

LUCY, FIRST MISSION TO THE JUPITER TROJANS: POST-LAUNCH UPDATE. K. S. Noll¹, H. F. Levison², S. Marchi², J. Spencer², and the *Lucy* Team; ¹GSFC, Greenbelt, MD, USA; ²SwRI, Boulder, CO, USA.

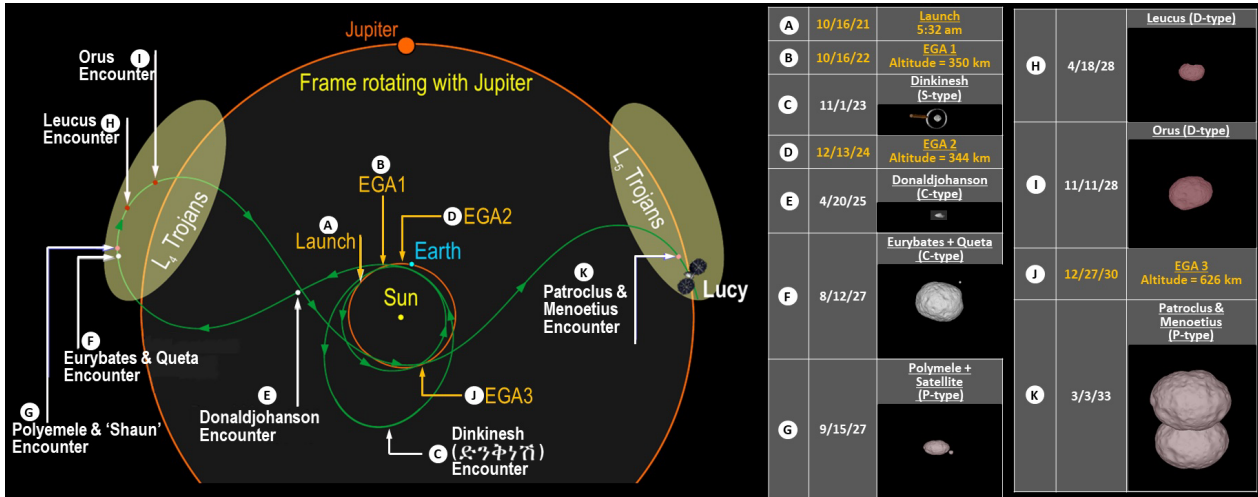


Fig. 1: The *Lucy* mission trajectory (green) is shown in non-inertial frame rotating with Jupiter. Major mission events are identified with dates and spectral types listed in the legend. Targeted Trojan bodies are represented at approximate relative sizes and shapes based on Earth-based observations.

Launch and Trajectory: The *Lucy* mission [1,2] was launched from Cape Canaveral on the morning of October 16, 2021 by an Atlas V-401 that precisely placed *Lucy* onto its planned trajectory (Fig. 1).

Exactly one year after launch, on October 16, 2022, *Lucy* executed a gravity assist maneuver, EGA1, with a flyby of the Earth at an altitude of approximately 350 km. As a result of EGA1, *Lucy*'s aphelion was increased to 2.26 AU. The next major mission event will be an encounter with a small Main Belt asteroid, (152830) Dinkinesh on November 1, 2023. Following a second EGA in December 2024, *Lucy* will encounter a Main Belt asteroid in 2025 on its way to flybys of six Trojan objects in the L4 cloud from August 2027 to November 2028. The prime mission will conclude with a third EGA in 2030 and an encounter with the Patroclus-Menoetius binary in the L5 cloud on March 3, 2033. Detailed sequences for encounters are currently being planned with Polymele, Dinkinesh and Eurybates being the most advanced [3].

Instruments and Calibration: Several campaigns of instrument calibration have been completed, most recently in March-April 2023. All instruments are functioning within specifications. Observations of the lunar surface obtained during EGA1 test the L'LORRI instrument's imaging performance [4]. Observations of the DART impact from *Lucy*'s unique observing geometry were also obtained as part of the EGA1 campaign [5].

Solar Array Anomaly: Shortly after launch, *Lucy* spacecraft telemetry revealed that one of the two solar arrays had not completely deployed. Over the following months the anomaly was characterized, and further deployment was attempted. Significant additional opening was achieved, but attempts were halted in November 2022 when data showed that more progress was unlikely. With the array approximately 98% open, the configuration was judged to be capable of meeting mission requirements in its current state.

Target Knowledge Updates: The discovery of satellites of Eurybates [6,7] and Polymele [8] have added two additional Trojan targets to the *Lucy* mission. The sizes and shapes of the *Lucy* targets, important for planning onboard target acquisition, have continued to be refined from both lightcurve data [9] and stellar occultations [8, 10, 11]. *Lucy*'s enhanced exploration of eight diverse Trojan targets in a single mission will revolutionize our understanding of these primitive bodies and the history of the early solar system.

References: [1] Levison, H. et al. (2021) *PSJ*, 2, 171. [2] Olkin C. et al. (2021) *PSJ*, 2, 172. [3] Spencer J. et al. (2023) *ACM 2023*. [4] Robbins, S. et al. (2023) *LPSC 54*, #2976. [5] Weaver, H. et al. (2023) *ACM 2023*. [6] Noll, K. et al. (2020) *PSJ*, 1, 44. [7] Brown, M. et al. (2022) *PSJ*, 2, 170. [8] Buie, M. (2022) *BAAS* 54, 8, #512.03. [9] Mottola S. et al. (2023) *PSJ* 4:18. [10] Buie, M. et al. (2021) *PSJ*, 2, 202. [11] Keeney, B. et al. (2022) *BAAS* 54, 8, #512.04.