

IAF SPACE EXPLORATION SYMPOSIUM (A3)  
Mars Exploration – Science, Instruments and Technologies (3B)

Author: Ms. Maya Djachkova  
Space Research Institute (IKI), RAS, Russian Federation, [sualice@yandex.ru](mailto:sualice@yandex.ru)

Mr. Sergey Nikiforov  
Space Research Institute (IKI), RAS, Russian Federation, [nikiforov@np.cosmos.ru](mailto:nikiforov@np.cosmos.ru)  
Prof.Dr. Igor Mitrofanov

Institute for Space Research, Russian Federation, [mitrofanov@np.cosmos.ru](mailto:mitrofanov@np.cosmos.ru)

Mr. Denis Lisov  
Space Research Institute (IKI), RAS, Russian Federation, [lisov@np.cosmos.ru](mailto:lisov@np.cosmos.ru)

Dr. Maxim Litvak  
Space Research Institute (IKI), Russian Academy of Sciences (RAS), Russian Federation,  
[mlitvak.iki@gmail.com](mailto:mlitvak.iki@gmail.com)

Dr. Anton Sanin  
Space Research Institute (IKI), RAS, Russian Federation, [sanin@iki.rssi.ru](mailto:sanin@iki.rssi.ru)

HYDRATED MINERALS IN GALE CRATER ON MARS: JOINT ANALYSIS OF ORBITAL AND  
SURFACE DATA

**Abstract**

The Dynamic Albedo of Neutrons (DAN) instrument designed to detect neutrons in order to determine hydrogen abundance in the Martian subsurface (down to 1 m deep) is successfully working onboard Mars Science Laboratory (MSL) rover Curiosity for more than 10 years. The Curiosity rover covered more than 27 km on the Martian surface and crossed a range of terrain types and geological structures of different mineralogical composition. Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) onboard Mars Reconnaissance Orbiter performs imaging spectrometry in the visible and near infrared wavelength range. Such chemicals as iron, oxides, carbonates, etc. on the martian surface have characteristic spectral features in the visible and infrared ranges and are distinguishable by CRISM. We investigated the possible correlation between water content value as measured by DAN instrument along the Curiosity traverse and the presence of hydrated minerals as seen from orbit in order to connect geochemical features of the surface to the subsurface water measurements. Our cross-analysis of subsurface water content from DAN passive measurements in Gale crater and special data sets, reflecting distribution of hydrated/hydroxylated minerals on the surface of this crater, shows an increase of the average water content for the surface containing certain types of minerals as related to the surface, which does not contain them. This increase is higher, with the more prominent spectral feature of the mineral on the surface. Thus, certain types of minerals being part of the sedimentary deposits composing the Gale crater surface have considerable thickness, which is sufficient for being detected by the DAN measurements.