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Evolution of Mercury's crust: interactions between impact basins, smooth volcanic plains and deep material

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Mercury is the innermost and smallest terrestrial planets. Improving knowledge of the planet is crucial to our understanding of the formation and evolution of terrestrial planets. Moreover, understanding the global geological history of Mercury will help to explain the role of planet size and solar distance concerning the magmatic and tectonic history of terrestrial planets. Between 2008 and 2015, the NASA/MESSENGER mission obtained data of the surface of Mercury with the aim of understanding the origin and evolution of the surface. The results concluded that extensive volcanism has taken place on Mercury, reshaping the surface over time. Impact basins are among the most important geological features on the surface of Mercury giving the opportunity to study the evolution of the crust through volcanic processes and resurfacing of deep material brought to the surface. Basins are known to have experienced various volcanic episodes after their formation including the setting up of volcanic smooth plains whose spectral differences remain not fully understood. They also allowed the resurfacing of deep material originated from the primary carbon rich crust. Here, we present a study of several spectral units in link with impact basins. We analyse data derived from the Mercury Atmospheric and Surface Composition Spectrometer (MASCS/MESSENGER) and contained in the Mercury Surface Spectroscopy (MeSS) database. Spectral maps of several basins were generated highlighting different spectral units and revealing similarities between basins according to their age and size. It appears that processes at the origin of the similarity between basins are more related to the formation of the basin than to its location on the surface. Moreover, our method provides a detailed study of interactions between spectral units in order to better understand their geological history in relation with deep magmatic processes at the origin of surface volcanism. Our work is part of the preparation of the ESA/JAXA/BEPICOLOMBO mission whose objectives will be in part to continue to study the evolution of a planet close to its parent star and to continue to study Mercury as a planet: its geology, composition, interior and craters.

Field

Planetology (including small bodies and exoplanets)

Day constaints

On Friday 25 march please I will not be available on Wednesday and Thursday.

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