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From morpho-stratigraphic to geo-stratigraphic units: the PLANMAP contribution.

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Geological units on Earth are defined by several parameters besides the stratigraphic ones, such as rock textures, lithology, composition, and environmental conditions of their origin (numerous and diverse magmatic, volcanic, metamorphic and sedimentary environments). On the other hand, from the Apollo era onward, planetary 'geologic' mapping has been carried out using a photo-interpretative approach mainly on panchromatic and monochromatic images. This limited the definition of geological units to morpho-stratigraphic considerations so that units were mainly defined by their stratigraphic position, surface textures and morphology, and attribution to general emplacement processes (a few related to magmatism, some broad sedimentary environments, some diverse impact domains, and all with uncertainties of interpretation). Hence, the two products are still separated by an important conceptual and effective gap which makes the traditional planetary morpho-stratigraphic maps unable to satisfy fully the needs of modern planetary exploration, i.e. an optimised product to define mission strategy in terms of target selection, exploration traverse definition and resource evaluation for ISRU purposes. One of the approaches that might close this gap is to integrate spectral, color and compositional information into morpho-stratigraphic maps, thus generating spectro-morphic or geo-stratigraphic maps.

The PLANMAP team has explored diverse methods for the integration of color variation and spectral information into planetary geological maps that diverge on the bases of the data available, the planetary surface under consideration (Moon, Mars and Mercury),the geological environments and the scale of mapping.

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