



Studying the spectral characteristics of 121 impact craters on Mercury

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We have characterized the spectral reflectance of 121 complex impact craters on Mercury. To do so, we have combined Mercury Atmospheric and Surface Composition Spectrometer (MASCS) Visible and Infrared Spectrograph (VIRS) data with Mercury Dual Imaging System (MDIS) images, both acquired from orbit by the MERCURY Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) spacecraft. The MASCS spectra were taken from the DLR database, which currently contains several million MASCS VIRS spectra normalized at 700 nm wavelength to provide a first-order correction for variations in observing conditions. The craters for this study were selected on the basis of geological and physical criteria from the MDIS global dataset. For each impact crater, we mapped as independent geological units the central peak, floor deposits, wall deposits, and external ejecta from 1 to 10 crater radii outward of the crater rim (at a sampling step of 1 radius). From the DLR database, we retrieved MASCS VIRS observations for each geological unit of the 121 impact craters. We explored two different classification schemes. In the first scheme we included all reflectance observations, even those shared between units for different craters. In the second scheme, we excluded spectra that are shared by multiple areas. Under the first scheme, therefore, the same spectral unit can be assigned to two or more craters, whereas under the second scheme spectral units are uniquely linked to a single crater. Preliminary results of our study show a range of distinctive spectra for the crater central peaks. Spectral variations are also seen among crater floor deposits. The goal of the study is to complete a global spectral map as a basis for improving our understanding of crustal stratigraphy on Mercury using impact craters as stratigraphic markers.