

IAF SPACE EXPLORATION SYMPOSIUM (A3)  
Mars Exploration – missions current and future (3A)

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## WATER-RICH PERMAFROST ON MARS: FREND MAPPING DATA FROM ESA'S TGO

**Abstract**

Presence of ground water has been identified in the shallow sub-surface of Mars, and observable geological structures show evidence of liquid water in the past. Detailed knowledge of the present location of ground water is essential for understanding the planet evolution, but also for targeting future exploration. The initially available maps of sub-surface water from Mars Odyssey have spatial resolution of hundreds of kilometers, which is insufficient to achieve this goal. The recent data is presented from the neutron telescope FREND on the ESA's Trace Gas Orbiter, that by using a collimation technique significantly improves mapping spatial resolution. This data is used to resolve the boundaries of northern and southern of water-rich polar permafrost areas on Mars, which generally follow the lines of latitudes at 60 degrees north and south, but at some places deviate rather far upwards or downwards from them. The physical definition of a water-rich permafrost boundary is suggested, as an isoline of ground water content of 15 wt%. The physical origin of shapes of these boundaries is discussed in correspondence with geomorphological properties of surface along them.