Instrumentation for Neutron Activation Analysis of Subsurface Composition of Mars and Moon

I. Mitrofanov (1)

(1) Institute for Space Research, Moscow, Russia (imitrofa@space.ru / Fax +7 495 333 2588 / Phone +7 495 333 3489

The concept of instrumentation is presented, which uses the well known method of neutron activation analysis for determination of composition of subsurface material on Mars and on Moon. This instrumentation contains the pulsing neutron generator, which produces 1 microsecond long pulses of 14 MeV neutrons, the sensors of thermal and epithermal albedo neutrons and the detector of induced gamma-ray lines. Die away curves of induced neutron emission are shown to depend on the content of hydrogen in the soil, and these data allows to estimate the content of hydrogen (or water, or hydroxyl) and also to resolve the layering stratification of hydrogen bearing minerals. Data for gamma-ray lines, which could be induced either by in-elastic scattering or by capture reactions with neutrons, provides the composition of soil constituting elements of tested subsurface. The present design concept is discussed for the instrument DAN (Dynamic Albedo of Neutrons), which has been selected for NASA Mars Science Laboratory. Another similar instruments are also considered, which may be useful for studying elemental composition of Mars and Moon surfaces from the landing platforms.