CORRELATIONS OF HYDROGEN CONCENTRATION AND SURFACE FORMATIONS ON THE MOON ACCORDING TO THE LUNAR PROSPECTOR NEUTRON SPECTROMETER. M. P. Sinitsyn[1] [1] Moscow State University, Sternberg Astronomical Institute ,13 Universitetsky prospect,Moscow 119992,Russia (msitsyn.sai@gmail.com).

Introduction: As a result of Lunar Prospector Neutron Spectrometer (LPNS) was obtained distribuuteon of hydrogen across the surface of the Moon, including its equatorial regions [1]. Based on these data, we studied the distribution of hydrogen to the subjects, located in the equatorial regions. In consequence of result of the analysis it was discovered some regularities, which represent the correlation between hydrogen concentration (C_H) and surface formations.

Elevated levels of hydrogen in the immature formations. Comparing the distribution of hydrogen and maturity of young craters, we found an increased hydrogen content in immature impact formations. In connection with the frequency of this phenomenon we can speak about the anticorrelation between a hydrogen concentration and maturity. We recognized several well-known immature craters in which there is an increased concentration of hydrogen.
Among them are the craters Proclus, Aristarchus, Pliny, Timocharis (fig.1).

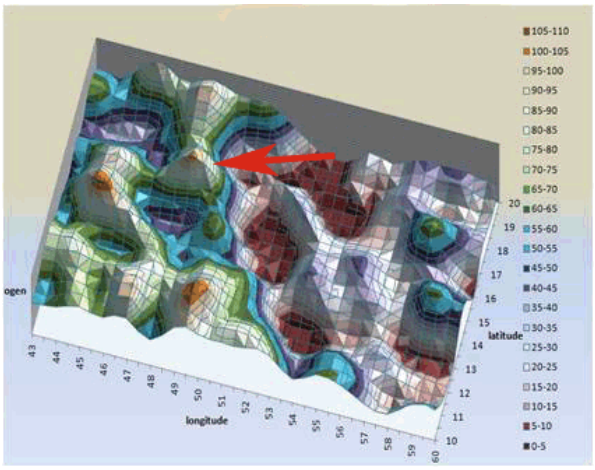

Fig.1 Distribution of hydrogen in the vicinity of the crater Proclus (red arrow). The concentration of hydrogen (right) is presented in ppm.

In the figure we observe a significant concentration of hydrogen (more than 100 ppm) on the location of the extremely young crater Proclus. It should be noted that this is a very significant amount of hydrogen to the equatorial region.

This rather unexpected correlation contradicts the conventional laws of proportionality of the hydrogen content and maturity. However, this trend is confirmed by other sources. According to the Moon Mineralogy Mapper on Chandrayaan-1, wide absorption lines at 3 micrometers observed in fresh feldspathic craters and in small highland (<1 km) morphologically fresh impact craters with ejects [2]. In addition, V.V. Shevchenko was found crumbling slopes of craters that reveal fresh immature fraction of the soil [3]. On such immature sloping surfaces have been found the most dramatic lines about 3 micrometers [2]. This means that on the fresh surface is particularly active OH/H_2O accumulates.

Correlation of hydrogen with marine and highlands formations

Analyzing the distribution of hydrogen on large surfaces, we found some patterns of accumulation of hydrogen in marine and highlands areas. According to these laws, hydrogen accumulates in marine areas is much less (fig. 2).

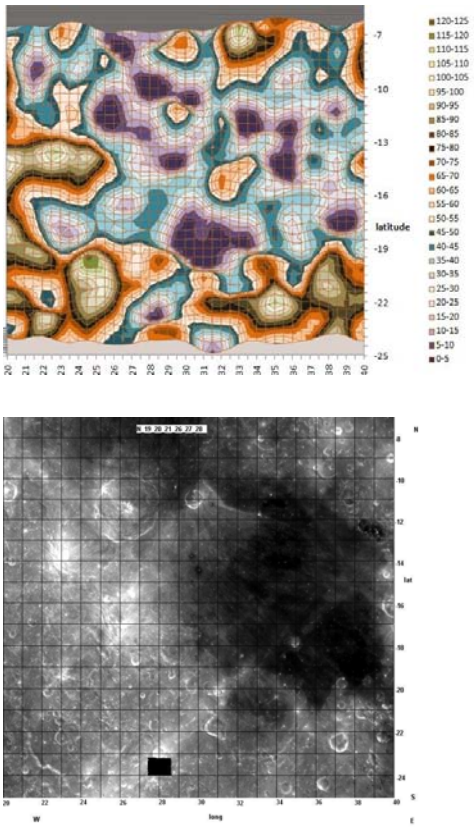

Fig.2 Hydrogen distribution in the Mare Nectaris region (above) and photo of the same area (below).

The average content of hydrogen in the Mare Nectaris is about 15 - 20 ppm. While on the continent, this value is much higher, about 70 ppm. This trend has con-

tinued in other marine and highlands areas. From the figure clearly shows that the shape of the hydrogen concentration is not accurate, but even so corresponds to the shoreline.

Elevated levels of hydrogen in the mountains
On the surface regions with mountain ranges such as the Caucasus, the Carpatus, the Apenninus there is a significant increase in hydrogen content.
From fig. 3 clearly shows that the C_H in maximum rises to 135 ppm (red arrow).

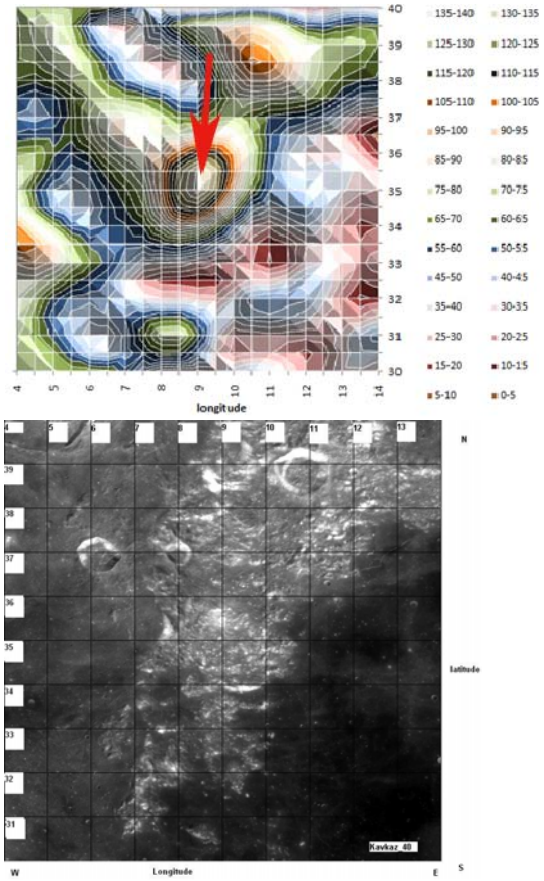

Fig.3 Hydrogen distribution in Montes Caucasus (above) and photo of the same area (below).

Mountain areas are very favorable for the accumulation of hydrogen. This is due to the fact that under the influence of gravity is a constant destruction of rocks, which leads to the accumulation of vacancies for the introduction of solar-wind protons. Vacant mechanism of introduction of hydrogen is described in detail by L.V. Starukhina [4]

Features of the distribution of hydrogen on the result of LPNS

LPNS measured distribution of epithermal neutrons with a resolution of 150 km. In the course of treatment could significantly increase the resolution. This result makes it possible to examine patterns of distribution of hydrogen on the surface. The process of recovering the distribution of hydrogen in the neutron flux is described in detail Lawrence [5]. At present, it is important to compare the results of processing the data received LPNS with new results coming from the neutron spectrometer LEND of LRO spacecraft.

References:
[1]http://pds-geo-sciences.wustl.edu/missions/lunarp/reduced_grsns.html

[2] Pieters, C.M. et al. *Science, 326,568(2009);*
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[5] Lawrence, D.J. et al. JGR,111,E8(2006)