Exploration Zone for Human mission to Mars: the area South of Firsoff Crater in Arabia Terra G. G. Ori [1 2], M. Pondrelli [1]. [1]IRSPS, Universita' d'Annunzio (Viale Pindaro 42, 65127 Pescara, Italy, ggori@irsps.unich.it), [2] Ibn Battuta Centre, Universte Cadi Ayyad, Marrakech, Morocco

Introduction: The entire Arabia Terra is a promising area for Martian Exploration, but the area around Crommelin and Firsoff craters bears a large number of targets that may be useful in understanding the geological history and the complexity of Mars. We are proposing an area South of Firsoff Crater centered at 0° 23' 28"N, 8° 21' 45" W (Fig. 1). The area is relatively flat (elevation range: min. -1900, max -1600) and dominated by an unnamed crater to the North. The procedure to define the name of this crater will be started if the EZ will be approved for further analysis. The area has been deeply mapped and investigated [1]. Engineering constraints will be analyzed after an assessment of the scientific requirement. The working team is involved (under contract ESA/Thales Alenia Space) with the analysis of the engineering constraints and certification of the ExoMars 2016 and 2018 missions. Therefore it shows a good background for this kind of analysis.

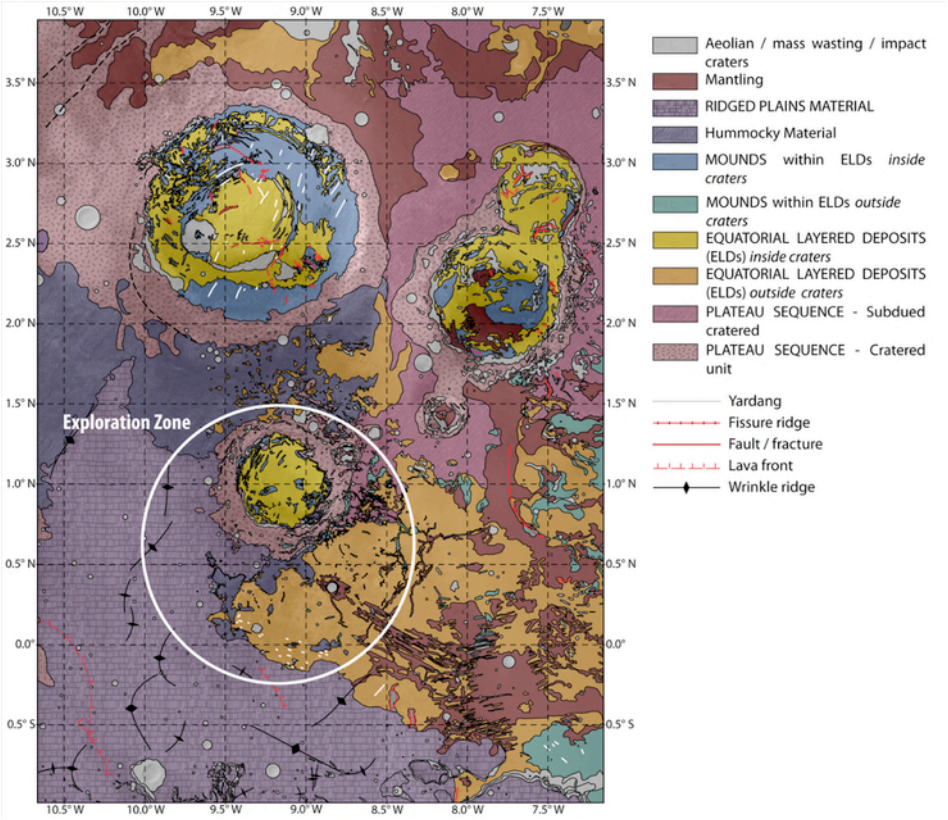

Fig. 1 - Geological map of Firsoff crater and the surrounding plateau [1]. The Exploration Zone is shown.

Science requirements: The area displays a wealth of different geological and astrobiological targets that can be investigated in several ROIs (Fig. 2):

- ROI1 (8°56'46.094"W 0°54'45.528"N), possible spring mounds and layers aligned along a fissure ridge in a terrain that consist of sulfate bearing light-toned layered deposits;
- ROI2 (9°1'44.735"W 1°11'3.785"N), possible spring, travertine-like, terraces made of sulfate bearing light-toned layered deposits;
- ROI3 (8°56'24.81"W 0°41'55.274"N), Middle Noachian highland unit [2], onlapped by the light-toned layered deposits;
- ROI4 (9°24'52.264"W 0°31'30.191"N), Middle Amazonian Ridged Plains Material [1];
- ROI5 (9°32'15.115"W 0°12'9.427"N), stratigraphic relation between light-toned layered deposits, Hummocky Material and Ridged Plains Deposits;

- ROI6 (9°11'29.523"W 0°9'10.552"N), aeolian cross bedding in light-toned layered deposits in the plateau;
- ROI7 (8°32'23.801"W 0°48'16.871”N), aligned mounds and possible playa deposits.

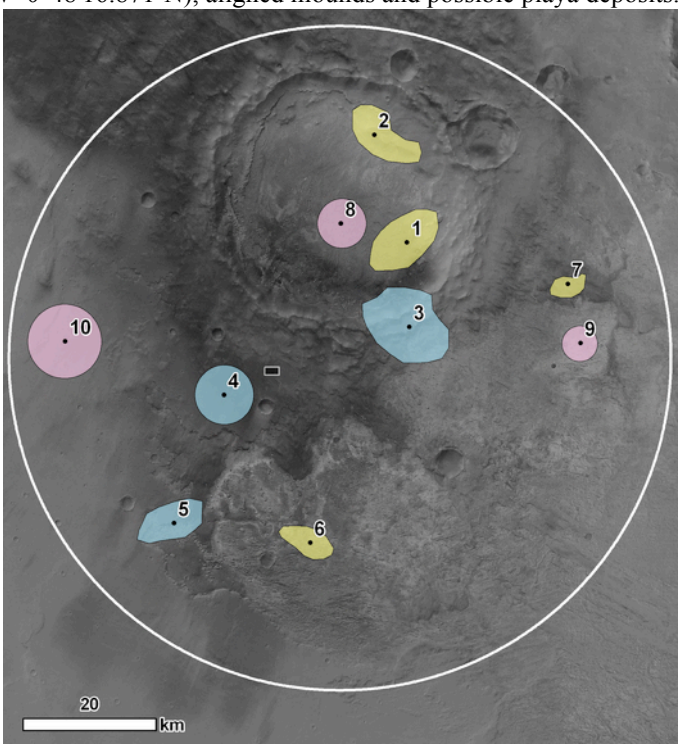

Fig. 2 - ROIs location. In yellow and blue science targets (yellow=light tone deposits, blue = stratigraphic reconstructions), in pink resources targets. The black square indicates the Mars Landing site and surface field station.

These first selected ROIs include a number of scientific themes that allow the reconstruction of the stratigraphy at global scale, including absolute dating of the Middle Noachian highland unit and the Middle Amazonian Ridged Plains Material, the identification of sedimentary environment and, consequently, the reconstruction of changes in environments and climates, and an assessment of the astrobiological context and eventually, the identification of past life.

- The presence of sulfate and possible presence of clay are suggestive of high habitability and good biosignature preservation
- The stratigraphic sequence cropping out in the area span from late Noachian to Amazonia providing a large slice of the Martian geological history [1]
- The Noachian Highlands and the Ridged Plains are datum that can globally constraint the local stratigraphy
- Capping lava flow provide also a datum plane (stratigraphic and radiometric) for the sedimentary sequence
- The possible playa deposits cropping out south of the unnamed crater is interpreted as sebkha deposits that provide a good environment for biological and plaeoclimatic investigation
- Mound features are the evidence of subsurface/surface communication with the transport of water, sediments and possible biological material from subsurface to surface
- The area is mapped in details and most of the unit boundaries and mapped and evaluated.

Resources and Engineering Constraints: These aspects will be analyzed in the near future however resources for construction and supplies are generically available. The engineering constraints, at first sight do not represent a major problem. Rock abundance does not seem to be extremely high and slopes, apart from the crater rim (that is however largely dissected) are within the rover operational constraints. Resources might consist of sulfate materials (ROIs 8 and 9) and basalts (ROI 10).

References [1] Pondrelli M et al. (2015) GSA Bulletin 127 (7-8):1064-1089. doi:10.1130/b31225.1, [2] Tanaka, K. L et al., 2014, USGS Scientific Investigations Map 3292..