

Petrologic and Chemical Studies of Samples from Luna 16 and Luna 20 Regolith Cores

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The main aim of this project consists is to increase the number of age determinations of lunar samples, specifically those brought by the unmanned Russian missions. Based on remote sensing data, Luna 16 and Luna 20 (and 24) landing sites appear to be less contaminated by the Procellarum-KREEP Terrain (PKT) than the Apollo missions landing sites. The Luna 16 site was situated in the northeastern side of Mare Fecunditatis, and Luna 20 site was situated in the highlands, just 120 km east from the Luna 16 site. Thus, the chemical and petrologic identification of samples from the Luna landing sites will provide data of extreme importance as their analyses will possibly carry information concealed in the Apollo samples. Presently, petrographic and petrologic studies are being undertaken on samples from the Luna 16 and Luna 20 regolith cores with the objective of determining mare basalts and highland material chemical composition. The identification of samples that have experienced little to no effects of meteor impacts are preferred as the age obtained will be easier to interpret as well as more conclusive. This will enable the development of a more comprehensive lunar chronology and a better understanding of the early history of the Moon (and Solar System). The basalts and metabasalts thus far analysed have as major mineralogic phases plagioclase, pyroxene and ilmenite, as it is common for lunar basalts. Olivine is also present as a major phase in one of the samples. The minor phases present are spinel, troilite and metallic iron. The plagioclase chemical composition ranges from is An_{92} to An_{98} . Pyroxenes are Fe-rich, show zoning, and range in composition from augite to ferroaugite and pigeonite. The olivines analyzed are more Fa than Fo. Zoned ilmenites in one of the samples showed from core to rim a decrease in TiO_2 and increase in FeO. ^{40}Ar - ^{39}Ar analyses for age determination of these samples are currently being undertaken and will be presented at the meeting.