THE COMPARISON CONTENT OF HYDROGEN IN THE REGION OF THE NORTH POLE AND SOUTH POLE OF THE MOON. S.G. Pugacheva, V.V. Shevchenko, Sternberg State Astronomical Institute, Moscow University, 13 Universitetskiy pr., 119992 Moscow, Russia, pugach@sai.msu.ru

Introduction: The article is devoted to studying the hydrogen content in the lunar craters of the South and North Poles. The surface of the craters that are situated in the area South Pole and North Pole is not exposed to the direct sun light and has extremely low temperature (below 90 K) that remains for billions of years. The estimated values of photometric parameters in visible and infrared spectral ranges show that conditions of the solar radiation of the pole areas create prerequisites for formation of considerable water ice fields [3, 4].

Craters with the high contents of hydrogen: Measurements made by KA Lunar Prospector (LP) and Lunar Reconnaissance Orbiter (LRO) proves high content of hydrogen in the Moon's soil [1, 2]. We have compared the hydrogen presence in the soil of the five craters near the South Pole and six craters near the North Pole. The craters located near the South Pole: Cabeus (85.28°S, -41.81°W, D=100.58 km), Shackleton (89.63°S, 132.32°E, D=21 km), Faustini (81.18°S, 85.02°E, D=42.48 km), Shoemaker (88.03°S, 39.85°E, D=48.33 km), Haworth (87.2°S, -7.49°W, D=51.42 km). Craters located near the North Pole: Peary (88.57°N, 25.73°E, D=85.15 km); Rozhdestvenskiy (85.49°N, -158.44W, D=180 km); Whipple (89.14°N, 119.92°E, D=14.53 km); Hermite (87.08°N, -91.31°W, D=104.64 km), Byrd (85.38°N, 12.05°E, D=91.92 km); Lenard (85.17°N, -109.32°W, D=45.24). The histogram in Figure 1 shows the distribution content of the hydrogen in the craters near the South Pole. According to figure 1 the general distribution of hydrogen in Cabers crater is of polymodal nature and can be divided into two marginal distributions that have form close to normal distribution. In this case, the first mode means 127 ppm, and the second mode of the hydrogen distribution is 172 ppm. The second mode of the hydrogen distribution matches with the northern shadowed border of Cabeus formation (83.78°S, 338.96°E). LCROSS has discovered out presence of water at this area of the crater Cabeus [4]. The histogram in Figure 2 shows the distribution of the hydrogen in the craters near the North Pole. The distribution of the hydrogen in the craters of the North Pole had form of the normal distribution. A maximum content of the hydrogen was found in the crater Peary (152 ppm) which significantly less the content of the hydrogen of the crater Cabeus (172 ppm). The content of the hydrogen in the regions of the North Pole varies in the interval values from 140 ppm to 170 ppm.

Conclusions: The analysis of the results obtained confirms that the macrostructure surface polar areas of the Moon are homogenous. The contents of hydrogen are positively correlation with solar insolation of slopes of the pole craters. The changes in basalts are contributed with the meteoroid- and comet impacts that cause the substance melting and formation of various breccias [5]. Probably, the regolith in the area of craters Cabeus and Peary has higher porosity and irregular macrostructure that can create conditions to accumulation of H_2O in the subsurface.

References: [1] Lawrence, D. J. et al., (2002) *J. Geophys. Res., Ser. E*, vol. 107, no. 12, p. 5130. [2] Lawrence, D. J. et al., (1998) *Science*, vol. 281, 1484–1489. [3] Pugacheva S. G., Shevchenko V. V. (2003) *LPS XXXI*, Abstract #1112. [4] Ivatury V., McClanahan T.P. (2009) *LPS XXXX*, Abstract #1134. [5] Pugacheva S. G., Shevchenko V. V. (2009) *LPS XXXXI*, Abstract #1297.

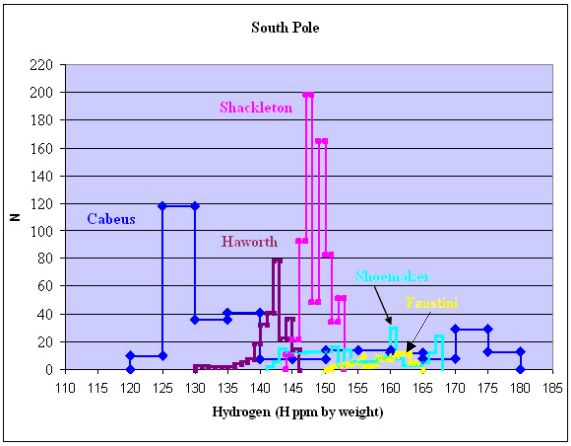

Fig. 1. The hydrogen distributions in the surface layer at the lunar craters located near the South Pole.

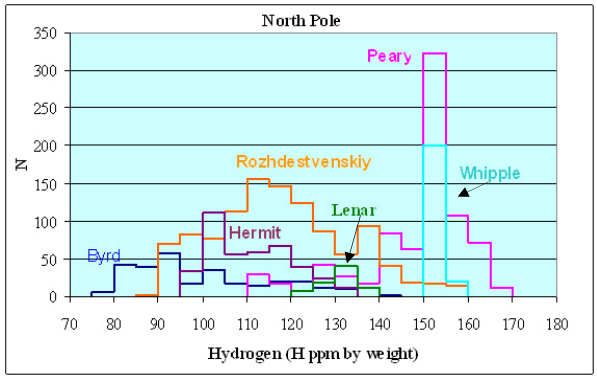

Fig. 2. The hydrogen distributions in the surface layer at the lunar craters located near the North Pole.