

(617) PATROCLUS-MENOETIUS MUTUAL EVENTS OBSERVATIONS FROM OASI OBSERVATORY

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We present the mutual event lightcurves of the (617) Patoclus-Menoetius binary system acquired at the Observatório Astronômico do Sertão de Itaparica (OASI, MPC code Y28) from 2024 September 25 to 2024 October 12.

CCD photometric observations of (617) Patoclus-Menoetius binary system were carried out at the Observatório Astronômico do Sertão de Itaparica (OASI) (MPC code Y28, Nova Itacuruba) of the IMPACTON project, between 2024 September 25 and 2024 October 12. We used the 1.0-m f/8 telescope and a CCD Apo-U47-MB-0, with an array 1024×1024 pixels, set to 2×2 binning and R-Cousins filter. More details on available instrumentation at OASI are given in Rondón et al. (2020).

The data reduction was performed using the *IRAF* package (Tody, 1986) correcting the science image for bias, dark and flat frames. The lightcurves for the mutual events were built using the *MPO Canopus* software (Warner, 2018), computing the differential magnitude.

The asteroid (617) Patoclus-Menoetius, studied in this work, is a Jupiter Trojan binary system in synchronous rotation-orbit, with both components being of similar size (Merline et al., 2001). This object is a target for NASA's Lucy Mission. We observed mutual events for this object between 2024 September 25 AND 2024 October 12. In table I are given the observational dates and observational circumstances. During this period of time, we captured three inferior events, when Menoetius is on the near side to the observer, on the nights of September 25 (Fig. 1, upper panel), October 07 (Fig. 1, first middle panel), October 08 (Fig. 1, second middle panel) and October 12 (Fig. 1, bottom panel). The observed event durations were 3.146, 5.94 and 1.38 hours, respectively.

On the night of October 08 (Fig. 1, second middle panel) we were able to observe the mutual event from its maximum until its possible end, spanning 2.76 hours. The magnitude drop during this event was 0.786, from which we estimated a minimum diameter ratio of 0.717. Data coverage on the night was incomplete due to the object exceeding the telescope's altitude limit.

Figure 2 shows observations from the night of September 27, October 05, 06, and 09, when no mutual events were observed. The magnitude fluctuation seen in these plots are attributed to the rotational variation of each component of the system.

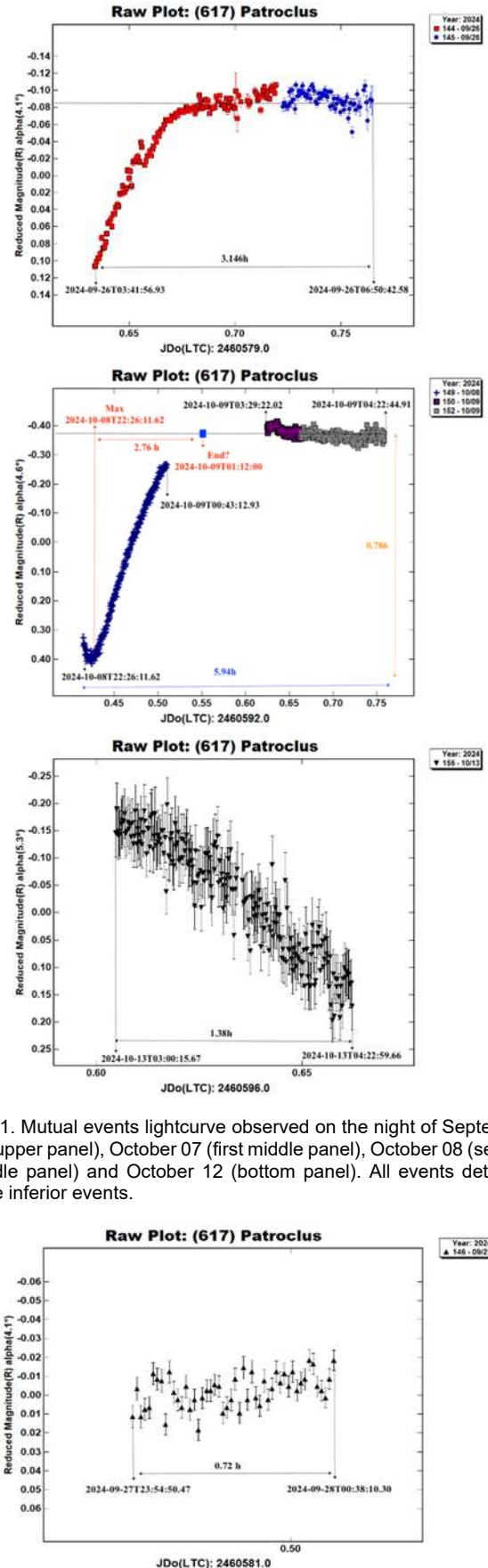


Fig. 1. Mutual events lightcurve observed on the night of September 25 (upper panel), October 07 (first middle panel), October 08 (second middle panel) and October 12 (bottom panel). All events detected were inferior events.

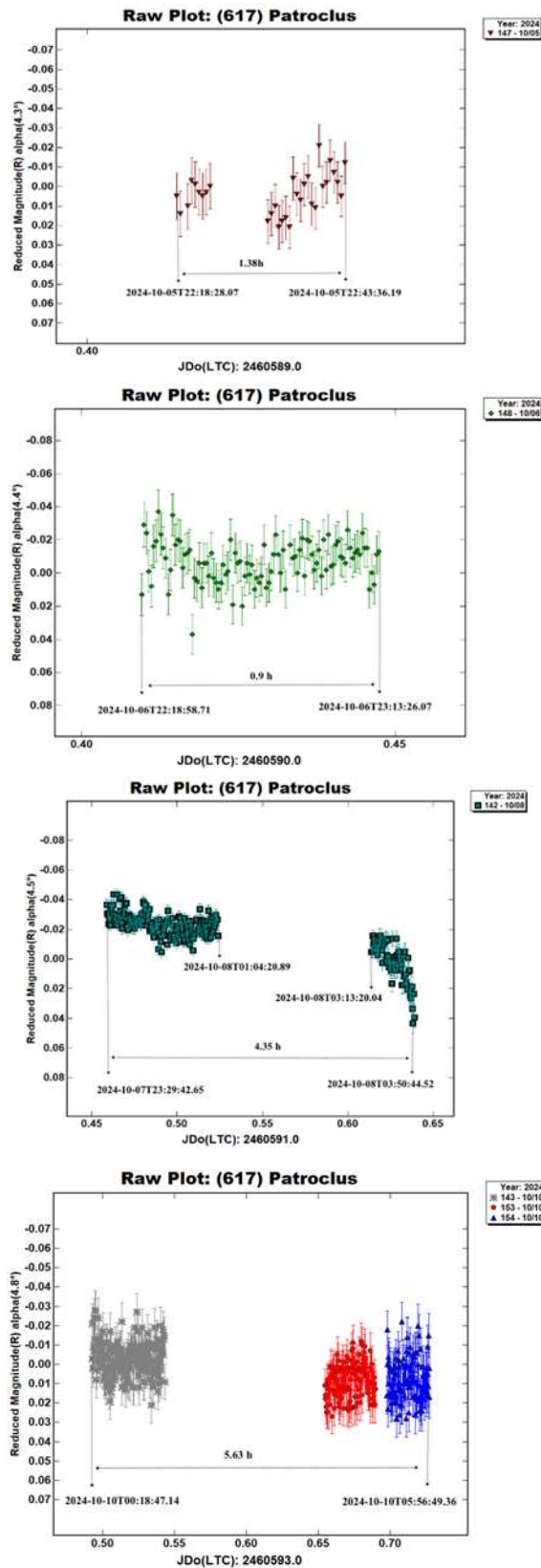


Fig.2. Lightcurve observed at the night of September 27 (upper panel), October 05 (first middle panel), 06 (second middle panel) and 09 (bottom panel). No mutual events were detected in these observation intervals, in agreement with Brozovic et al. (2024) predictions.

Night	Number of images used	Exposure time (s)	Delta (au)	r (au)	alpha(°)
2024-09-25	209	50	3,526	4,487	4.1
2024-09-27	49	50	3,526	4,488	4.1
2024-10-05	32	30	3,537	4,489	4.4
2024-10-06	99	30	3,539	4,489	4.5
2024-10-07	242	30	3,542	4,490	4.6
2024-10-08	600	30	3,546	4,490	4.7
2024-10-09	433	20	3,549	4,490	4.8
2024-10-12	213	20	3,555	4,490	5.0

Table 1. Observational nights and observing circumstances, giving the dates, the number of images used, the exposure time, the distance to the Earth (Delta), the distance to the Sun (r), the solar phase angle (alpha).

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