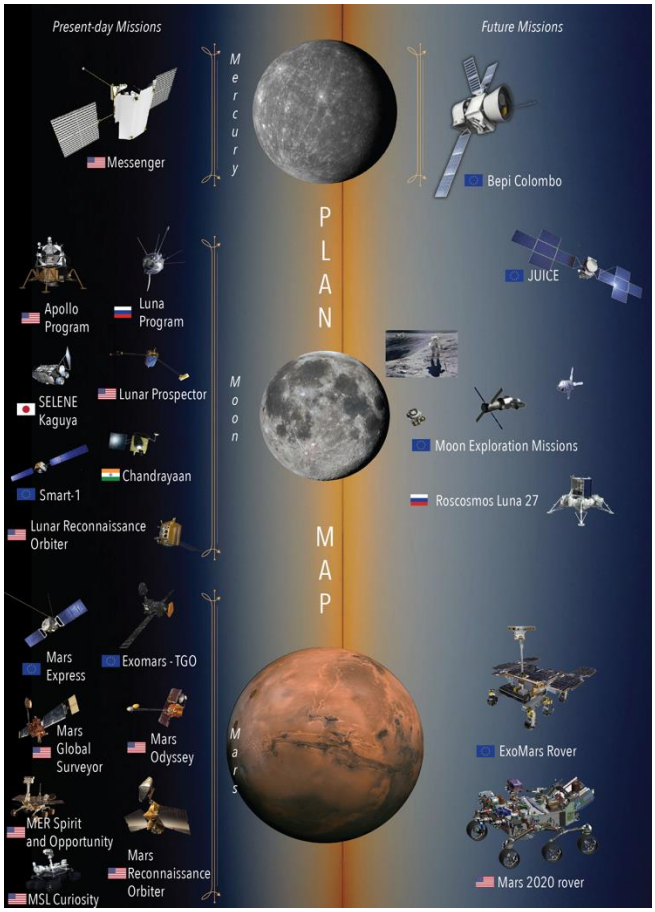
Geological mapping and 3D geo-modelling of planetary surfaces

(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-PLANMAP project 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. They will also provide the basis for subsurface 3D geological modelling and will be disseminated using dedicated WebGIS software. The innovative approach of PLANMAP 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 human).



It is expected that the PhD student will carry out his research by developing geological maps and derived 3D models of a given planetary body among the three main bodies of interest for Europe in the next decade: Mars, Mercury, and the Moon. Such maps and models will be instrumental for ongoing and future mission and used for developing research on hot topics related to these planetary bodies such as methane release, hydrothermal activity, salt tectonism, volcano-tectonics, and polar

caps stratigraphy and deformation on Mars; tectonism and volatile storage and release on Mercury; lava tunnels development, basin volcanism and tectonism, and human exploration on the Moon.

The PhD will carry out his work in collaboration to the PLANMAP consortium members and other institution involved on specific planetary mission or mission proposals (i.e. Bepi-Colombo mission to Mercury, ExoMars, Heracles project for the Moon).

Collaborations: PLANMAP consortium members (LPG/CNRS, INAF, Jacobs University Bremen, Westfälische Whilelms-Universität Münster; Open University), ESA-EAC, ESA-ESAC; China University of Geosciences (Beijing) for Moon topics.

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