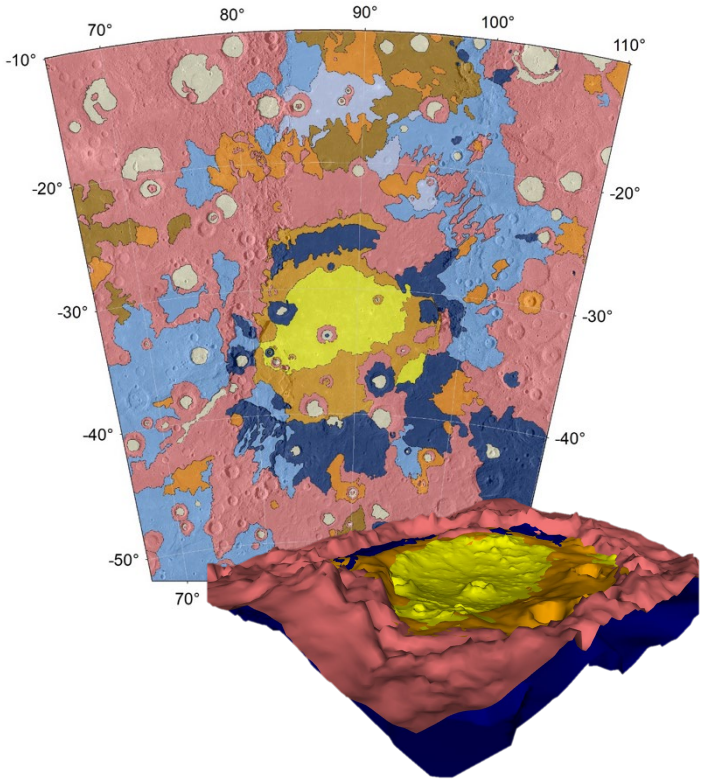
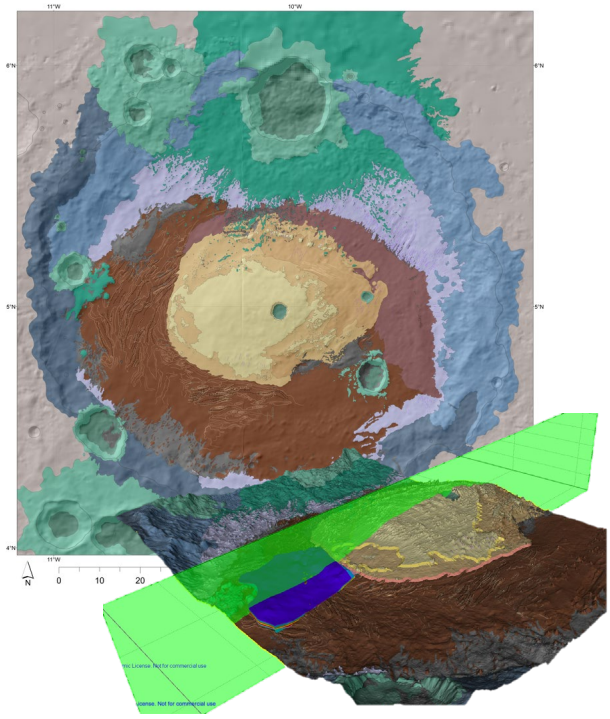
Geological mapping and 3D geo-modelling of planetary surfaces

(Proposer: Prof. Matteo Massironi)

Scheduled and future European space missions to Solar System bodies need adequate geological support to ensure successful observational strategies for orbital probes and effective landing site selection for robotic and human missions. Geological maps provide the context for all observations and interpretations of surface and subsurface processes on any solid planetary body, and their histories. Nowadays many nations can maintain robust space programs that continuously provide a great amount of highly complex datasets that can be integrated for highly informative geological maps. The PhD student will be involved within the H2020-EPN2024- GMAP infrastructure whose major focus is the integration of different datasets through data-fusion aiming at the production of geological maps which will include spectral information, elemental composition, absolute ages and ground truth information. The maps should provide the basis for eventual subsurface 3D geological modelling and will be disseminated using dedicated WebGIS software. The innovation of this mapping approach is to integrate data from different sources (images, DTMs, spectral-cubes, chemical data, radar sounding products, in situ observation) to produce geological maps specifically dedicated to planetary exploration at different levels (orbital probes, robotics and crewed).





It is expected that the PhD student will carry out his research by developing geological maps and/or derived 3D models of a given planetary or small body, even with the eventual help of laboratory studies of analogue materials to infer the most likely composition of the investigated surfaces. Such maps and models will be instrumental for ongoing and future mission and used for developing research on hot topics related to planetary and small bodies. For this reason, the candidate should provide a project in which a specific scientific topic of a given planetary or small body can be faced

through the production of innovative geological maps and/or derived products (e.g. 3D geological models).

The PhD will carry out his work in collaboration to the GMAP teams and other institution involved on specific planetary mission or mission proposals (e.g., Bepi-Colombo mission to Mercury, ExoMars, JUICE mission to the Jovian system; Daedalus project for the exploration of lava tubes on the Moon).

Collaborations: GMAP and ESA mission consortium members (e.g., Università di Chieti-Pescara, INAF, ISPRA, LPG/CNRS, DLR, Jacobs University Bremen, Westfälische Whilelms-Universität Münster; Polish Academy of Sciences; Open University; China University of Geosciences), ESA-EAC, ESA-ESAC.

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