

HIGHLAND COMPONENT IN THE LUNA 16 SOIL. \* Semenova A.S., \* Kononkova N.N., \*\* Guseva E.V. \* Vernadsky Institute of Geochemistry and Analytical Chemistry USSR Academy of Sciences, Kosygin St. 19, 117975, Moscow, USSR; \*\* Moscow States University, 119899, Moscow, USSR.

**INTRODUCTION.** The previous studies of light-colored particles in the Luna 16 soil show that they may be characterized as ANT-suite lithic fragments [1-3]. The quantity of particles described weren't enough to answer the question about the most abundant rock type in this region. At the same time the Apollo 15 highland rock types found in regolith breccias and soil show large diversity [4,5]. Taking into consideration this fact 95 light-colored particles of the Luna 16 soil were studied to receive their descriptions and to compare with those of Luna 20 mission.

**SAMPLE SELECTION.** Pl-rich fragments colored in white, light-grey, grey were hand-picked in fines fraction (200-450 $\mu$ m) of soil samples 1635 and 1639. The highland component in soil sample 1635 is present as (% ; N) 1. fine-grained lithic rock (44; 137); 2. glass and aphanitic fragments (34.9; 109); 3. homogeneous glasses (19.2; 60); 4. light-colored breccias (1.9; 6).

**LITHIC FRAGMENTS.** 40 highland lithic particles were studied using optmicroscopy, EPMA and SEM. Based on modal dates and chemistry compositions of minerals all particles were divided into three groups by classification of ANT-plutonic suite [6]: anorthosites (7), noritic and troctolitic anorthosites (13), anorthositic norites and troctolites (20). Spinel-troctolites (2), K-rich norites (3), KREEP-basalt (1) were also defined in the last group. Most rock structures are shocked or poikilitic. Separate grains of Pl and Ol in the structures have wavy or mosaic extinction, some grains of Px retain twinning.

**CHEMISTRY OF MINERALS.** Anorthosites and gabbro-anorthosites consist of Pl (An 92-97 mol%), rare Pig, Aug (Fig.1; 1) and Ol (Fo 50-70 mol%). Noritic and troctolitic anorthosites have more variable composition of their minerals: Px (Opx, Pig, Aug) (Fig.1; 2, 4); Ol (Fo 44-85 mol%); Pl (An 90-95 mol%). Chemistry composition of the same minerals in the anorthositic norites and troctolites is more constant: Pl (An 90-95 mol%), Ol (Fo 70-80 mol%), Px (Hyp, Pig) (Fig.1, 3, 5). Xenomorphic orthoclase occurs in three particles of norites (An 2-4.5 Ab 12.7-18.9 Or 76.6-85.1) (Fig.1; 6). The content of Ort and silica is about 2-10 vol% that is characteristic to K-rich norites. Chemistry compositions of minerals from Spn-troctolites are similar those from Spn-troctolites of Luna 20 [6,7] (Ol - Fo 91-93 mol%; Pl - An 94-98 mol%, Mg-rich Spn). Fine-grained fragment consists (vol.%) of: Pl (49.6; An 82-88 mol%), Hyp (42; Wo 3.4 En 64.8 Fs 31.7) (Fig.1; 7), Ilm (4.1; to 5 % MgO), Whitl (2.7), silica (1.6). Whitlockite (Ca 2.33 Mg 0.25 Fe 0.06 P 2.13 O 8) enriched in Y<sub>2</sub>O<sub>3</sub> (2.07%), Ce<sub>2</sub>O<sub>3</sub> (1.89%), Nd<sub>2</sub>O<sub>3</sub> (1.02%), Pr<sub>2</sub>O<sub>3</sub> (0.52%), Sm<sub>2</sub>O<sub>3</sub> (0.31%). Mineralogical data suggest that the particle resembles KREEP-basalts [5].

**GLASS PARTICLES** (45) are enriched of Pl component. Their bulk composition is 22-31 % Al<sub>2</sub>O<sub>3</sub>; 3-8.5 % FeO; 2.3-9.7% MgO; 0.02-0.54 % TiO<sub>2</sub>. Most of them are intermediate between noritic anorthosites and VHA-basalts. A lot of glasses contain small

iron-spherules with 4.2-18.2 at.% Ni, to 1.5 at.% Co. These fragments may be described as impact glasses [8].

**DISCUSSION.** The lithic fragments of the Luna 16 soil examined are members of ANT-suite and similar to highland Luna 20 rocks. The ANT-rocks belong to ferroan (anorthosites, noritic anorthosites, gabbro-anorthosites) and magnesian suite (Spn-troctolite, anorthositic troctolites and norites) (Fig.2). Their modal composition suggests that anorthositic norites and troctolites are predominant rock type as in the Luna 20 soil [6]. It's argued that ANT-suite rocks were transported from the Apollonium highland region. It should be noted that KREEP-basalts and K-rich norites hadn't been found earlier in the Luna 16 [1-3] and Luna 20 soil [6,7]. We believe that these exotic particles are the fragments from the remote other regions.

**REFERENCES:** 1. P. Jakeš et al. "Lunar soil from Sea of Fertility", 1974, 64-78 (in Russian); 2. J.B. Reid et al., *ibid*, 79-91; 3. K. Keil et al., *ibid*, 250-268; 4. M.M. Lindstrom et al. Proc. 18th LPSC, 1988, 169-185; 5. S.B. Simon et al., *ibid*, 187-201; 6. M. Prinz et al. "Regolith from the highland region of the Moon", 1979, 83-104 (in Russian); 7. L.S. Tarasov et al. *ibid*, 105-118; 8. D. Stöffler et al. Proc. Conf. Lun. Highlands Crust, 1980, 51-70.

