The Geology of the Marcia Quadrangle of Asteroid 4Vesta: An Integrated Mapping Study Using *Dawn* Spacecraft Data

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ABSTRACT

We used geologic mapping applied to *Dawn* data as a tool to understand the geologic history of the Marcia quadrangle of Vesta. This region hosts a set of relatively fresh craters and surrounding ejecta field, an unusual dark hill named Arisia Tholus, and a orange (false color) diffuse material surrounding the crater Octavia. Stratigraphically, from oldest to youngest, three increasingly larger impact craters named Minucia, Calpurnia, and Marcia make up a snowman-like feature, which is surrounded by a zone of dark material interpreted to consist of impact ejecta and possibly impact melts. The floor of Marcia contains a pitted terrain thought to be related to release of volatiles (1). The dark ejecta field has an enhanced signature of H, possibly derived from carbonaceous chondritic material that accumulated in Vesta's crust (2,3). The dark ejecta has a spectrally distinctive behavior with shallow pyroxenes band depths. Outside the ejecta field this quadrangle contains various cratered terrains, with increasing crater abundance moving south to north away from the Rheasilvia basin. Arisia Tholus, originally suggested as an ancient volcano, appears to be an impact-sculpted basin rim fragment with a superposed dark-rayed impact crater. There remains no unequivocal evidence of volcanic features on Vesta's surface, likely because basaltic material of the HED meteorite suite demonstrates magmatism ended very early on Vesta (4). Ongoing work includes application of crater statistical techniques to obtain model ages of surface units, and more detailed estimates of the compositional variations among the surface units.

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