TENTATIVE ABSTRACT OF 2000-WORD PAPER FOR APOLLO XII MEETING:

Analyses of Apollo XII Specimens: A Mixing Model

Gordon G. Goles
Masumi Osawa
Marilyn R. Martin
Robert L. Beyer
David J. Lindstrom
and
Keith Randle

Center for Volcanology, University of Oregon
Eugene, Oregon 97403

Instrumental neutron activation analyses of Apollo XII specimens confirm the marked variability suggested by results of the Preliminary Examination Team. Sodium contents range over a factor of about four, in contrast to Apollo XI specimens. Rare earth abundance patterns are similar to those observed before, although Eu contents are more variable (but always relatively depleted) than is the case for Apollo XI specimens. The breccia 12010 exhibits an enrichment of three-hundred-fold over chondritic rare earth contents, and seems to have a slight relative enrichment of light over heavy rare earths.

A satisfactory two-component mixing model may be devised to account for the composition of the "soil" (12044 and 12070). Mixing 48% of a deep-seated component (12010 plus glass from the surface of 12034) with 52% of a shallow component (12002, 12018, two splits of 12021, three splits of 12040, and 12065) matches within errors the "soil" composition for rare earths (including Eu), Hf, Ta, Mn, Co, Fe, Sc, and Cr. Sodium contents predicted from the mixing model are too low by about 13%, perhaps reflecting sampling error or a special mechanism for fractionation of this element. It is implausible that crystal sorting was operative during generation of the "soil", otherwise elements like Eu, Co and Sc which are concentrated in specific phases would not fit the mixing model. Our data do not support the concept of two magma types advanced by Warner, but they are not comprehensive enough to construct a strong argument.