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Geologic Mapping of Asteroid (52246) Donaldjohanson as observed by NASA's *Lucy* mission

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NASA's *Lucy* mission will study the Jupiter Trojan asteroids, which are thought to be a physically and compositionally diverse group of primitive planetesimals that originated in the outer Solar System from ~15-30 AU [1]. The Jupiter Trojans are thus early Solar System relics, which are one of the last accessible, stable, small-body groups yet to be explored by a spacecraft. Prior to the first Trojan encounter, (3548) Eurybates in August 2027, *Lucy* flew by two main-belt asteroids: asteroid (152830) Dinkinesh in November 2023 [2] and asteroid (52246) Donaldjohanson in April 2025 [3], both of which have never before been visited by a spacecraft.

Here we present the first geologic map of the entire observed portion of Donaldjohanson. The asteroid is about 8 km long, with a greater than 2 to 1 axis ratio, and appears to be an elongated contact binary composed of two lobes joined by a narrower neck. The primary datasets on which we base the geologic map are images from the L'LORRI camera [4] and the derived shape model [5]. We will present a geologic map that includes both lobes and the neck. We will discuss geologic units, linear features and point features, and an analysis of their distribution across the surface. We will also use geomorphic and structural analyses of these features to make inferences about the present-day subsurface structure and formation mechanism of Donaldjohanson.

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