

Trace Element Studies of Rocks and Soils from Oceanus Procellarum and Mare Tranquillitatis

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Six elements (Zn, Ga, Ge, Cd, In and Ir) have been determined in six Apollo-12 rocks and two soil samples. The concentration ranges of most elements are greater than those observed in Apollo-11 samples. Gallium, which was present in nearly constant amounts in Apollo-11 samples, varies by about a factor of 2 in our Apollo-12 rocks, and is positively correlated with Ca and Al, and negatively correlated with Mg. All elements are enriched in the soils relative to the crystalline rocks. The enrichments in soil 12070 of all elements except Cd and In are consistent with the addition of 1.0 ± 0.2 % of a material resembling the water-free portion of C1 chondrites to a matrix containing amounts of these elements comparable to those in the local rocks. A similar treatment of the published data for Apollo-11 yields a C1-like fraction amounting to 1.1 ± 0.2 %. The 10 % lower C1 content at the Apollo-12 site, if real, is about equal to the difference in the ages of samples at the two sites. The data are consistent with a constant meteoritic flux during the past 3.7 Gy, and similar regolith depths at the two sites, or an exponentially decreasing meteoritic flux, and a greater regolith depth at the Mare Tranquillitatis site. Cadmium and probably In are too abundant in the soil to be accounted for by the above amounts of C1-like material. Although it is possible that they are enriched in the Al-rich, "anorthositic" component of the soil, an additional lunar or extralunar component may be indicated. The light gray soil 12033 contains a meteoritic component about 65 % as great as 12070. It appears to consist of two components: about 65 % old, local soil and about 35 % of a basaltic material slightly enriched in Al_2O_3 and low in FeO.