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Intergrating morpho-stratigraphic and spectral units on Mercury and the Moon: Updates from the PLANMAP project

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The numerous past and present space missions dedicated to the Solar System planetary bodies exploration, provided a huge amount of data so far. In particular, data acquired by cameras and spectrometers allowed for producing morpho-stratigraphic and mineralogical maps for many planets, satellites and minor bodies. Despite the considerable progresses, the integration of these products is still poorly addressed. To date, no geological maps of planetary bodies other than the Earth, containing both the information, are available yet. In this context, one of the main goals the “European Union’s Horizon 2020 - PLANetary MAPPING (PLANMAP)” project [1] is to provide, for the first time, highly informative geological maps of specific regions of interest on the Moon, Mercury and Mars, taking into account datasets publicly available in the Planetary Data System (PDS) database [2].

Here, we show the results achieved during the first two years of the project by the PLANMAP “Compositional unit definition Work Package”. In particular, we focused on specific areas, such as Hokusai quadrangle (22°-60° N, 0°-90°W) and Beethoven (13.24°S- 28.39° S; 116.1°- 132.32°W, 630 km diameter) and Rembrandt (24.58°S- 41.19°S, 261.72°- 282.73°W, 716 km diameter) basins on Mercury, and the Apollo basin (10 ° -60 ° S, 125 ° -175 ° W, 492 km diameter) within the northeastern edge of the ~ 2500 km South Pole-Aitken (SPA) basin on the Moon [3]. For this work, we considered the multi-color images acquired by the Mercury Dual Imaging System - Wide Angle Camera (MDIS-WAC) [3] onboard the MESSENGER mission and hyperspectral data provided by the Moon Mineralogy Mapper (M3) [4] onboard the Chandrayaan-1 mission. After data calibration and the instrumental artifacts removal, we have photometrically corrected the data to derive multi- and hyper-spectral reflectance maps, afterwards we defined appropriate spectral indices to eventually obtain the spectral unit maps of these regions of interest. In next step, we will integrate the spectral unit maps obtained with the morpho-stratigraphic ones provided by other PLANMAP work packages [5, 6, 7] to merge the information and finally retrieve geological units.

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