

Mars Exploration (3)
Mars Exploration (3) (3)

Author: Dr. Alexey Malakhov

Space Research Institute (IKI), RAS, Russian Federation, alexey@malakhov.name

Prof.Dr. Igor Mitrofanov

Institute for Space Research, Russian Federation, mitrofanov@np.cosmos.ru

Dr. Anton Sanin

Space Research Institute (IKI), RAS, Russian Federation, sanin@iki.rssi.ru

Dr. Maxim Litvak

Space Research Institute (IKI), Russian Academy of Sciences (RAS), Russian Federation,
mlitvak.iki@gmail.com

Mr. Dmitry Golovin

Space Research Institute (IKI), RAS, Russian Federation, golovin@np.cosmos.ru

Mr. Artem Anikin

Space Research Institute (IKI), RAS, Russian Federation, a.anikin@np.cosmos.ru

Ms. Maya Djachkova

Space Research Institute (IKI), RAS, Russian Federation, a.anikin@np.cosmos.ru

Mr. Denis Lisov

Space Research Institute (IKI), RAS, Russian Federation, lisov@np.cosmos.ru

Mr. Sergey Nikiforov

Space Research Institute (IKI), RAS, Russian Federation, nikiforov@np.cosmos.ru

Mr. Nikita Lukyanov

Space Research Institute (IKI), RAS, Russian Federation, n.lukyanov@np.cosmos.ru

LOCAL VARIATIONS OF HYDROGEN AT MARS' MODERATE LATITUDES MAPPED WITH
FREND NEUTRON TELESCOPE ONBOARD EXOMARS TGO.

Abstract

Fine Resolution Epithermal Neutron Detector, FREND, is an instrument onboard ExoMars' Trace Gas Orbiter (TGO). It measures neutrons to detect hydrogen (and thus water) in the soil of the planet. FREND's distinctive characteristic is its neutron collimator that significantly narrows down the field of view (FOV) to 28 degrees full cone allowing for creation of high spatial resolution hydrogen map. The size of its pixel is 60-200km spot on the surface, which is significantly smaller than that of previous similar instruments. With these data we are able to associate local hydrogen variations with local geomorphological features.

The experiment is in active mapping phase since May 2018, and we present here results of mapping during the first Martian year. We use a technique to locate most prominent local spots, either very "dry" or very "wet", allowing to identify places of potential interest. Several such local spots are presented, characterized and associated with particular geomorphological features or/and with the selected landing sites candidates of future Martian missions.

Locating spots with enhanced hydrogen close to equator is of particular interest since water is known to not be stable on the surface in these areas. This is of much interest for both, the scientific community, and for the purpose of future landing sites selection processes. FREND's sensitivity is mostly in the upper 1m of the regolith which makes these deposits easily accessible by both automatic and manned missions.