Compositional study of the oldest Meridiani Planum Terrain, Mars, using data from orbiting imaging spectrometers and correlation with morphology, structures and stratigraphy to produce integrated planetary geological maps.

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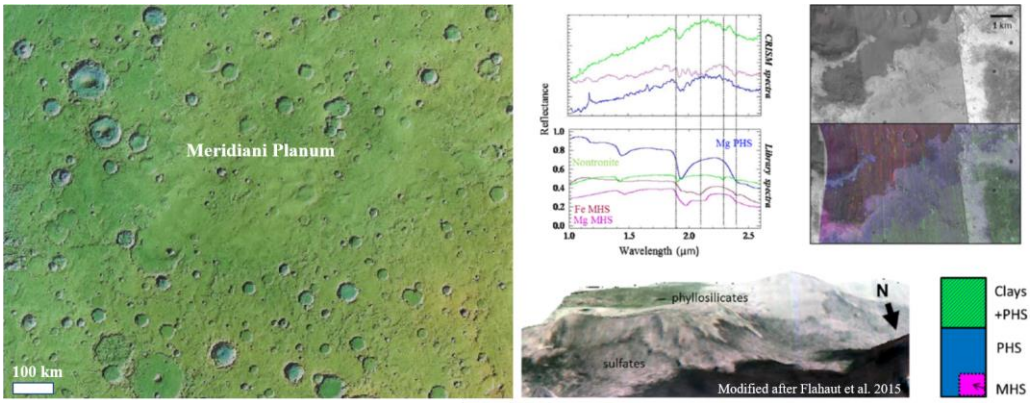
Introduction: Recently the PLANMAP team has explored different methods for the integration of spectral information into planetary geological maps, taking into account differences on data available, planetary surfaces, geological environments and the scale of mapping. The aim of the PLANMAP project is to fill an historical gap associated with products that are conceptually and effectively separated in planetary sciences. This gap makes the traditional planetary morpho-stratigraphic maps unable to fully satisfy the needs of modern planetary exploration.
Mars in particular shows a complex geological history, with a high variability in the occurred processes. Mineralogical diversity clearly reflects this history, showing the presence of several mineral phases attributable to rock forming minerals as well as to secondary processes due to volcanism, sedimentary environment, hydrothermal alteration, etc. Specific hydrated phases are assigned to different martian ages, indicating a change in geological environment.
Proposed activity: The aim of this Ph.D. project call is to investigate specific regions among the oldest terrains in Meridiani Planum, on Mars, to identify the mineral phases, associated with the original bedrocks and hydrated alteration. Subsequently this information should be compared with the superficial features associated with different morphologies, structures and stratigraphic position. This would allow to define lithological units that could be integrated into higher detailed geological maps, thus the planetary geological mapping on Mars from the definition of morpho-stratigraphic to geo-stratigraphic units.
The candidate should have a general knowledge of Planet Mars, with particular focus on geological epochs and minerals distribution, should prove a solid background in the analysis of the data from hyperspectral cameras to derive compositional information and skills in managing different data sets.
Expected Results: Hence the candidate should produce integrated maps, working with different data sets to investigate mineralogical and physical properties of the surface materials, geomorphology, structural geology and stratigraphy of significant sites in Meridiani Planum. The candidate will be stimulated to move for the spectral analysis from a more classic approach that enables to detect the mineral phases by spectral parameters analysis to a hyperspectral classification approach to identify methods for the investigation of planetary hyperspectral images aiming at the definition of compositional/spectral units. Moreover, the candidate should be able to identify and discuss the geological processes occurring in the selected areas.



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