ABSTRACT FOR SECOND ANNUAL LUNAR SCIENCE CONFERENCE

THE ORIGIN OF THE LUNAR SOIL
BASED ON REE, K, Rb, Ba, Sr, P, AND Sr$^{87/86}$ DATA

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Apollo 12 materials fall into three basic groups by their rare earth patterns. One group includes the soils 12070 and 12044, the coarse fines 12033, a breccia 12073, fragments from the coarse fines and the dark material from 12013. The second group is the common igneous rocks 12002, 12051, 12053, and 12035. The third and distinctly minor group is light colored, high SiO$_2$, K, and Ba materials such as the light material of 12013. The Apollo 12 soil (12070, 12044) is quantitatively matched by about equal parts of coarse fines (12033) and common igneous rocks. The breccia 12073 is matched by 2 parts of 12033 and 1 part of common igneous rock. A fragment of dark igneous rock was removed from breccia 12073 and found to be identical to the common igneous rocks. A fragment from coarse fines sample 12003 was found to have REE identical to a dark fragment of 12013. This fragment is one of many similar coarse fines which are all characterized by high K and P. The mineralogy, chemical and strontium isotopic composition of Luny Rock 1 from Apollo 11 and the K and P rich glass and related high K and P rock fragments in the coarse fines for Apollo 12 define a distinctly different and widespread rock type on the moon. This rock appears to be an extreme member of a continuous trend in REE, K, Rb, and P contents. It has many of the properties inferred for the "cryptic" or "magic" component. Its association with rock 12013 suggests that it may be much older than the common igneous rocks from the Apollo 12 site. We suggest that this high REE, K and P material was mixed with an approximately equal portion of the common igneous rocks to produce the Apollo 12 soils.