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High resolution geomorphological analysis of Agwo facula (Mercury)

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On Mercury, faculae are high-albedo, spectrally red, deposits originating from explosive volcanic eruptions (Kerber et al., 2009) whose source are likely rimless depressions. These depressions are usually located in the center of the facula and interpreted to be volcanic vents. In this work we analyzed the Agwo facula, sited in the western margin of Caloris basin (22.39°N, 146.16°E). We performed a detailed geomorphological map of the area using MDIS derived mosaics with a spatial resolution ranging from 20 m/pixel to 28 m/pixel and with different illumination conditions. Additionally, a BDR (Basemap reduced Data Record) MDIS mosaic, with a resolution of 166 m/pixel, was used as a basemap. MDIS WAC color maps, based on the reflectance at 750 nm and the VIS slope between 480 and 830 nm, respectively, were also used as part of the analysis. These latter maps helped determine the areal extent of the pyroclastic deposits. Finally, a DTM of the region, derived from MDIS images using the technique of stereophotoclinometry (SPC) and with a spatial resolution of 20 m/pixel, helped us to better characterize the facula's topography. The geomorphological map highlights that Agwo facula experienced several explosive episodes. In particular, through the cross-cutting relationship observed among the pits, at least eight eruptive events have been distinguished. The terrain within the pits shows different surface texture and albedo, that allowed the distinction of several geological units: from the oldest and smoother surfaces to the younger and rougher textured surfaces. Therefore, the morphological and spectral characteristics of pits suggest that Agwo facula is the result of multiple eruptions, which likely occurred at different times, contributing to the better understanding of the formation of this feature.

References:

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