4^{+1.7}_{-2.5} M_{\oplus}$, which is in the mass domain between super-Earths and mini-Neptunes. Its semi-major axis $a_d =$ 0.35 ± 0.01 AU would place this planet beyond the ice line, with an equilibrium temperature of 86 K (111 K) for a Bond albedo

 $^{^{1}}$ 0.43% is the upper limit considering a standard deviation of 1 degree in our above calculations, and for all other standard deviations, the posterior probability is lower than 0.43%.



Fig. 6. Transit probability of GJ1132c with a Gaussian prior on inclination. We chose the inclination of planet b for the central value of the distribution ($i_b = 88.68$ degrees), and we computed the transit probability for various standard deviations of this distribution (x axis) to reflect both the uncertainty on i_b and a small possible non-coplanarity.



Fig. 7. Ephemerides for the GJ1132c inferior conjunction overplotted on *Spitzer* photometry. Based on this data set, Dittmann et al. (2017a) excluded possible transits of any additional planet larger than Mars. GJ1132c transits are therefore largely excluded.

of 0.75 (0.3). Planet d would be \sim 7.3 times farther away from the star than planet c. A priori, its transit probability would thus be \sim 7.3 lower. *Spitzer* photometry rejects only a small portion (13%) of possible transit configurations.

4.5. Transit-timing variations

The orbital period ratio of planets b and c is close to 11/2. Even if inside a resonance, its low order would imply low transit-timing

Fig. 5. Mass–radius diagram for planets with masses $M_p < 20$ M_{\oplus} and radii $R_p < 3.5$ R_{\oplus} queried from the NASA Exoplanet Archive. The gray level scales linearly with the relative uncertainties (with equal weight for both mass and radius). GJ1132b is shown in red, and blue circles show Earth and Venus. Curves are for the mass–radius relations predicted with theoretical models (Zeng & Sasselov 2013).

variations (TTV). We use the Rebound code (Rein & Liu 2011) with the WHFast integrator (Rein & Tamayo 2015) to compute TTVs for this system. Although not shown here, TTVs were found to be generally lower than 30 s, in agreement with the lack of TTVs found in Dittmann et al. (2017a).

5. Conclusion

To conclude, our HARPS RV follow-up helps to describe the GJ1132 system more completely and with more details. We confirm the detection of planet b based on RVs alone, and we refine its characteristics, including its mass, density, and eccentricity. We also detect at least one new planet in the system. Assuming coplanarity with planet b, GJ1132c is a super-Earth with mass $m_c = 2.75^{+0.76}_{-0.61} M_{\oplus}$. Its equilibrium temperature is that of a temperate planet, although it is probably too close to the star to allow for liquid water on its surface. Finally, we also detect a third Keplerian signal, but its true nature is yet to be decided (planet or stellar activity). If confirmed as a planet, GJ1132(d) would be a super-Earth or mini-Neptune found farther away from the star and beyond the ice line. Further observations, and potentially at other wavelengths with infrared spectrographs such as CARMENES (Quirrenbach et al. 2014; Sarkis et al. 2018) or SPIROU (Delfosse et al. 2013), may help to interpret the true nature of this signal.

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Fig. A.1. Marginal posterior PDFs of the model parameters. See text for details.

Table A.1. HARPS RV	/ and spectrosc	opic index	time-series.
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BJD-2400000.0	RV (km s^{-1})	$\sigma \mathrm{RV} (\mathrm{km} \mathrm{s}^{-1})$	H_{α}	$\sigma \mathrm{H}_{lpha}$	H_{β}	σH_{β}	NaD	σ NaD	S	σS
57180.4657	35.0715	0.0021	0.0736	0.0002	0.0594	0.0006	0.0078	0.0002	1.1837	0.1395
57181.4875	35.0777	0.0024	0.0737	0.0003	0.0593	0.0008	0.0073	0.0003	1.2959	0.1978
57182.5211	35.0790	0.0024	0.0738	0.0003	0.0604	0.0008	0.0072	0.0003	1.1192	0.2717
57183.5369	35.0766	0.0029	0.0733	0.0003	0.0628	0.0010	0.0075	0.0004	1.0605	0.2463
57184.5827	35.0770	0.0034	0.0746	0.0004	0.0623	0.0013	0.0081	0.0005	1.3121	0.4228
57185.4828	35.0725	0.0034	0.0774	0.0004	0.0697	0.0012	0.0083	0.0005	1.1838	0.2943
57186.4758	35.0688	0.0034	0.0789	0.0004	0.0730	0.0012	0.0090	0.0005	1.0703	0.3002
57187.4707	35.0770	0.0033	0.0739	0.0004	0.0611	0.0011	0.0076	0.0005	1.2266	0.2843
57188.4751	35.0677	0.0063	0.0759	0.0007	0.0639	0.0023	0.0077	0.0011	0.5631	0.5589
57189,4766	35.0767	0.0024	0.0737	0.0003	0.0620	0.0009	0.0079	0.0003	1.3587	0.3760
57190.4747	35.0828	0.0025	0.0757	0.0003	0.0666	0.0009	0.0087	0.0003	1.1962	0.2160
57191.4635	35.0733	0.0026	0.0726	0.0003	0.0579	0.0008	0.0072	0.0003	1.0801	0.2145
57192.4695	35.0811	0.0038	0.0756	0.0004	0.0667	0.0012	0.0093	0.0006	1.2518	0.3017
57199,4737	35.0686	0.0039	0.0759	0.0003	0.0692	0.0008	0.0149	0.0003	0.8405	0.2049
57200.4709	35.0826	0.0022	0.0730	0.0003	0.0646	0.0007	0.0076	0.0002	1.1800	0.1595
57201.4700	35.0781	0.0035	0.0759	0.0004	0.0736	0.0013	0.0108	0.0004	0.8145	0.3528
57203.4724	35.0772	0.0033	0.0767	0.0004	0.0679	0.0010	0.0097	0.0004	2.0155	0.2546
57204.4690	35.0739	0.0022	0.0732	0.0003	0.0602	0.0007	0.0088	0.0002	0.6547	0.1638
57211.4898	35.0786	0.0028	0.1089	0.0004	0.1535	0.0014	0.0181	0.0004	3.7218	0.3768
57212.4771	35.0678	0.0065	0.0759	0.0007	0.0694	0.0025	0.0085	0.0010	3.5179	4.3547
57218.4902	35.0808	0.0070	0.0774	0.0007	0.0719	0.0027	0.0072	0.0012	2.6520	1.2886
57219.4812	35.0686	0.0043	0.0766	0.0005	0.0763	0.0016	0.0071	0.0006	1.3183	0.6870
57220.4694	35.0780	0.0029	0.0751	0.0003	0.0669	0.0010	0.0074	0.0003	0.9122	0.3073
57221.4706	35.0769	0.0025	0.0769	0.0003	0.0660	0.0009	0.0079	0.0003	1.3581	0.3381
57222.4842	35.0738	0.0039	0.0784	0.0004	0.0762	0.0016	0.0109	0.0005	2.8997	0.6544
57318.8586	35.0770	0.0022	0.0778	0.0003	0.0709	0.0007	0.0101	0.0002	1.4137	0.1460
57319.8553	35.0739	0.0065	0.0747	0.0007	0.0550	0.0022	0.0090	0.0010	0.9849	0.9136
57325.8585	35.0855	0.0019	0.0747	0.0002	0.0637	0.0006	0.0084	0.0002	1.3391	0.0847
57364.8062	35.0725	0.0017	0.0732	0.0002	0.0567	0.0005	0.0053	0.0001	0.8243	0.0849
57365.8194	35.0703	0.0016	0.0736	0.0002	0.0563	0.0004	0.0057	0.0001	0.7972	0.0720
57366.7942	35.0782	0.0029	0.0739	0.0003	0.0582	0.0008	0.0057	0.0003	0.8061	0.1615
57367.8072	35.0745	0.0020	0.0734	0.0002	0.0551	0.0005	0.0057	0.0002	0.8998	0.1020
57370.8365	35.0741	0.0021	0.0721	0.0002	0.0564	0.0006	0.0065	0.0002	1.0348	0.1061
57371.8364	35.0755	0.0022	0.0736	0.0003	0.0577	0.0006	0.0060	0.0002	0.6316	0.1142
57373.8390	35.0704	0.0034	0.0740	0.0004	0.0571	0.0009	0.0059	0.0004	0.6013	0.1954
57374.7626	35.0756	0.0020	0.0746	0.0002	0.0601	0.0006	0.0072	0.0002	0.9275	0.1048
57389.8172	35.0778	0.0019	0.0740	0.0002	0.0606	0.0005	0.0064	0.0002	0.8959	0.0829
57390.8011	35.0757	0.0019	0.0740	0.0002	0.0616	0.0005	0.0065	0.0002	0.9732	0.0809
57391.8098	35.0764	0.0034	0.0741	0.0004	0.0585	0.0010	0.0071	0.0004	0.3834	0.2935
57401.7321	35.0757	0.0015	0.0752	0.0002	0.0649	0.0004	0.0075	0.0001	1.1823	0.0609
57403.7974	35.0823	0.0019	0.0764	0.0002	0.0685	0.0005	0.0083	0.0002	1.3221	0.0755
57404.7412	35.0796	0.0022	0.0790	0.0003	0.0730	0.0007	0.0083	0.0002	1.4257	0.1107
57405.6930	35.0881	0.0017	0.0751	0.0002	0.0677	0.0005	0.0082	0.0002	1.2337	0.0754
57406.7642	35.0841	0.0028	0.0754	0.0003	0.0681	0.0009	0.0077	0.0003	1.4073	0.1748
57407.6980	35.0793	0.0024	0.0737	0.0002	0.0505	0.0045	0.0080	0.0003	-1.8703	3.2426
57412.7474	35.0790	0.0023	0.0757	0.0003	0.0635	0.0007	0.0085	0.0002	0.9553	0.1079
57413.7202	35.0876	0.0019	0.0733	0.0002	0.0627	0.0006	0.0086	0.0002	1.1364	0.0899
57415.7809	35.0830	0.0022	0.0772	0.0003	0.0704	0.0007	0.0089	0.0002	1.6911	0.1186
57416.7217	35.0842	0.0027	0.0737	0.0003	0.0656	0.0008	0.0076	0.0003	1.3785	0.1412
57417.7195	35.0773	0.0023	0.0763	0.0003	0.0693	0.0007	0.0083	0.0002	1.6400	0.1145
57418.7193	35.0775	0.0021	0.0742	0.0002	0.0663	0.0006	0.0084	0.0002	1.3759	0.1162
57420.7413	35.0797	0.0019	0.0929	0.0003	0.1135	0.0007	0.0137	0.0002	2.6172	0.1104
57421.7295	35.0863	0.0016	0.0740	0.0002	0.0647	0.0005	0.0078	0.0001	1.1015	0.0828
57422.7158	35.0802	0.0017	0.0797	0.0002	0.0772	0.0005	0.0102	0.0002	1.8171	0.0822
57423.7243	35.0843	0.0019	0.0778	0.0002	0.0739	0.0006	0.0096	0.0002	1.7806	0.1194

Notes. Radial velocities are given in the solar system barycentric reference frame.

Table A.1. continued.

5742.64008 35.0815 0.0018 0.0744 0.0002 0.0007 0.0000 0.0007 1.0757 57445.64185 35.0818 0.0020 0.0778 0.0003 0.0761 0.0007 0.0080 0.0002 1.4571 0.0750 57445.64185 35.0814 0.0021 0.0772 0.0003 0.0761 0.0006 0.0085 0.0002 1.4571 0.0753 57449.5755 50.0815 0.0022 1.0513 0.0003 0.1561 0.0006 0.0085 0.0002 1.1410 0.0715 57451.5918 35.0815 0.0018 0.0742 0.0002 0.0054 0.0006 1.1410 0.0715 57453.5449 35.0816 0.0018 0.0791 0.0001 0.0744 0.0005 0.0054 0.0001 1.4374 0.0714 57453.5449 35.0818 0.0028 0.0072 0.0584 0.0001 1.4374 0.0794 57453.5540 35.0837 0.0019 0.0773 0.0062 0.00654 0.0006 <td< th=""><th>BJD-2400000.0</th><th>$RV (km s^{-1})$</th><th>$\sigma \mathrm{RV}~(\mathrm{kms^{-1}})$</th><th>$H_{\alpha}$</th><th>$\sigma H_{lpha}$</th><th>$H_{\beta}$</th><th>$\sigma H_{\beta}$</th><th>NaD</th><th>$\sigma$NaD</th><th>S</th><th>$\sigma S$</th></td<>	BJD-2400000.0	$RV (km s^{-1})$	$\sigma \mathrm{RV}~(\mathrm{kms^{-1}})$	H_{α}	σH_{lpha}	H_{β}	σH_{β}	NaD	σ NaD	S	σS
57425.8801 35.0815 0.0024 0.0794 0.0064 0.0007 0.0006 0.0002 1.6742 0.1679 57445.6185 35.0818 0.0021 0.0778 0.0006 0.0006 0.0008 0.0002 1.6356 0.0818 57445.520 35.0821 0.0019 0.0072 0.0006 0.0006 0.0008 0.0002 1.6356 0.0015 5745.531918 35.0831 0.0018 0.0734 0.0006 0.0064 0.0002 1.1318 0.0719 5745.5344 35.0816 0.0016 0.0734 0.0002 0.0674 0.0006 0.0079 0.0002 1.1318 0.0719 5745.5344 35.0816 0.0016 0.0734 0.0006 0.0064 0.0001 1.3474 0.0716 5745.5736 35.0851 0.0030 0.0759 0.0002 0.0544 0.0001 0.0854 0.0001 1.4816 0.333 5745.5735 35.0864 0.0031 0.0721 0.0032 0.00671 0.00022 0.021	57424.6908	35.0800	0.0018	0.0734	0.0002	0.0627	0.0005	0.0080	0.0002	1.2936	0.0928
57446.6185 35.0818 0.0020 0.0778 0.0006 0.0076 0.0006 0.0076 0.0006 0.0080 0.0002 1.6571 0.0079 57448.5784 35.0817 0.0019 0.0774 0.0003 0.01691 0.0006 0.0085 0.0002 1.5313 0.0683 57449.5756 35.0875 0.0021 0.0734 0.0002 0.0693 0.0006 0.0099 0.0002 1.1410 0.0715 5745.57918 35.0816 0.0018 0.0021 0.0054 0.0006 0.0099 0.0002 1.871 0.0775 5745.57948 35.0816 0.0018 0.0074 0.0002 0.0554 0.0010 0.0846 0.0001 1.4374 0.0795 5745.5705 35.0851 0.0030 0.0776 0.0002 0.0554 0.0006 0.0384 0.0001 1.4374 0.0393 57475.5715 35.0870 0.0022 0.0751 0.0006 0.0081 0.0002 1.4381 0.0214 0.0344 0.00014 0.	57425.6801	35.0815	0.0024	0.0744	0.0003	0.0640	0.0007	0.0080	0.0003	1.6742	0.1567
57447,6264 35,0804 0.0021 0.0772 0.0003 0.0076 0.0006 0.0088 0.0002 1.6356 0.0688 57448,5976 35,0875 0.0022 0.1053 0.0002 0.0612 0.0016 0.0076 0.0006 0.0079 0.0002 1.6156 0.0075 57451,5918 35,0841 0.0018 0.0734 0.0002 0.0054 0.0006 0.0079 0.0002 1.1318 0.0719 57453,5344 35,0818 0.0016 0.0742 0.0002 0.0674 0.0001 0.0066 0.0003 1.2374 0.0333 57455,5748 35,0817 0.0016 0.0759 0.0002 0.0654 0.0001 0.0066 0.0031 1.2791 0.333 57455,5745 35,0816 0.0016 0.0739 0.0002 0.0654 0.0001 0.0064 0.0784 0.0391 0.0014 0.0782 0.0016 0.0072 0.1289 0.0314 0.0791 0.022 0.0251 0.0006 0.0814 0.0102 0.12	57446.6185	35.0818	0.0020	0.0798	0.0002	0.0753	0.0006	0.0102	0.0002	1.4571	0.0769
57448 5920 35.087 0.0019 0.0764 0.0003 0.1524 0.0101 0.0072 1.5313 0.0628 57480 550 35.0873 0.0012 0.0754 0.0002 0.0693 0.0006 0.0075 0.0007 1.410 0.0075 57455 550839 0.0018 0.0819 0.0002 0.0674 0.0006 0.0097 0.0002 1.410 0.0755 57455 5748 35.0816 0.0018 0.0760 0.0001 0.0074 0.0001 0.0094 0.0002 1.4374 0.0761 57455 5748 53.0815 0.0030 0.0760 0.0002 0.0654 0.0006 0.0081 0.0002 1.4374 0.0901 57455 53.0840 0.0019 0.0772 0.0002 0.0654 0.0006 0.0081 0.0002 1.4374 0.0901 57475 53.0840 0.0031 0.0721 0.0002 0.0654 0.0008 0.0002 1.4314 0.1183 57470.5	57447.6264	35.0804	0.0021	0.0772	0.0003	0.0716	0.0006	0.0098	0.0002	1.6056	0.0810
57449.5756 35.0875 0.0022 0.1033 0.0001 0.0171 0.0003 2.527 0.0831 57450.5011 35.0831 0.0018 0.0733 0.0002 0.0640 0.0005 0.0003 0.0002 0.0033 0.0002 0.0031 0.0002 1.874 0.0002 1.874 0.0001 1.474 0.0716 0.0003 1.574 0.0001 0.0084 0.0001 1.474 0.0716 0.0033 1.574 0.0001 0.0044 0.0001 1.474 0.0716 0.0003 0.0674 0.0010 0.0041 1.4816 0.2335 57455.5740 35.0851 0.0019 0.0772 0.0002 0.0654 0.0006 0.0081 0.0002 1.2344 0.991 57475.5540 35.0837 0.0019 0.0772 0.0002 0.0638 0.0002 0.0638 0.0002 0.0634 0.0002 1.6454 0.1014 0.0021 1.2474 0.1746 0.1022 1.244 0.1746 0.1022 1.24414 0.1014 0.1244	57448.5920	35.0821	0.0019	0.0764	0.0002	0.0691	0.0006	0.0085	0.0002	1.5313	0.0688
57450.9011 35.0831 0.0021 0.0754 0.0006 0.0084 0.0002 1.1410 0.0705 57451.5918 35.0841 0.0018 0.0021 0.0022 0.0064 0.0005 0.0079 0.0002 1.1410 0.0765 57452.5529 35.0839 0.0016 0.0742 0.0003 0.0679 0.0010 0.0041 1.4474 0.07165 57453.57443 35.0816 0.0030 0.0760 0.0003 0.0674 0.0010 0.0091 1.4714 0.0716 57455.5705 35.0846 0.0031 0.0772 0.0002 0.0658 0.0000 0.0082 0.0002 1.4314 0.0991 57452.5523 35.0846 0.0031 0.0771 0.0002 0.0658 0.0006 0.0082 0.0002 1.4314 0.0991 57475.553 35.0846 0.0017 0.0724 0.0002 0.0658 0.0006 0.0081 0.0002 0.4746 0.1138 57475.6611 35.0850 0.0020 0.0773 0	57449.5756	35.0875	0.0022	0.1053	0.0003	0.1542	0.0010	0.0171	0.0003	2.6527	0.0831
57451.5918 35.0834 0.0018 0.0733 0.0002 0.0640 0.0005 0.0079 0.0002 1.1318 0.0719 57452.5523 35.0836 0.0016 0.0739 0.0003 0.0674 0.0006 0.0099 0.0001 1.3474 0.0716 57455.57448 35.0816 0.0028 0.0779 0.0003 0.0674 0.0010 0.0081 1.2791 0.3333 57457.5540 35.0851 0.0019 0.0774 0.0002 0.0654 0.0006 0.0081 0.0002 1.4374 0.0019 57475.5540 35.0851 0.0019 0.0772 0.0004 0.0588 0.0002 0.0634 0.0002 1.6374 0.1019 0.8774 57475.5527 35.0880 0.0021 0.0774 0.0002 0.0060 0.0081 0.0002 0.4593 0.1018 57475.6271 35.0885 0.0024 0.0776 0.0002 0.0087 0.0002 0.0001 0.4593 0.1018 57477.5256 35.0835 0	57450 5911	35 0831	0.0021	0.0754	0.0002	0.0693	0.0006	0.0084	0.0002	1 1410	0.0705
57452.5529 35.0819 0.0018 0.0819 0.0002 0.0872 0.0005 0.0002 1.8971 0.0765 57453.5449 35.0816 0.0026 0.0779 0.0003 0.0679 0.0010 0.0004 1.8474 0.0716 57455.5748 35.0811 0.0023 0.0770 0.0003 0.0674 0.0010 0.0004 1.4374 0.0909 57455.5743 35.0821 0.0019 0.0735 0.0002 0.0654 0.0006 0.0001 0.0022 1.4374 0.0919 57476.555 35.0846 0.0021 0.0751 0.0002 0.0658 0.0000 0.0002 0.1654 0.1006 0.0002 0.1654 0.1128 57476.0555 35.0846 0.0012 0.0744 0.0002 0.0665 0.0007 0.0021 0.1434 0.1138 57475.651 35.0850 0.0017 0.0724 0.0002 0.0662 0.0007 0.0002 1.0454 1.1384 0.151 57475.6611 35.0850 0.000	57451 5918	35 0841	0.0018	0.0733	0.0002	0.0640	0.0005	0.0079	0.0002	1 1318	0.0719
57455.5429 35.0816 0.0016 0.0742 0.0005 0.0045 0.0001 0.0007 1.2474 0.0715 57455.7948 35.0818 0.0028 0.0759 0.0003 0.0674 0.0010 0.0084 0.0003 1.2791 0.333 57455.7540 35.0851 0.0019 0.0742 0.0002 0.0654 0.0006 0.0081 0.0002 1.2344 0.021 57455.7540 35.0851 0.0019 0.0742 0.0002 0.0658 0.0006 0.0081 0.0002 1.2344 0.021 57475.6523 35.0805 0.0021 0.0740 0.0002 0.0658 0.0006 0.0081 0.0002 0.0674 0.0002 0.0674 0.0002 0.0674 0.0002 0.0674 0.0001 0.0024 0.0175 0.0002 0.0673 0.0002 0.0674 0.0006 0.0006 0.0006 0.0006 0.0006 0.0006 0.0006 0.0006 0.0006 0.0006 0.0006 0.0006 0.0006 0.0006 0.000	57452 5529	35 0839	0.0018	0.0819	0.0002	0.0872	0.0006	0.0099	0.0002	1 8971	0.0765
57455.794 530818 0.0025 0.0755 0.0037 0.0010 0.0086 0.0003 1.2791 0.3333 57455.5704 35.0811 0.0030 0.0760 0.0002 0.0674 0.0010 0.0094 1.4374 0.0039 57455.5743 35.0821 0.0019 0.0735 0.0002 0.0658 0.0006 0.0081 0.0021 1.4374 0.0093 57455.5743 35.0846 0.0001 0.0071 0.0004 0.0088 0.0000 0.0002 0.8746 0.1129 57472.6955 35.0846 0.0001 0.0774 0.0002 0.0663 0.0006 0.0081 0.0002 1.0464 0.1138 57475.651 35.0885 0.0030 0.0724 0.0002 0.0663 0.0006 0.0084 0.9834 0.1501 57475.651 35.0885 0.0020 0.0773 0.0002 0.0664 0.0008 0.0002 1.4413 0.1018 57475.6563 35.0835 0.0021 0.0774 0.0002 0.0660	57453 5449	35 0816	0.0016	0.0012	0.0002	0.0654	0.0005	0.0099	0.0002	1 3474	0.0716
57456.5702 25.0851 0.0020 0.0072 0.0003 0.0074 0.0004 1.4816 0.2336 57457.5540 35.0851 0.0019 0.0742 0.0002 0.0654 0.0006 0.0021 1.4374 0.0091 57458.5628 35.0821 0.0019 0.0732 0.0002 0.0658 0.0006 0.0081 0.0002 1.2384 0.0091 57470.6955 35.0805 0.0021 0.0740 0.0002 0.0658 0.0006 0.0081 0.0002 0.0571 0.0022 0.0571 57472.5555 35.0805 0.0021 0.0740 0.0002 0.0663 0.0005 0.0002 1.4343 0.1571 57475.6271 35.0885 0.0012 0.0773 0.0002 0.0663 0.0008 0.0002 1.4393 0.1018 57477.6016 35.0835 0.0002 0.0770 0.0002 0.0679 0.0006 0.0006 0.0006 0.0006 0.0002 1.4413 0.1707 57478.6565 35.0835 0.	57455 7948	35 0818	0.0010	0.0742	0.0002	0.0004	0.0005	0.0004	0.0001	1.3474	0.3333
57427.5540 53.0821 0.0010 0.0023 0.0024 0.0002 0.0021 0.4240 0.0002 57457.5544 35.0821 0.0019 0.0735 0.0002 0.0654 0.0006 0.0081 0.0002 1.4374 0.0001 57470.6955 35.0846 0.0021 0.0751 0.0003 0.0670 0.0001 0.0002 1.4474 0.0002 57472.555 35.0846 0.0017 0.0714 0.0002 0.0638 0.0005 0.0002 1.0474 0.1138 57475.651 35.0808 0.0017 0.0724 0.0000 0.0620 0.0008 0.0002 1.4573 0.011 5.0776 0.0002 0.0652 0.0006 0.0081 0.0002 1.4413 0.1501 57475.6611 35.0855 0.0020 0.0733 0.0002 0.0679 0.0002 0.0087 0.0002 1.4413 0.1717 57475.6663 35.0853 0.0020 0.0738 0.0002 0.0669 0.0002 1.450 0.12531 <tr< td=""><td>57456 5705</td><td>35 0851</td><td>0.0020</td><td>0.0750</td><td>0.0003</td><td>0.0674</td><td>0.0010</td><td>0.0000</td><td>0.0003</td><td>1.2771</td><td>0.2336</td></tr<>	57456 5705	35 0851	0.0020	0.0750	0.0003	0.0674	0.0010	0.0000	0.0003	1.2771	0.2336
57478.562 50001 0.0012 0.0022 0.0038 0.0001 1.2374 0.0041 57478.5628 35.0821 0.0019 0.0735 0.0002 0.0658 0.0001 0.0081 0.0002 1.2384 0.0041 57472.7555 35.0793 0.0022 0.0751 0.0002 0.06678 0.0005 0.0068 0.0002 0.8746 0.1102 57475.6271 35.0808 0.0017 0.0744 0.0002 0.0665 0.0005 0.0002 0.9334 0.1015 57475.6271 35.0885 0.0024 0.0762 0.0002 0.0662 0.0007 0.0082 0.0002 1.3534 0.1018 57477.6013 35.0853 0.0022 0.0774 0.0002 0.0662 0.0006 0.0082 0.0022 1.413 0.1787 0.135 57478.6563 35.0835 0.0022 0.0774 0.0002 0.0660 0.0080 0.0002 1.2384 0.1315 5748.5523 35.0801 0.0021 0.0776 0.0003<	57457 5540	35 0837	0.0019	0.0742	0.0003	0.0074	0.0010	0.0091	0.0004	1 4374	0.2330
57470.695 53.084 0.0037 0.0022 0.0038 0.0004 0.0031 0.0004 0.0004 0.0004 0.0004 0.0002 0.0126 57470.6955 35.0793 0.0021 0.0710 0.0038 0.0007 0.0081 0.0002 0.8746 0.1126 57473.5981 35.0805 0.0017 0.0724 0.0002 0.0638 0.0005 0.0069 0.0022 1.0444 57475.6271 35.0885 0.0030 0.0723 0.0004 0.0620 0.0008 0.0002 1.14413 0.1077 57476.631 35.0853 0.0019 0.0767 0.0002 0.0669 0.0006 0.0087 0.0002 1.4413 0.1077 57478.6553 35.0853 0.0021 0.0774 0.0002 0.0669 0.0006 0.0082 1.0088 0.0002 1.4413 0.1077 5748.6563 35.0803 0.0021 0.0774 0.0003 0.0711 0.0003 0.0619 0.0008 0.0081 1.0367 1.1387 <tr< td=""><td>57458 5628</td><td>35 0821</td><td>0.0019</td><td>0.0735</td><td>0.0002</td><td>0.0054</td><td>0.0000</td><td>0.0002</td><td>0.0002</td><td>1 2384</td><td>0.0901</td></tr<>	57458 5628	35 0821	0.0019	0.0735	0.0002	0.0054	0.0000	0.0002	0.0002	1 2384	0.0901
57470.7525 35.073 0.0021 0.0024 0.0024 0.0030 0.0001 0.0002 0.7702 0.1002 57472.755 35.0734 0.0021 0.0740 0.0002 0.0670 0.0008 0.0002 0.0454 0.1102 57475.5271 35.0885 0.0030 0.0723 0.0004 0.0663 0.0006 0.0002 0.9334 0.1501 57475.6271 35.0855 0.0024 0.0723 0.0004 0.0642 0.0008 0.0002 1.0454 0.1018 57477.6036 35.0853 0.0014 0.0767 0.0002 0.0669 0.0006 0.0082 0.0002 1.2298 0.1441 57478.6565 35.0835 0.0022 0.0724 0.0002 0.0669 0.0006 0.0082 1.2298 0.1441 57478.6565 35.0801 0.0021 0.0774 0.0002 0.0669 0.0002 1.2298 0.0031 1.3647 5748.5563 35.0801 0.0021 0.0774 0.0003 0.0662 0.000	57470 6055	35.0846	0.0019	0.0733	0.0002	0.00588	0.0000	0.0001	0.0002	0 7002	0.0941
57473.598 35.0805 0.0021 0.0734 0.0002 0.0604 0.0004 0.0002 0.1445 0.1132 57473.5981 35.0808 0.0017 0.0724 0.0002 0.0663 0.0005 0.0004 0.9834 0.1501 57476.6011 35.0770 0.0022 0.0773 0.0004 0.0652 0.0007 0.0080 0.0002 1.0443 0.1138 57476.6011 35.0770 0.0022 0.0773 0.0002 0.0662 0.0006 0.0087 0.0002 1.4413 0.1070 57476.603 35.0835 0.0022 0.0774 0.0002 0.0669 0.0065 0.0002 1.2798 0.1417 57478.6563 35.0803 0.0024 0.0767 0.0003 0.0671 0.0006 0.0006 0.0002 1.2078 0.1135 57488.552 35.0808 0.0024 0.0731 0.0003 0.6622 0.0083 0.0003 1.3646 0.1755 5732.51943 35.0734 0.0061 0.0774 0.007	57470.0555	35 0703	0.0022	0.0721	0.0004	0.0500	0.0007	0.0075	0.0004	0.7702	0.1207
57474.6150 35.0802 0.0021 0.0002 0.0003 0.0003 0.0002 0.0103 0.0002 0.0103 0.0002 0.0103 0.0002 0.0103 0.0002 0.0103 0.0002 0.0103 0.0002 0.0103 0.0002 0.0103 0.0002 0.0003 0.0002 0.0003 0.0002 0.0003 0.0002 0.0002 0.0002 0.0002 0.0002 0.0003 0.0002 0.0002 0.1003 0.0002 1.4413 0.1010 57478.6565 35.0853 0.0002 0.0774 0.0002 0.0006 0.0008 0.0002 1.287 0.137 5748.6565 35.0830 0.0024 0.0776 0.0003 0.0068 0.0002 1.287 0.1287 5748.6565 35.0801 0.0021 0.0776 0.0003 0.0622 0.0007 0.0003 1.3646 0.1755 5748.5563 35.0806 0.0027 0.0713 0.0003 0.0602 0.0004 0.0003 0.0404 0.0003 0.0404 0.0013 </td <td>57473 5081</td> <td>35.0805</td> <td>0.0022</td> <td>0.0740</td> <td>0.0003</td> <td>0.0070</td> <td>0.0007</td> <td>0.0001</td> <td>0.0002</td> <td>1 0/5/</td> <td>0.1102</td>	57473 5081	35.0805	0.0022	0.0740	0.0003	0.0070	0.0007	0.0001	0.0002	1 0/5/	0.1102
57475.627 35.0885 0.0030 0.0724 0.0002 0.0003 0.0003 0.0004 0.9843 0.1501 57475.6271 35.0885 0.0020 0.0773 0.0002 0.0674 0.0008 0.0002 1.3693 0.1018 57475.6271 35.0855 0.0022 0.0767 0.0002 0.0679 0.0006 0.0002 1.2498 0.1017 57476.6365 35.0853 0.0022 0.0774 0.0002 0.0669 0.0006 0.0008 0.0002 1.2498 0.1187 57478.6563 35.0803 0.0024 0.0776 0.0003 0.0711 0.0008 0.0002 1.2498 0.1187 57488.5522 35.0801 0.0021 0.0776 0.0003 0.0622 0.0007 0.0003 1.3067 1.187 5758.576 35.0808 0.0028 0.0731 0.0003 0.0622 0.0008 0.0003 1.0401 1.1707 0.4517 5756.572 35.0743 0.0061 0.0719 0.0003 0.0740 </td <td>57474 6150</td> <td>35.0808</td> <td>0.0021</td> <td>0.0774</td> <td>0.0002</td> <td>0.0000</td> <td>0.0000</td> <td>0.0001</td> <td>0.0002</td> <td>0.0100</td> <td>0.0870</td>	57474 6150	35.0808	0.0021	0.0774	0.0002	0.0000	0.0000	0.0001	0.0002	0.0100	0.0870
5/47.6.001 35.0783 0.0030 0.0723 0.0002 0.0042 0.0004 0.7849 0.1263 5/476.601 35.0855 0.0024 0.0762 0.0002 0.0652 0.0006 0.0082 0.0003 2.1576 0.1534 5/477.5256 35.0855 0.0022 0.0774 0.0002 0.0660 0.0087 0.0002 1.2298 0.1417 5/478.5656 35.0833 0.0022 0.0774 0.0002 0.0660 0.0080 0.0002 1.2298 0.1417 5/48.5663 35.0803 0.0021 0.0776 0.0003 0.0610 0.0080 0.0002 0.29245 0.0871 5/48.8.5522 35.0801 0.0021 0.0726 0.0003 0.0612 0.0008 0.0002 0.9245 0.0871 5/748.5.720 35.0744 0.0025 0.0739 0.0003 0.0632 0.0004 0.0831 0.0007 0.0001 1.160 0.2945 0.1630 5/756.4772 35.0788 0.0025 0.0779 0.	57475 6271	35.0808	0.0017	0.0724	0.0002	0.0005	0.0003	0.0009	0.0002	0.9109	0.0070
5/1703011 5/07/05 6/07/2 6/0	57476 6011	35.0005	0.0030	0.0723	0.0004	0.0020	0.0008	0.0072	0.0004	1 3603	0.1018
57477.603 5.0053 0.0019 0.0767 0.0002 0.0679 0.0006 0.0068 0.0002 1.2413 0.1707 57478.6655 35.0835 0.0022 0.0774 0.0002 0.0669 0.0006 0.0068 0.0002 1.2288 0.1287 57486.5563 35.0803 0.0024 0.0767 0.0003 0.0612 0.0006 0.0006 0.0006 0.0003 1.3667 0.1287 57488.5523 35.0801 0.0021 0.0726 0.0003 0.0622 0.0009 0.0003 0.322 0.0001 0.0003 1.3646 0.1755 57488.522 35.0866 0.0027 0.0739 0.0003 0.0622 0.0009 0.0003 0.324 0.1535 57529.5196 35.0866 0.0025 0.0738 0.0007 0.0700 0.0009 0.0001 1.4100 0.2996 57565.4727 35.0788 0.0025 0.0758 0.0003 0.0740 0.0009 0.0007 1.4413 0.42308 57569.5552<	57477 5256	35.0770	0.0020	0.0755	0.0002	0.0042	0.0000	0.0080	0.0002	2 1576	0.1018
57478.665 35.0833 0.0019 0.0724 0.0020 0.0006 0.0006 0.0006 0.0021 1.218 0.1017 57478.655 35.0835 0.0022 0.0734 0.0002 0.0619 0.0006 0.0068 0.0002 1.2298 0.1815 57488.5552 35.0801 0.0021 0.0726 0.0003 0.0711 0.0008 0.0008 0.0003 0.9245 0.0871 57488.5522 35.0801 0.0021 0.0726 0.0003 0.0622 0.0008 0.0003 0.0323 0.0008 0.0003 0.0323 0.0008 0.0003 0.0324 0.0015 0.4073 0.0003 0.0323 0.0003 0.0324 0.0016 0.0625 0.0114 0.0001 1.1707 0.4517 5756.4667 35.0868 0.0028 0.0073 0.0010 0.0655 0.0041 0.0095 0.0005 1.2613 0.3376 5756.47172 35.0788 0.0023 0.0747 0.0003 0.0749 0.0019 0.0005 1.2610	57477.5250	35.0853	0.0024	0.0762	0.0003	0.0052	0.0007	0.0082	0.0003	2.1370	0.1070
5/7479.6303 35.0833 0.0022 0.0738 0.0002 0.0006 0.0006 0.0006 0.0002 1.287 57479.6303 35.0803 0.0024 0.0738 0.0002 0.0016 0.0006 0.0008 0.0002 1.287 57488.5522 35.0801 0.0021 0.0726 0.0003 0.6622 0.0009 0.0001 1.3646 0.1755 57529.5196 35.0806 0.0027 0.0739 0.0007 0.0700 0.0002 0.0114 0.0001 1.7677 0.4517 5753.5194 35.0743 0.0061 0.0816 0.0007 0.0700 0.0009 0.0009 1.0097 0.0005 1.4100 0.2996 57564.472 35.0788 0.0025 0.0738 0.0003 0.0740 0.0009 0.0009 1.0097 1.2613 0.3376 57568.4726 35.0850 0.0044 0.0735 0.0004 0.0085 0.0007 1.3251 0.4338 57584.4054 35.0850 0.0044 0.0730 0.000	574778 6655	35.0835	0.0019	0.0707	0.0002	0.0079	0.0000	0.0067	0.0002	1.4413	0.1070
57486.563 35.0742 0.0024 0.0767 0.0003 0.0003 0.0003 0.0003 1.7637 0.1237 57486.563 35.0801 0.0021 0.0776 0.0003 0.0602 0.0003 0.0007 0.0003 0.0007 0.0003 0.0007 0.0003 0.0007 0.0003 0.0007 0.0003 0.0007 0.0003 0.0007 0.0003 1.543 0.333 0.0473 0.0003 0.0011 0.0003 1.547 0.2308 5756.74772 35.0763 0.0044 0.0003 0.0016 0.0002 0.0007 1.4878 0.6013 0.3376 57572.5167 <t< td=""><td>57470 6303</td><td>35.0835</td><td>0.0022</td><td>0.0724</td><td>0.0002</td><td>0.0000</td><td>0.0000</td><td>0.0005</td><td>0.0002</td><td>1.2290</td><td>0.1417</td></t<>	57470 6303	35.0835	0.0022	0.0724	0.0002	0.0000	0.0000	0.0005	0.0002	1.2290	0.1417
37488.5522 35.0801 0.0021 0.0030 0.0030 0.0030 0.0003 0.	57479.0505	35.0742	0.0020	0.0758	0.0002	0.0019	0.0000	0.0008	0.0002	1.7007	0.1207
37488.7183 35.0801 0.0021 0.0720 0.0020 0.0070 0.0070 0.0070 0.0021 0.5243 0.0171 0.0071 0.0071 0.0003 0.5243 0.0011 0.1755 57323.5194 35.0806 0.0027 0.0739 0.0003 0.0622 0.0014 0.0011 1.1707 0.4517 57535.5792 35.0743 0.0003 0.0881 0.0013 0.0090 0.0019 1.2531 0.6473 57566.4667 35.0868 0.0028 0.0733 0.0003 0.0719 0.0009 0.0094 0.0003 1.5649 0.2308 57566.467 35.0868 0.0025 0.0743 0.0003 0.0719 0.0013 0.0094 0.0003 1.5649 0.2308 57566.5552 35.0673 0.0047 0.0733 0.0005 0.0746 0.0016 0.0092 0.0007 1.2613 0.3376 57575.517 35.0750 0.0024 0.0731 0.0005 0.0746 0.0012 0.0007 0.3945 <t< td=""><td>57480.5005</td><td>35.0803</td><td>0.0024</td><td>0.0707</td><td>0.0003</td><td>0.0711</td><td>0.0008</td><td>0.0080</td><td>0.0003</td><td>0.0245</td><td>0.1313</td></t<>	57480.5005	35.0803	0.0024	0.0707	0.0003	0.0711	0.0008	0.0080	0.0003	0.0245	0.1313
57529.5196 35.0806 0.0023 0.0021 0.0032 0.0020 0.0003 0.0003 0.0024 0.1630 57529.5196 35.0734 0.0061 0.0816 0.0007 0.0760 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0007 0.0011 1.1707 0.4517 57563.6476 35.0868 0.0025 0.0758 0.0003 0.0740 0.0009 0.0004 0.0091 1.2531 0.6473 57567.4772 35.0788 0.0025 0.0758 0.0003 0.0740 0.0009 0.0094 0.0003 1.5649 0.2308 57567.4772 35.0780 0.0047 0.0743 0.0005 0.0799 0.0019 0.0085 0.0008 1.5105 0.4358 57567.5552 35.0673 0.0044 0.0735 0.0014 0.0016 0.0092 0.0007 1.3251 0.2503 57567.567.5167 35.0769 0.0044 0.0735 0.0017 0.0087 0.0007 1.3251 0.2503 57729.816 35.0752 0.0223 0.0730 0.0627 0.0017	57400.5522	35.0801	0.0021	0.0720	0.0003	0.0002	0.0000	0.0070	0.0002	0.9245	0.06/1
3729-3190 35.0800 0.0027 0.0793 0.0003 0.0022 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0003 0.0002 0.0014 0.0001 0.0015 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0005 0.0011 0.0005 0.0005 0.0011 0.0005 0.0005 0.0011 0.0005 0.0005 0.0011 0.0005 0.0005 0.2308 0.7568.4726 35.0819 0.0033 0.0747 0.0003 0.0719 0.0013 0.0005 0.0008 0.0005 0.0008 0.0005 1.2613 0.3376 57565.030 35.0653 0.0044 0.0735 0.0004 0.0637 0.0017 0.0007 1.4878 0.6083 57759.8316 35.0752 0.0023 0.0730 0.0007 0.0076 0.0002 1.1951 0.1406 57757.5167 35.0769 0.0023 0.0730 0.0005	57520 5106	35.0808	0.0028	0.0731	0.0003	0.0022	0.0009	0.0070	0.0003	0.0024	0.1733
57536.5794 55.0743 0.0031 0.0040 0.0007 0.0022 0.0114 0.0011 1.1707 0.4317 57536.5792 35.0743 0.0033 0.0022 0.0014 0.0099 0.0009 1.4100 0.2996 57566.4667 35.0868 0.0025 0.0788 0.0003 0.0719 0.0009 0.0094 0.0003 1.5649 0.2308 57566.4772 35.0788 0.0047 0.0743 0.0005 0.0719 0.0016 0.0092 0.0008 1.5649 0.2308 57566.5552 35.0673 0.0047 0.0743 0.0005 0.0719 0.0016 0.0092 0.0007 1.2613 0.3376 57576.5030 35.0850 0.0044 0.0735 0.0016 0.0087 0.0017 0.0088 0.0008 0.6917 0.3945 57756.5163 35.0840 0.0044 0.0731 0.0002 0.0628 0.0007 0.0062 1.1951 0.1406 57732.8377 35.0803 0.0019 0.0734 0.0002 0.0624 0.0002 0.0022 1.2762 0.0887 <	57522 5104	35.0800	0.0027	0.0739	0.0003	0.0052	0.0008	0.0065	0.0003	0.9024	0.1050
57565.4667 35.0868 0.0093 0.0004 0.0004 0.0004 0.0009 0.0003 1.4100 0.2990 57566.4667 35.0868 0.0025 0.0758 0.0003 0.0740 0.0009 0.0094 0.0003 1.5649 0.2308 57566.4726 35.0819 0.0033 0.0747 0.0003 0.0719 0.0019 0.0085 0.0008 1.5161 0.3376 57565.552 35.0673 0.0044 0.0803 0.0005 0.0746 0.0019 0.0085 0.0007 1.3251 0.2503 57575.5030 35.0850 0.0044 0.0735 0.0004 0.0637 0.0017 0.0087 0.0007 1.4878 0.6083 57759.5030 35.0752 0.0023 0.0730 0.0003 0.6627 0.0017 0.0087 0.0007 1.4878 0.6083 57759.5728.816 35.0752 0.0023 0.0730 0.0003 0.6620 0.0007 0.0002 1.1951 0.1406 57731.831 3.0019 0.0724 0.0002 0.6620 0.0006 0.0002 1.5138 0.9210	57536 5702	35.0734	0.0001	0.0810	0.0007	0.0700	0.0022	0.0114	0.0011	1.1707	0.4317
37506-4007 35.5086 0.0073 0.0074 0.0009 0.0094 0.0003 1.5231 0.0473 57567.4772 35.0788 0.0023 0.0740 0.0009 0.0094 0.0003 1.5649 0.2308 57568.4726 35.0819 0.0033 0.0747 0.0003 0.0719 0.0019 0.0095 0.0005 1.2613 0.3376 57565.552 35.0673 0.0047 0.0743 0.0005 0.0716 0.0016 0.0092 0.0007 1.4878 0.5033 57575.167 35.0759 0.0044 0.0735 0.0004 0.0637 0.0019 0.0088 0.0007 1.4878 0.6083 57758.45054 35.0840 0.0049 0.0731 0.0002 0.0620 0.0076 0.0002 1.1951 0.1406 57732.8377 35.0890 0.0060 0.0779 0.0002 0.0628 0.0005 0.0075 0.0002 1.2669 0.1141 57755.8231 35.0847 0.0057 0.0729 0.0062 0.0066 0.0079 0.0004 1.2188 0.2001 57755.8231	57566 4667	35.0745	0.0033	0.0802	0.0004	0.0665	0.0013	0.0097	0.0003	1.4100	0.2990
57568,4726 35.0838 0.0025 0.0738 0.0003 0.0749 0.0009 0.0095 0.0005 1.5049 0.2508 57568,4726 35.0819 0.0047 0.0743 0.0005 0.0719 0.0013 0.0095 0.0005 1.2513 0.3376 57568,5552 35.0673 0.0047 0.0743 0.0005 0.0746 0.0016 0.0095 0.0007 1.3251 0.2503 57575,5167 35.0769 0.0044 0.0735 0.0004 0.0637 0.0017 0.0088 0.0007 1.4878 0.6083 57758,45054 35.0840 0.0049 0.0731 0.0005 0.0687 0.0017 0.0088 0.0009 1.5138 0.9210 57732,8377 35.0890 0.0060 0.0779 0.0007 0.0628 0.0005 0.0075 0.0002 1.2669 0.1141 57754,8207 35.0771 0.0024 0.0724 0.0002 0.0628 0.0005 0.0075 0.0002 1.2669 0.1141 57754,8207 35.0770 0.0024 0.0724 0.0003 0.6621 0.0007	57567 4772	35.0808	0.0098	0.0723	0.0010	0.0005	0.0041	0.0090	0.0019	1.2331	0.0473
37584720 35.0619 0.0037 0.0743 0.0005 0.0719 0.0015 0.0015 0.0005 1.2013 0.3370 57569.552 35.0673 0.0044 0.0803 0.0005 0.0746 0.0016 0.0092 0.0007 1.3251 0.2503 57576.5030 35.0850 0.0044 0.0735 0.00045 0.0017 0.0087 0.0007 1.4878 0.6683 57576.5030 35.0840 0.0044 0.0735 0.0003 0.0627 0.0007 0.0088 0.0000 1.4878 0.6693 57729.8316 35.0752 0.0023 0.0730 0.0002 0.0067 0.0075 0.0002 1.951 0.1446 57732.8377 35.0890 0.0060 0.0779 0.0007 0.0628 0.0005 0.0002 1.2669 0.1141 57751.7936 35.0771 0.0019 0.0724 0.0002 0.0622 0.0006 0.0081 0.0002 1.2669 0.1141 57755.8231 35.0831 0.0019 0.072	57569 1726	35.0700	0.0023	0.0738	0.0003	0.0740	0.0009	0.0094	0.0005	1.3049	0.2306
57576.5030 35.0057 0.0047 0.0043 0.0005 0.0079 0.0079 0.0005 0.0007 1.3251 0.2503 57576.5030 35.0850 0.0044 0.0803 0.0005 0.0017 0.0087 0.0007 1.3251 0.2503 57575.5167 35.0769 0.0044 0.0735 0.0005 0.0687 0.0019 0.0088 0.0002 1.4878 0.6083 57752.817 35.0840 0.0023 0.0730 0.0007 0.0620 0.0007 0.0068 0.0009 1.5138 0.9210 57734.8518 35.0813 0.0019 0.0724 0.0002 0.6620 0.0005 0.0075 0.0002 1.2669 0.1141 57755.8014 35.0771 0.0019 0.0724 0.0002 0.6620 0.0006 0.0004 1.0037 0.4191 57755.8014 35.0771 0.0019 0.0724 0.0003 0.6621 0.0007 0.0003 1.1402 0.1332 57755.8231 35.0831 0.0019 0.0724 0.0002 0.0682 0.0006 0.0091 0.0002 1.3278	57560 5552	35.0619	0.0033	0.0747	0.0005	0.0719	0.0015	0.0095	0.0003	1.2015	0.3370
57570.5050 55.0550 0.0044 0.0735 0.0004 0.0687 0.0007 0.0092 0.0007 1.4231 0.6335 57577.5167 35.0769 0.0044 0.0735 0.0003 0.0687 0.0019 0.0088 0.0002 1.4878 0.6083 57575.45054 35.0752 0.0023 0.0730 0.0003 0.0620 0.0007 0.0076 0.0002 1.1951 0.1406 57732.8377 35.0890 0.0060 0.0779 0.0007 0.0624 0.0002 0.0085 0.0002 1.2762 0.0887 57751.7936 35.0771 0.0019 0.0724 0.0002 0.0628 0.0005 0.0008 0.0002 1.2669 0.1141 57753.8014 35.0781 0.0057 0.0724 0.0003 0.642 0.0007 0.0075 0.0009 1.037 0.4191 57755.8231 35.0781 0.0024 0.0723 0.0003 0.6621 0.0007 0.0002 1.3278 0.1112 57795.8231 35.0751 0.0020 0.0743 0.0003 0.0642 0.0091 0.0002	57509.5552	35.0075	0.0047	0.0743	0.0005	0.0709	0.0019	0.0000	0.0008	1.2251	0.4558
57773167 53.0799 0.0044 0.0735 0.00057 0.0017 0.0088 0.0008 0.6917 0.3945 57584.5054 35.0840 0.0049 0.0731 0.0005 0.0687 0.0007 0.0076 0.0002 1.14578 0.3945 57729.8316 35.0752 0.0023 0.0730 0.0007 0.0654 0.0007 0.0088 0.0009 1.5138 0.9210 57734.8518 35.0813 0.0019 0.0734 0.0002 0.6620 0.0006 0.0081 0.0002 1.2669 0.1141 57751.7936 35.0771 0.0017 0.0724 0.0002 0.0620 0.0066 0.0081 0.0002 1.2669 0.1141 57751.8212 35.0847 0.0057 0.0729 0.0006 0.0644 0.0019 0.0075 0.0009 1.1218 0.2001 57754.8207 35.0770 0.0024 0.0723 0.0003 0.0621 0.0007 0.0078 0.0002 1.3481 0.1112 57795.752.8231 35.0831 0.0019 0.0751 0.0002 0.0724 0.0006 0.0091	57570.5050	35.0850	0.0044	0.0805	0.0003	0.0740	0.0010	0.0092	0.0007	1.5251	0.2303
57729.8316 35.0752 0.0049 0.0731 0.0003 0.0620 0.0007 0.0002 1.1951 0.1406 57729.8316 35.0752 0.0023 0.0730 0.0003 0.0620 0.0007 0.0002 1.1951 0.1406 57732.8377 35.0890 0.0060 0.0779 0.0002 0.0620 0.0005 0.0002 1.2762 0.0887 57751.7936 35.0771 0.0019 0.0724 0.0002 0.0620 0.0006 0.0081 0.0002 1.2669 0.1141 57752.8122 35.0847 0.0030 0.0724 0.0003 0.0642 0.0009 0.0084 0.0004 1.2188 0.2001 57753.8014 35.0781 0.0030 0.0724 0.0003 0.0642 0.0007 0.0003 1.1402 0.1332 57755.8231 35.0831 0.0019 0.0751 0.0002 0.0682 0.0006 0.0091 0.0002 1.3278 0.1112 57795.6726 35.0782 0.0022 0.0743 0.0002 0.0751 0.0002 1.6221 0.0927 57795.6726	57594 5054	35.0709	0.0044	0.0733	0.0004	0.0057	0.0017	0.0087	0.0007	1.40/0	0.0005
57732.8377 35.0890 0.0020 0.0073 0.0007 0.0070 0.0007 0.0002 1.1931 0.1400 57732.8377 35.0890 0.0060 0.0779 0.0007 0.0654 0.0007 0.0005 0.0070 0.0002 1.2762 0.0887 57734.8518 35.0813 0.0019 0.0724 0.0002 0.0620 0.0006 0.0081 0.0002 1.2669 0.1141 57751.7936 35.0771 0.0057 0.0729 0.0006 0.0644 0.0019 0.0075 0.0009 1.1037 0.4191 57753.8014 35.0770 0.0024 0.0723 0.0003 0.0621 0.0007 0.0084 0.0004 1.2188 0.2001 57754.8207 35.0770 0.0024 0.0723 0.0003 0.0621 0.0007 0.0024 0.1332 57755.8231 35.0831 0.0019 0.0751 0.0002 0.0728 0.0006 0.0091 0.0021 1.3481 0.1118 57795.6726 35.0782 0.0021 0.0829 0.0003 0.0647 0.0006 0.0002 1.621	57504.5054	35.0840	0.0049	0.0730	0.0003	0.0087	0.0019	0.0088	0.0008	1 1051	0.3943
57732.8377 35.0890 0.0000 0.0779 0.0007 0.00034 0.00034 0.00035 0.00035 0.00002 1.2762 0.0887 57734.8518 35.0813 0.0019 0.0734 0.0002 0.0628 0.0005 0.0005 0.0002 1.2762 0.0887 57751.7936 35.0771 0.0019 0.0724 0.0002 0.0620 0.0006 0.0081 0.0002 1.2669 0.1141 57753.8014 35.0781 0.0030 0.0724 0.0003 0.0642 0.0009 0.0084 0.0004 1.2188 0.2001 57754.8207 35.0770 0.0024 0.0723 0.0003 0.0621 0.0007 0.0078 0.0003 1.1402 0.1332 57755.8231 35.0831 0.0019 0.0751 0.0002 0.0682 0.0006 0.0091 0.0002 1.3481 0.1158 57792.7277 35.0751 0.0020 0.0764 0.0002 0.0728 0.0006 0.0092 0.0002 1.636 0.807 57795.6726 35.0782 0.0021 0.0829 0.0030 0.647	57729.8510	35.0752	0.0023	0.0730	0.0003	0.0020	0.0007	0.0070	0.0002	1.1951	0.1400
57754.8318 53.0813 0.0019 0.0734 0.0002 0.0025 0.0005 0.00175 0.0002 1.2702 0.0867 57751.7936 35.0771 0.0019 0.0724 0.0002 0.0620 0.0006 0.0081 0.0002 1.2669 0.1141 57751.7936 35.0771 0.0030 0.0724 0.0003 0.0642 0.0009 0.0084 0.0004 1.2188 0.2001 57753.8014 35.0770 0.0024 0.0723 0.0003 0.0621 0.0007 0.0078 0.0003 1.1402 0.1332 57755.8231 35.0831 0.0019 0.0751 0.0002 0.0682 0.0006 0.0091 0.0002 1.3481 0.1158 57792.7277 35.0751 0.0020 0.0764 0.0002 0.0728 0.0006 0.0092 0.0002 1.3278 0.1112 57795.6726 35.0782 0.0022 0.0743 0.0003 0.0647 0.0006 0.0092 1.0217 0.0927 57796.6455 35.0843 0.0021 0.0727 0.0002 0.0591 0.0005 0.0078	57724 9519	35.0890	0.0000	0.0779	0.0007	0.0034	0.0020	0.0085	0.0009	1.3130	0.9210
57752.8122 35.0847 0.0057 0.0729 0.0006 0.0064 0.0019 0.0075 0.0009 1.1037 0.4191 57752.8122 35.0847 0.0057 0.0729 0.0006 0.0644 0.0019 0.0075 0.0009 1.1037 0.4191 57753.8014 35.0781 0.0030 0.0724 0.0003 0.0642 0.0009 0.0084 0.0004 1.2188 0.2001 57755.8231 35.0831 0.0019 0.0751 0.0002 0.0682 0.0006 0.0091 0.0002 1.3481 0.1158 57792.7277 35.0751 0.0020 0.0764 0.0002 0.0728 0.0006 0.0092 0.0002 1.3278 0.1112 57795.6726 35.0782 0.0021 0.0829 0.0003 0.0647 0.0006 0.0096 0.0002 1.6221 0.0927 57795.6402 35.0795 0.0019 0.0716 0.0002 0.0591 0.0005 0.0078 0.0002 1.6221 0.0927 57798.6965 35.0809 0.0021 0.0727 0.0002 0.665 0.0066	57751 7036	35.0813	0.0019	0.0734	0.0002	0.0028	0.0005	0.0075	0.0002	1.2702	0.0007
57752.612255.08470.00570.00570.007240.00060.00440.00150.00150.00051.10570.419157753.801435.07810.00300.07240.00030.06420.00090.00840.00041.21880.200157754.820735.07700.00240.07230.00030.06210.00070.00780.00031.14020.133257755.823135.08310.00190.07510.00020.06820.00060.00910.00021.34810.115857792.727735.07510.00200.07640.00020.07280.00060.00920.00021.32780.111257795.672635.08430.00210.08290.00030.06470.00060.00960.00021.62210.092757796.645535.08430.00210.07270.00020.05910.00050.00780.00021.62210.092757797.640235.07950.00190.07160.00020.05910.00050.00780.00021.6390.92257799.624635.08180.00300.07190.00020.06150.00080.00820.00021.1740.158757810.634335.07630.00210.07290.00020.06140.00060.00820.00021.49490.84657830.583335.07700.00170.07360.00020.06620.00050.00800.00021.49490.84657831.542335.07700.0017	57752 8122	35.0771	0.0019	0.0724	0.0002	0.0020	0.0000	0.0081	0.0002	1.2009	0.1141
57753.801453.07810.00300.07240.00030.00420.00090.00840.00041.21880.200157754.820735.07700.00240.07230.00030.06210.00070.00780.00031.14020.133257755.823135.08310.00190.07510.00020.06820.00060.00910.00021.34810.115857792.727735.07510.00200.07640.00020.07280.00060.00920.00021.32780.111257795.672635.07820.00220.07430.00030.06470.00060.00960.00021.62210.092757796.645535.08430.00210.08290.00030.08100.00070.01100.00021.62210.092757796.645535.08990.00210.07270.00020.06550.00060.00850.00021.6390.092257799.624635.08180.00300.07190.00030.05810.00080.00880.00041.12410.198857803.758535.07630.00210.07290.00020.06140.00060.00820.00021.49490.08465781.634335.07700.00170.07360.00020.06620.00050.00800.00021.49490.084657835.523335.08110.00220.07610.00030.06980.00070.00840.00021.59730.174257834.560435.07750.00260.0751 <t< td=""><td>57752.0122</td><td>35.0047</td><td>0.0037</td><td>0.0729</td><td>0.0000</td><td>0.0044</td><td>0.0019</td><td>0.0075</td><td>0.0009</td><td>1.1057</td><td>0.4191</td></t<>	57752.0122	35.0047	0.0037	0.0729	0.0000	0.0044	0.0019	0.0075	0.0009	1.1057	0.4191
57754.820755.07700.00240.00240.07230.00030.00210.00070.00780.00031.14020.133257755.823135.08310.00190.07510.00020.06820.00060.00910.00021.34810.115857792.727735.07510.00200.07640.00020.07280.00060.00920.00021.32780.111257795.672635.07820.00220.07430.00030.06470.00060.00960.00021.62210.092757796.645535.08430.00210.08290.00020.05910.00050.00780.00021.62210.092757797.640235.07950.00190.07160.00020.05910.00050.00780.00021.62210.092257799.624635.08180.00300.07190.00030.05810.00080.00880.00041.12410.198857803.758535.07630.00210.07290.00020.06140.00060.00820.00021.49490.084657830.583335.07940.00190.08030.00020.08300.00060.00990.00021.94670.114157834.560435.07750.00260.07510.00030.6980.00070.00840.00021.59730.174257835.521835.08250.00380.08360.00040.08300.00140.01150.00061.57550.3235	57754 8207	35.0781	0.0030	0.0724	0.0003	0.0042	0.0009	0.0084	0.0004	1.2100	0.2001
57792.727735.05310.00190.07310.00020.00820.00060.00910.00021.34810.113857792.727735.07510.00200.07640.00020.07280.00060.00920.00021.32780.111257795.672635.07820.00220.07430.00030.06470.00060.00960.00021.08360.080757796.645535.08430.00210.08290.00030.08100.00070.01100.00021.62210.092757797.640235.07950.00190.07160.00020.05910.00050.00780.00021.62470.088557798.696535.08090.00210.07270.00020.06050.00060.00850.00021.16390.092257799.624635.08180.00300.07190.00030.05810.00080.00880.00041.12410.198857803.758535.07630.00210.07290.00020.06140.00060.00820.00021.49490.084657830.583335.07940.00190.08030.00020.08300.00060.00990.00021.94670.114157832.573535.08110.00220.07610.00030.66980.00070.00840.00021.59730.174257834.560435.07750.00260.07510.00030.6940.00080.09330.00031.55970.201257835.521835.08250.00380.0836<	57755 8221	35.0770	0.0024	0.0723	0.0003	0.0021	0.0007	0.0078	0.0003	1.1402	0.1552
57792.727753.07310.00200.07640.00020.07280.00060.00920.00021.32780.111257795.672635.07820.00220.07430.00030.06470.00060.00960.00021.08360.080757796.645535.08430.00210.08290.00030.08100.00070.01100.00021.62210.092757797.640235.07950.00190.07160.00020.05910.00050.00780.00021.05470.088557798.696535.08090.00210.07270.00020.06050.00060.00850.00021.16390.092257799.624635.08180.00300.07190.00030.05810.00080.00880.00041.12410.198857803.758535.07630.00210.07290.00020.06140.00060.00820.00021.49490.084657830.583335.07940.00190.08030.00020.08300.00060.00800.00021.94670.114157832.573535.08110.00220.07610.00030.66880.00070.00840.00021.59730.174257834.560435.07750.00260.07510.00030.06940.00080.00930.00031.55970.201257835.521835.08250.00380.08360.00040.08300.00140.01150.00061.57550.3235	57702 2251	35.0851	0.0019	0.0751	0.0002	0.0082	0.0000	0.0091	0.0002	1.3401	0.1130
57795.072653.07820.00220.07430.00030.00470.00060.00960.00021.08360.080757796.645535.08430.00210.08290.00030.08100.00070.01100.00021.62210.092757797.640235.07950.00190.07160.00020.05910.00050.00780.00021.05470.088557798.696535.08090.00210.07270.00020.06050.00060.00850.00021.16390.092257799.624635.08180.00300.07190.00030.05810.00080.00880.00041.12410.198857803.758535.07630.00210.07290.00020.06140.00060.00820.00021.49490.084657830.583335.07940.00190.08030.00020.08300.00060.00990.00021.94670.114157831.542335.07700.00170.07360.00020.06620.00050.00800.00021.94670.114157834.560435.07750.00260.07510.00030.6940.00080.00930.00031.55970.201257835.521835.08250.00380.08360.00040.08300.00140.01150.00061.57550.3235	57705 6726	35.0751	0.0020	0.0704	0.0002	0.0728	0.0000	0.0092	0.0002	1.0276	0.1112
57790.043353.08430.00210.08290.00030.08100.00070.01100.00021.02210.092757797.640235.07950.00190.07160.00020.05910.00050.00780.00021.05470.088557798.696535.08090.00210.07270.00020.06050.00060.00850.00021.16390.092257799.624635.08180.00300.07190.00030.05810.00080.00880.00041.12410.198857803.758535.07630.00210.07290.00020.06140.00060.00820.00021.17740.158757810.634335.07690.00180.07460.00020.07090.00050.00820.00021.49490.084657830.583335.07700.00170.07360.00020.06620.00050.00800.00021.19670.114157832.573535.08110.00220.07610.00030.06980.00070.00840.00021.59730.174257834.560435.07750.00260.07510.00030.06940.00080.00930.00031.55970.201257835.521835.08250.00380.08360.00040.08300.00140.01150.00061.57550.3235	57706 6455	35.0762	0.0022	0.0745	0.0003	0.0047	0.0000	0.0090	0.0002	1.0050	0.0607
57797.040253.07930.00190.07160.00020.03910.00050.00780.00021.03470.088357798.696535.08090.00210.07270.00020.06050.00060.00850.00021.16390.092257799.624635.08180.00300.07190.00030.05810.00080.00880.00041.12410.198857803.758535.07630.00210.07290.00020.06140.00060.00820.00021.17740.158757810.634335.07690.00180.07460.00020.07090.00050.00820.00021.49490.084657830.583335.07940.00190.08030.00020.08300.00060.00990.00021.94670.114157831.542335.07700.00170.07360.00020.06620.00050.00800.00021.19670.110457834.560435.07750.00260.07510.00030.06940.00080.00930.00031.55970.201257835.521835.08250.00380.08360.00040.08300.00140.01150.00061.57550.3235	577076400	35.0645	0.0021	0.0629	0.0003	0.0610	0.0007	0.0110	0.0002	1.0221	0.0927
57799.6246 35.0809 0.0021 0.0727 0.0002 0.0003 0.0018 0.0012 0.0012 0.0014 0.0006 0.0082 0.0002 1.1774 0.1587 57810.6343 35.0769 0.0018 0.0746 0.0002 0.0709 0.0005 0.0082 0.0002 1.4949 0.0846 57830.5833 35.0770 0.0017 0.0736 0.0002 0.0830 0.0006 0.0099 0.0002 1.9467 0.1141 57832.5735 35.0811 0.0022 0.0761 0.0003 0.0698 0.0007 0.0084 0.0002 1.5973 0.1742 57835.5218 35.0825 0.0038 0.0836 0.0004 0.0830 0.0014	57708 6065	35.0795	0.0019	0.0710	0.0002	0.0591	0.0005	0.0078	0.0002	1.0547	0.0000
57797.024055.03160.00500.00790.00050.00810.00080.00880.00041.12410.198857803.758535.07630.00210.07290.00020.06140.00060.00820.00021.17740.158757810.634335.07690.00180.07460.00020.07090.00050.00820.00021.49490.084657830.583335.07940.00190.08030.00020.08300.00060.00990.00021.94670.114157831.542335.07700.00170.07360.00020.06620.00050.00800.00021.19670.110457832.573535.08110.00220.07610.00030.06980.00070.00840.00021.59730.174257834.560435.07750.00260.07510.00030.06940.00080.00930.00031.55970.201257835.521835.08250.00380.08360.00040.08300.00140.01150.00061.57550.3235	57700 6746	35.0009	0.0021	0.0727	0.0002	0.0003	0.0000	0.0000	0.0002	1.1039	0.0922
57805.7565 55.0705 0.0021 0.0729 0.0002 0.0014 0.0000 0.0082 0.0002 1.1774 0.1587 57810.6343 35.0769 0.0018 0.0746 0.0002 0.0709 0.0005 0.0082 0.0002 1.4949 0.0846 57830.5833 35.0794 0.0019 0.0803 0.0002 0.0830 0.0006 0.0099 0.0002 1.9467 0.1141 57831.5423 35.0770 0.0017 0.0736 0.0002 0.0662 0.0005 0.0080 0.0002 1.1967 0.1104 57832.5735 35.0811 0.0022 0.0761 0.0003 0.0698 0.0007 0.0084 0.0002 1.5973 0.1742 57835.5218 35.0825 0.0038 0.0836 0.0004 0.0830 0.0014 0.0115 0.0006 1.5755 0.3235	57802 7585	35.0010	0.0030	0.0719	0.0003	0.0501	0.0000	0.0000	0.0004	1.1241	0.1700
57830.5833 35.0709 0.0018 0.0740 0.0002 0.0709 0.0003 0.0032 0.0032 1.4949 0.0840 57830.5833 35.0794 0.0019 0.0803 0.0002 0.0830 0.0006 0.0099 0.0002 1.9467 0.1141 57831.5423 35.0770 0.0017 0.0736 0.0002 0.0662 0.0005 0.0080 0.0002 1.1967 0.1104 57832.5735 35.0811 0.0022 0.0761 0.0003 0.0698 0.0007 0.0084 0.0002 1.5973 0.1742 57834.5604 35.0775 0.0026 0.0751 0.0003 0.0694 0.0093 0.0003 1.5597 0.2012 57835.5218 35.0825 0.0038 0.0836 0.0004 0.0830 0.0014 0.0115 0.0006 1.5755 0.3235	57810 6242	35.0703	0.0021	0.0729	0.0002	0.0014	0.0000	0.0082	0.0002	1.1774	0.130/
57830.5855 55.0794 0.0017 0.0003 0.0002 0.0000 0.0009 0.0002 1.9407 0.1141 57831.5423 35.0770 0.0017 0.0736 0.0002 0.0662 0.0005 0.0009 0.0002 1.9407 0.1141 57832.5735 35.0811 0.0022 0.0761 0.0003 0.0698 0.0007 0.0084 0.0002 1.5973 0.1742 57834.5604 35.0775 0.0026 0.0751 0.0003 0.0694 0.0093 0.0003 1.5597 0.2012 57835.5218 35.0825 0.0038 0.0836 0.0004 0.0830 0.0014 0.0115 0.0006 1.5755 0.3235	57830 5822	35.0709	0.0010	0.0740	0.0002	0.0709	0.0003	0.0082	0.0002	1.4949	0.0040
57831.5425 55.0776 0.0017 0.0736 0.0022 0.0002 0.0036 0.0002 1.1967 0.1104 57832.5735 35.0811 0.0022 0.0761 0.0003 0.0698 0.0007 0.0084 0.0002 1.5973 0.1742 57834.5604 35.0775 0.0026 0.0751 0.0003 0.0694 0.0093 0.0003 1.5597 0.2012 57835.5218 35.0825 0.0038 0.0836 0.0004 0.0830 0.0014 0.0115 0.0006 1.5755 0.3235	57831 5422	35.0770	0.0019	0.0005	0.0002	0.0050	0.0000	0.0099	0.0002	1.2407	0.1141
57834.5604 35.0775 0.0026 0.0751 0.0003 0.0694 0.0008 0.0003 1.5975 0.2012 57835.5218 35.0825 0.0038 0.0004 0.0830 0.0014 0.0115 0.0006 1.5755 0.3235	57837 5725	35 0911	0.0017	0.0750	0.0002	0.0002	0.0003	0.0000	0.0002	1.1907	0.1104
57835.5218 35.0825 0.0038 0.0836 0.0004 0.0830 0.0014 0.0115 0.0006 1.5755 0.3235	57834 5604	35.0011	0.0022	0.0751	0.0003	0.0090	0.0007	0.0004	0.0002	1.5975	0.1742
	57835.5218	35.0825	0.0038	0.0836	0.0004	0.0830	0.0014	0.0115	0.0006	1.5755	0.3235

Table A.1. continued	1
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BJD-2400000.0	$RV (km s^{-1})$	$\sigma \mathrm{RV} (\mathrm{km} \mathrm{s}^{-1})$	H_{lpha}	σH_{lpha}	H_{β}	σH_{β}	NaD	σ NaD	S	σS
57836.5391	35.0818	0.0028	0.0743	0.0003	0.0664	0.0009	0.0079	0.0004	1.3216	0.2138
57847.6649	35.0737	0.0023	0.0749	0.0003	0.0661	0.0007	0.0084	0.0002	1.2955	0.2598
57848.7030	35.0808	0.0021	0.0758	0.0002	0.0659	0.0007	0.0086	0.0002	2.0690	0.3198
57849.7216	35.0725	0.0026	0.0755	0.0003	0.0682	0.0009	0.0084	0.0003	1.1287	0.4710
57850.5931	35.0790	0.0020	0.0771	0.0002	0.0702	0.0006	0.0098	0.0002	1.4973	0.1231
57851.7008	35.0822	0.0026	0.0755	0.0003	0.0657	0.0009	0.0091	0.0003	1.1375	0.2224
57852.6557	35.0815	0.0025	0.0788	0.0003	0.0770	0.0009	0.0100	0.0003	1.0996	0.2015
57854.6927	35.0733	0.0026	0.0764	0.0003	0.0674	0.0009	0.0101	0.0003	1.0953	0.1944
57872.5444	35.0741	0.0024	0.0726	0.0003	0.0618	0.0007	0.0076	0.0003	1.1265	0.1617
57873.6706	35.0727	0.0029	0.0735	0.0003	0.0637	0.0011	0.0074	0.0004	0.9222	0.3373
57874.5623	35.0746	0.0030	0.0783	0.0003	0.0736	0.0010	0.0097	0.0004	1.4706	0.2621
57875.6886	35.0714	0.0074	0.0747	0.0008	0.0614	0.0031	0.0086	0.0013	1.3750	0.7009
57877.5748	35.0749	0.0023	0.0734	0.0003	0.0613	0.0008	0.0080	0.0003	1.1110	0.2208
57924.5360	35.0747	0.0030	0.0737	0.0003	0.0620	0.0011	0.0078	0.0004	2.0765	0.3792
57925.5331	35.0745	0.0037	0.0774	0.0004	0.0698	0.0014	0.0091	0.0005	1.8617	0.4392