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# Smooth plains on Mercury. A comparison with Vesta

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Mercury, the closest planet to the Sun, has been visited by MESSENGER spacecraft and it is the target of the future BepiColombo mission. After 3 years of orbit around Mercury a global coverage of the surface has been done. A recent work by Denevi et al. (2014), based on the MESSENGER data, revels that $\sim$27% of Mercury's surface is covered by smooth plains (SP). Large part of Mercury's SP seems to have volcanic origin, while a further 2% have been identified as Odin-type plains which are of difficult interpretation and represent the knobby and hummocky plains surrounding the Caloris basin. SPs are widespread on Mercury's surface and they have an uneven distribution. Large part of SPs are mainly concentrated in the northern hemisphere, within the Caloris basins and in the circum-Caloris plains. Moreover has been observed that differences in material correspond to spectral slope variations. High-reflectance red plains (HRP) are characterized by spectral slope values greater than the average while low-reflectance blue plains (LBP) are identified thanks to their lower-than-average spectral slopes. X-Ray Spectrometer (XRS) data show that HRP-type areas are associated with a low-Fe (<4wt% Fe) basalt-like composition, while the LBP are Fe poor ultramafic composition (high Mg/Si and Ca/Si and low Al/Si)(Nittler et al., 2011; Weider et al., 2012; Denevi at al., 2014).
Vesta, explored by Dawn in 2011, does not show Mercury-like smooth plain, but it presents highly localized smooth material, such as in the Marcia crater floor and rim (Yingst et al., 2014). This unit is characterized by low albedo and has been interpreted as very young impact melt. Another example of smooth terrain on Vesta has been found in the Rheasilvia basin. This area occurs in irregularly-bounded of very smooth material, located on slopes or topographically lower regions (Yingst et al., 2014). This unit has been interpreted as ejecta emplaced during the Rheasilvia impact event, which could be modified by mass movement of material (Yingst et al., 2014).
Distribution and typology of smooth areas on Mercury and Vesta are the expression of the different crustal evolution of the two bodies. Application of classification methods applied to color image data of the MESSENGER wide angle camera (MDIS-WAC) together with a spectral analysis of the MESSENGER MASCS-VIRS spectrometer and Dawn-VIR spectrometer are applied to understand and highlight differences in composition of the smooth regions. Moreover a comparison between Mercury's SP and those of other solar system bodies, such as Vesta, reveals useful to obtain information on the origin and the evolution of such smooth regions and thus of the different bodies. This work has been done in support of the future BepiColombo (SIMBIO-SYS) missions which will provide higher spatial and spectral resolution data than MESSENGER, improving the results obtained so far.