Rotationally Resolved Photometry of the *Lucy* targets at 3.6 and 4.5 μm from *Spitzer*

J. P. Emery, S. Mottola, M. E. Brown, K. S. Noll, R. P. Binzel, I. Wong, S. Marchi, A. C. Martin

NASA's *Lucy* mission is on its way to flyby 5 Trojan asteroids in order to return data crucial to interpreting where they formed and how they evolved. On its path to the Trojan swarms, *Lucy* has already flown past one Main Belt asteroid (152830 Dinkinesh) and will fly past a second (52246 Donaldjohanson) in April 2025. The Trojan targets sample the color/spectral diversity observed among Trojans, including targets in the red (R) and less-red (LR) groups, as well as the largest member of the C-type (more neutrally-sloped) Eurybates family. Recent spectra from the *James Webb Space Telescope* (*JWST*) reveal broad absorptions from 2.7 to 3.6 μm with a depth of between 4 and 8% on the LR objects (15094 Polymele, 617 Patroclus) and (3548) Eurybates and ~1% on the R targets (11351 Leucus and 21900 Orus). The *JWST* spectra also show that the spectrum of Polymele in the 2–5 μm range has a negative (blue) reflectance slope, whereas the other 4 targets (both R and LR) have positive (red) slopes that are similar to each other (Wong et al. 2024).

A primary benefit of spacecraft imaging is the ability to search for and characterize surface heterogeneity. Prior to spacecraft imaging, rotationally resolved telescopic color data can provide an indication of whether to expect large scale variability in the high spatial resolution spacecraft data. To this end, we observed the *Lucy* targets at 3.6 and 4.5 μm with the InfraRed Array Camera (IRAC) on *Spitzer* in 2018 and 2019. Full lightcurves over 1.1 rotations at these wavelengths were obtained for Eurybates, Orus, and Polymele. Patroclus and Leucus are much slower rotators, and those objects were revisited every ~45^{o} of rotation, with one longitude of overlap, for 9-point lightcurves. Initial looks at the data showed some potential color variability for Polymele and Orus at these wavelengths. We are using updated shape models to improve removal of thermal contribution from the 4.5 μm data and will present updated results and analysis of these data. *Spitzer* did not resolve these targets, so each photometric point is a hemispheric average. Heterogeneity at small scales (e.g., from recent impacts or landslides) could still be expected in *Lucy* data, even if not detected in these *Spitzer* data.