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Geologic mapping of the Av-2 Bellicia quadrangle of asteroid 4 Vesta

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One of the largest asteroids in the Main Belt, the asteroid Vesta, is currently observed by the Dawn spacecraft [1]. In contrast to previously in-situ explored asteroids [2-7] Vesta is most probably an intact protoplanet and spectroscopic observations suggest a basaltic nature for its crust [8]. The Dawn Framing Camera [9] has acquired visible images that allow geologic mapping of its surface. Within the Dawn Mapping Working Group we focused on the north-eastern quadrangle (21° N-60° N and 0° E-90° E). Unfortunately, illumination conditions limited the observation from 21° N to 45° N and only with low incidence angle. The morphology of the study area is characterized by impact craters and smooth ejecta blankets typical for the northern hemisphere of Vesta. Using a lunar-like production function and chronology function [10], the crater size-frequency distribution (CSFD) indicates an old surface age with possible resurfacing events. A distinctive pattern in the CSFD for <10km craters is observed, but to fully understand its origin, further investigations are needed. Dark-rayed ejecta are observed, and overall distinctive albedo features are rare when compared to the equatorial terrains. For the study area we find that the visible-NIR spectral measurements, characterized by pyroxenes absorption bands [11], are neither related to volcanic/magmatic morphologic features (e.g., lava flows, dykes) nor to albedo features. Instead, the pyroxene signatures are associated with an old, cratered surface with a homogeneous albedo.

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