The ExoClock Project

Pro-Am Collaboration For Ground-Based Observations In Support Of The ARIEL Space Mission

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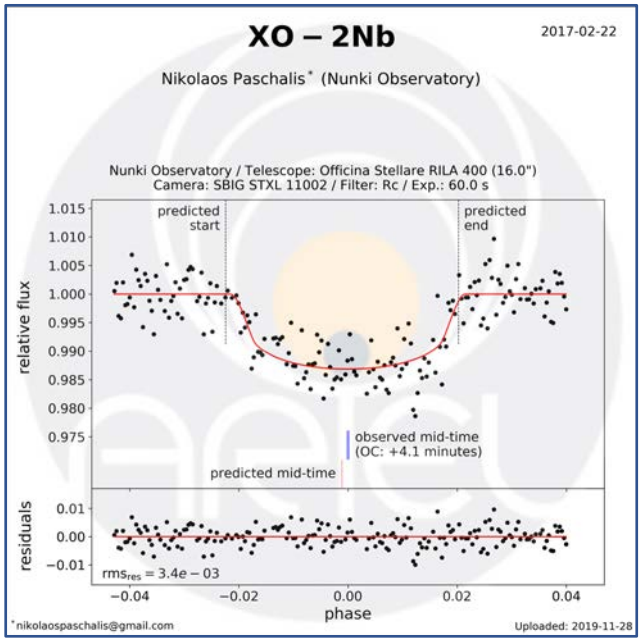
Introduction

What is ExoClock?

- An open platform
- Service for ephemerides
- Citizen Science project



Scope:

- Ephemeris refinement to increase mission efficiency

Why?

- The current targets have uncertainties which are gradually increasing.
- The future targets have already big uncertainties.

An integrated platform

1. Space data
for targets that are not accessible from the ground
(Billy Edwards, UCL)

2. Literature data
Integrating all current and future papers
(everyone)

3. Ground networks

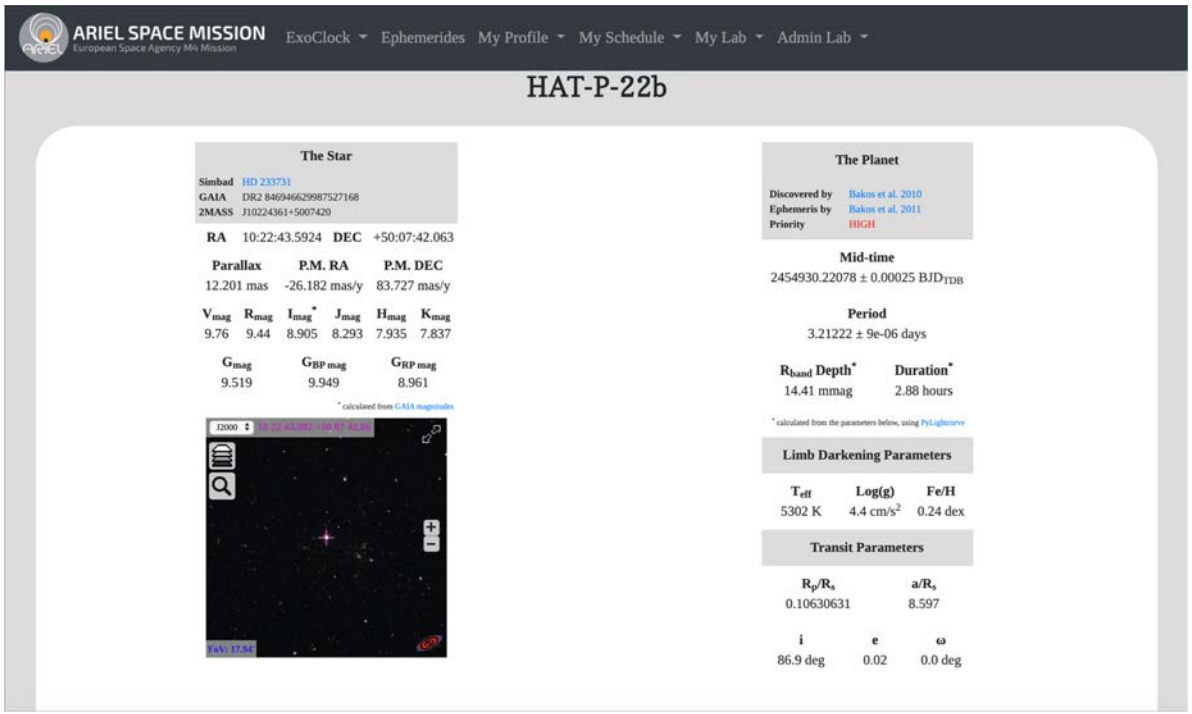
- **Telescope live**
  (Marco Rocchetto & Hamish Caines, UCL)
- **Synergy with the ETS**
  (Rob Zellem, JPL)
- **ExoClock network**
  (Anastasia Kokori, UCL)

An interactive platform

- Exoplanet Characterization Catalogue (ECC)

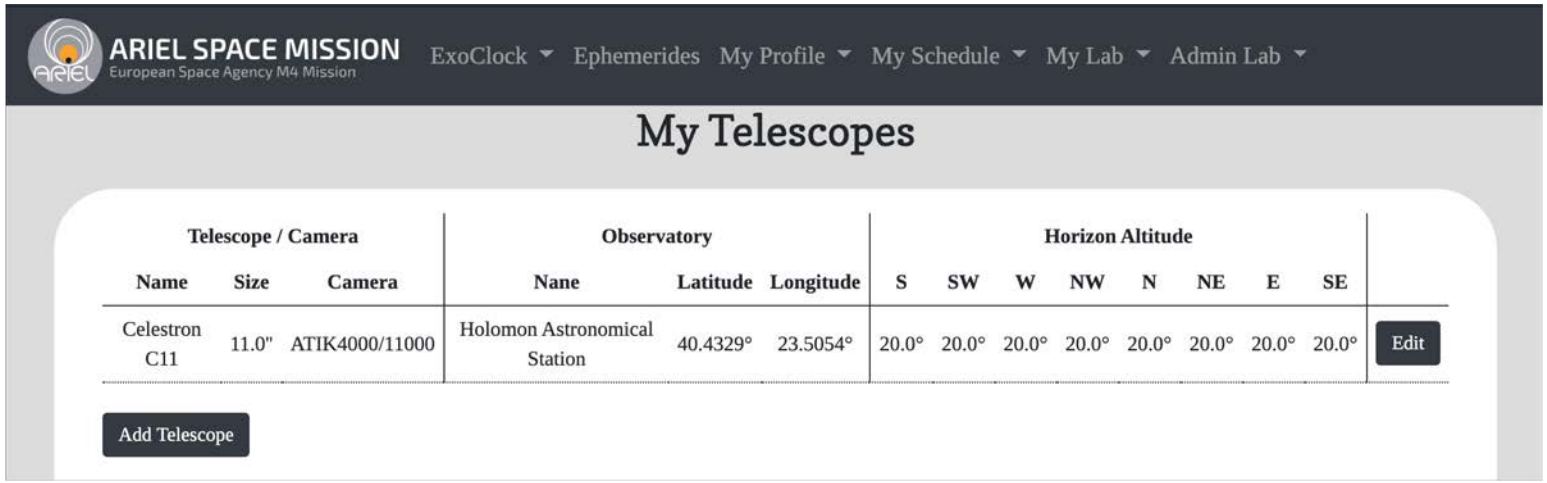
known targets in the MRS

currently 370



An interactive platform

- Scheduler based on the user telescope, location, site horizon, and the ECC



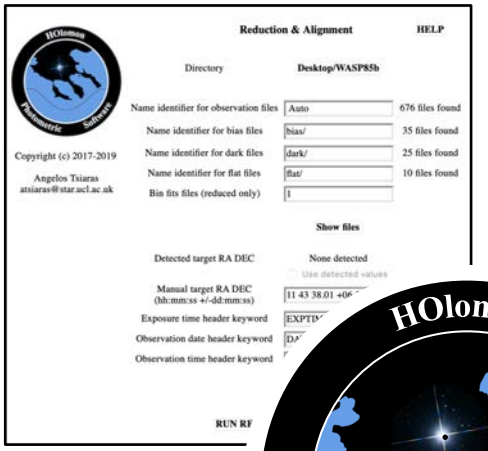
An interactive platform

- Target Prioritization – target 1σ =1/12 D to ensure that 0.5 D will be observed before and after transit (D: transit duration)

Planet	Star		Transit		Observting times [UTC+1.0] and target position				
	RA/DEC J2000	R_{mag} mag	R_{band} Depth mmag	Duration hours	1h Before Ingress	Transit Start	Mid Transit	Transit End	1h After Egress
KELT-18b LOW PRIORITY	14:26:05.7574 +59:26:39.288	9.941	9.02	4.66	2020/01/14 22:21 22° NE	2020/01/14 23:21 28° NE	2020/01/15 01:40 44° NE	2020/01/15 04:00 62° NE	2020/01/15 05:00 68° NE
WASP-65b MEDIUM PRIORITY	08:53:17.8286 +08:31:22.811	11.525	16.82	2.75	2020/01/15 00:44 58° S	2020/01/15 01:44 55° SW	2020/01/15 03:06 45° SW	2020/01/15 04:29 31° W	2020/01/15 05:29 20° W
WASP-14b MEDIUM PRIORITY	14:33:06.3573 +21:53:40.982	9.465	12.16	2.64	2020/01/15 01:04 22° E	2020/01/15 02:04 33° E	2020/01/15 03:23 48° E	2020/01/15 04:42 62° SE	2020/01/15 05:42 70° SE

Features

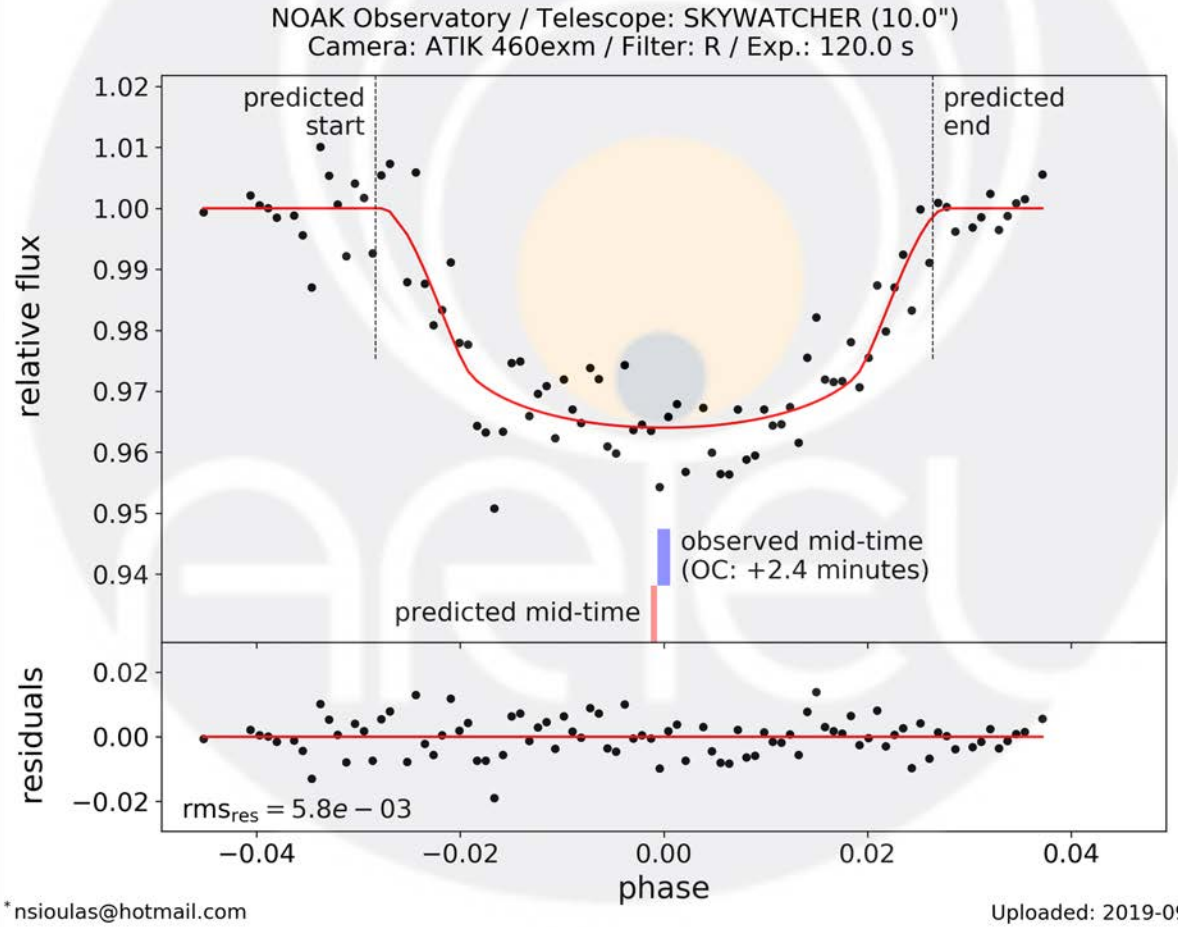
- Observation Guidelines
- Tools/ Software
  www.exoworldspies.com
- Online Fitting and validation by our team
- Ephemeris Update using all available data



CoRoT − 2b

2019-07-08

Nick Sioulas* (NOAK Observatory)



*nsioulas@hotmail.com

Uploaded: 2019-09-25

In a few words …

- ExoClock is open to everyone
- It has double role: Service & Outreach
- All observers are co-authors
- Users get feedback, personalized schedule & monthly newsletters

Current Status

Launched in EPSC - September 2019

51 participants
(75% amateurs)

12 countries

59 telescopes
(7-40 inches)

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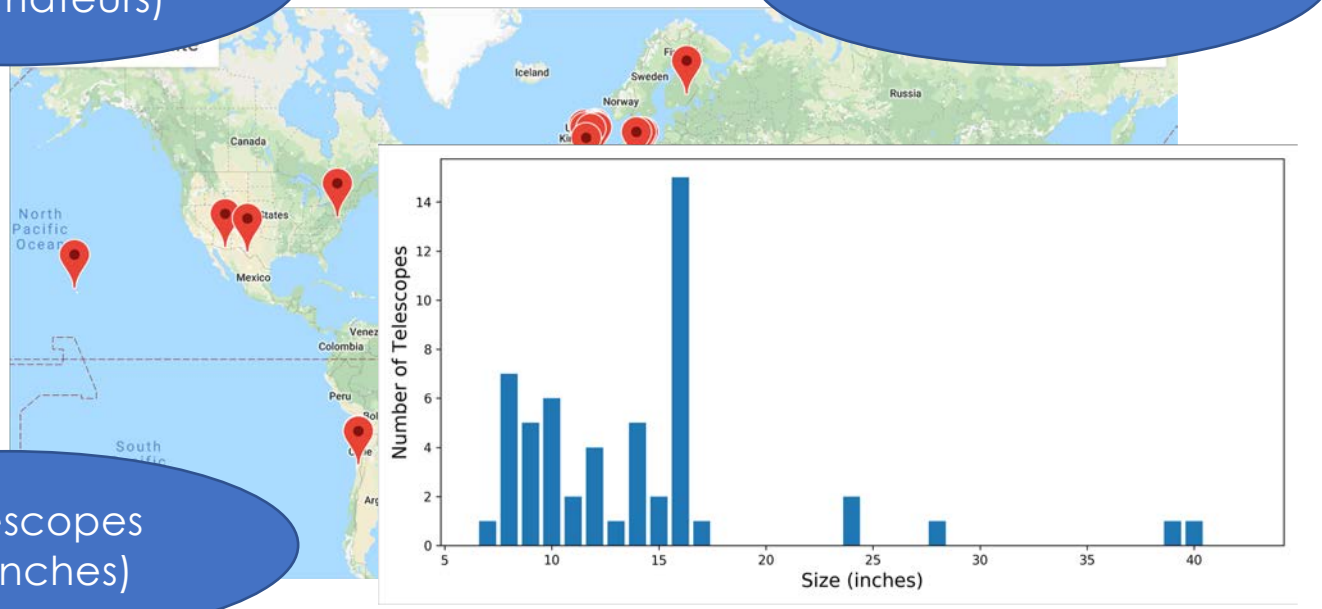


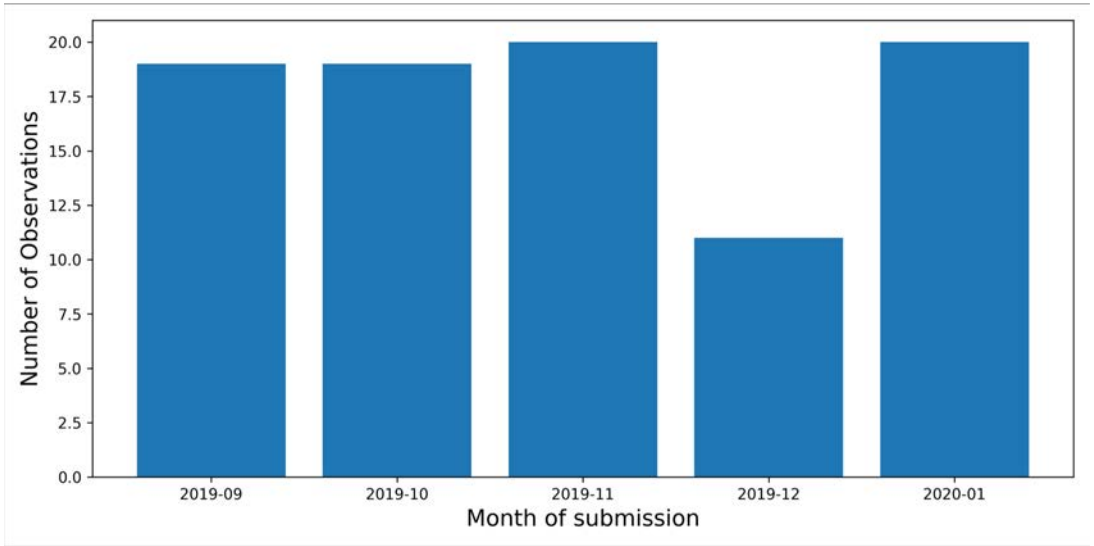
59 telescopes
(7-40 inches)

Current Status

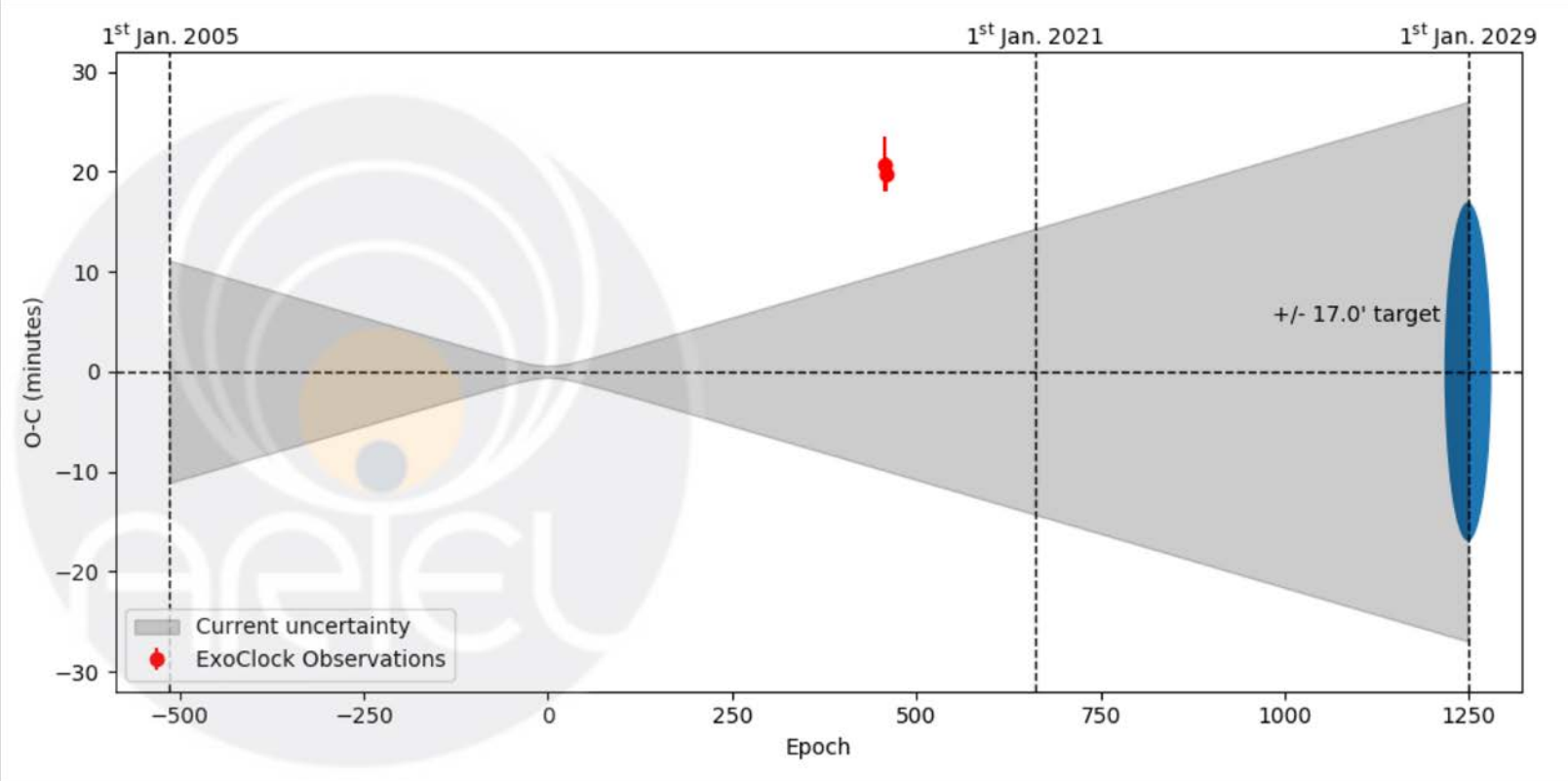
Launched in EPSC - September 2019

90 observations

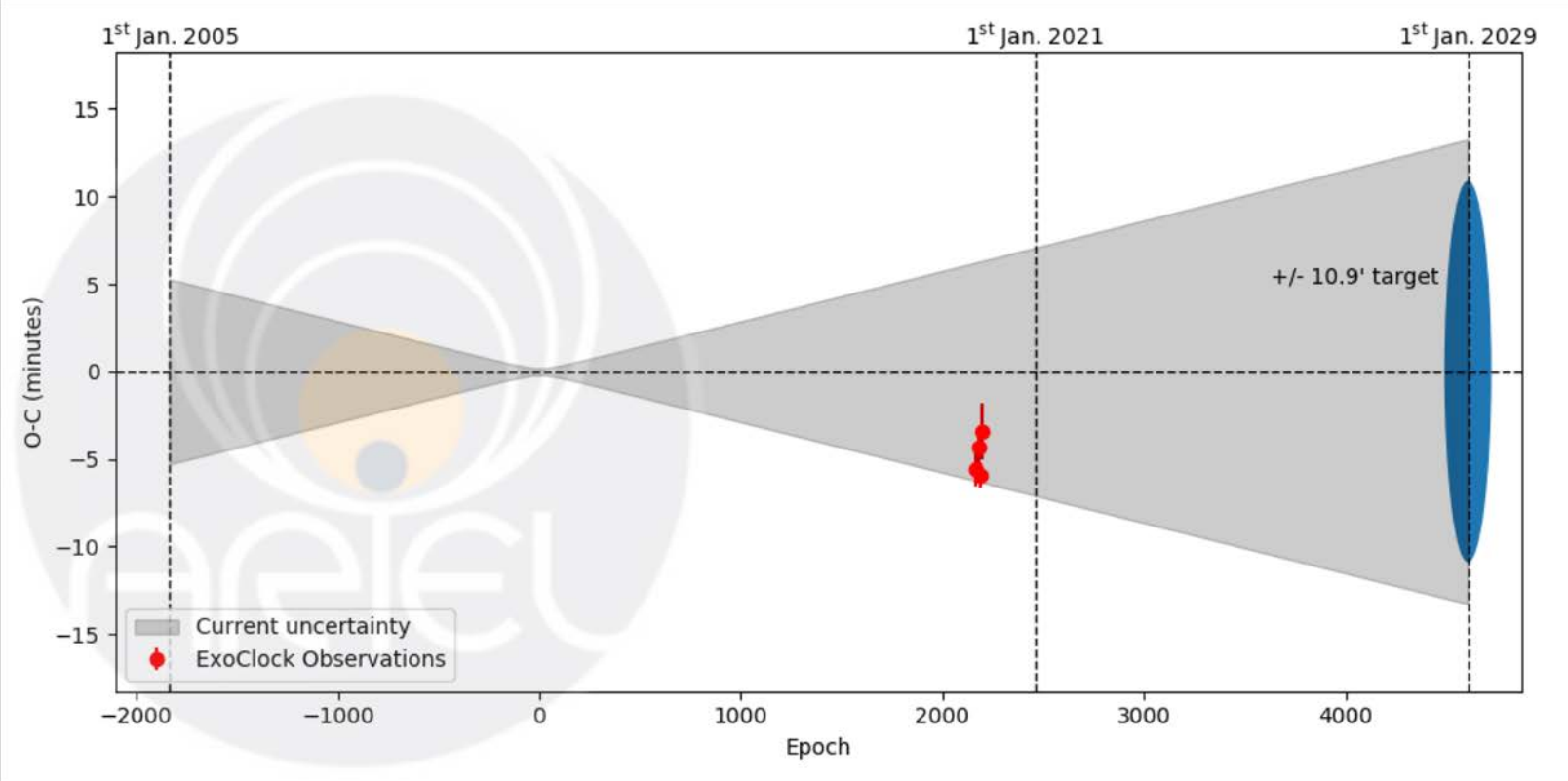
43 targets
out of the 370



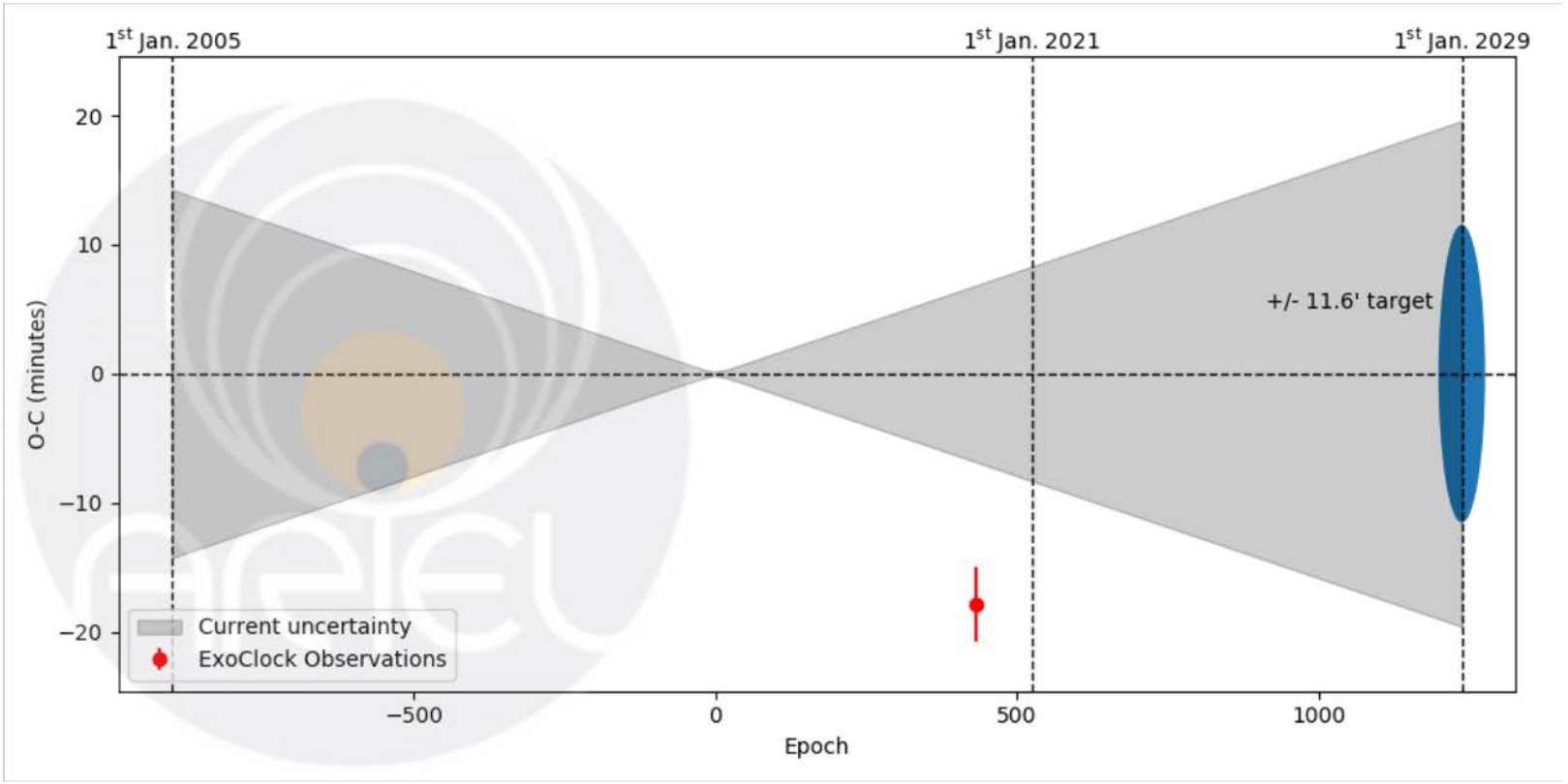
WASP-83b


1st Jan. 2005
1st Jan. 2021
1st Jan. 2029
30
20
10
0
−10
−20
−30
O-C (minutes)
+/- 17.0' target
Current uncertainty
ExoClock Observations
−500
−250
0
250
500
750
1000
1250
Epoch

WASP-77b


1st Jan. 2005
1st Jan. 2021
1st Jan. 2029
15
10
5
0
−5
−10
−15
O-C (minutes)
+/- 10.9' target
Current uncertainty
ExoClock Observations
−2000
−1000
0
1000
2000
3000
4000
Epoch

K2-30b


1st Jan. 2005
1st Jan. 2021
1st Jan. 2029
20
10
0
−10
−20
O-C (minutes)
+/- 11.6' target
Current uncertainty
ExoClock Observations
−500
0
500
1000
Epoch

Conclusion

Join the ExoClock project & share it!

- **Every transit counts**
- **Small telescopes are useful**

Register at ExoClock:
exoclock.space

Start training at ExoworldsSpies:
www.exoworldsspies.com

You can register to the Monthly Newsletters