DISTRIBUTION OF ELEMENTS BETWEEN DIFFERENT PHASES OF APOLLO 14 ROCKS AND SOILS

A. O. Brunfelt, K. S. Heier, B. Nilssen,
E. Steinness and B. Sundvoll (Norway)

The following samples were received: 14163,154 fines (4.96o gr), 14276 rock (o.236 gr), 143o3,14 breccia (32.31 gr) with two polished sections, 1431o,123 rock (4.o4 gr). 14276 is part of a consortium sample, and our determination of 37 elements will be reported by Professor Wasserburg. Data on 156o1,75 (soil) are also given. All analyses were by neutron activation analysis.

Lunar regolith, 14163 See Brunfelt et al. (1) for bulk analysis. Fine fraction (< o.12 mm) was analysed separately. It is similar to the bulk regolith composition. Seven fractions were handpicked: plagioclase, pyroxene, dark rock fragments, light rock fragments, dark irregular glass fragments, twisted glass fragments and glass spheres. Apart from the pyroxenes and plagioclase, all the fractions have similar composition, Fig 1. The REE patterns of the plagioclases and pyroxenes are compared with the bulk fines in Fig 2. Lunar regolith 156o1 is compared with 14163 and 12o7o in Fig 3. REE patterns of soils from the four APOLLO missions are compared in Fig 4.

Breccia 143o3 is compared with the composition of soil 14163 in Fig 5.

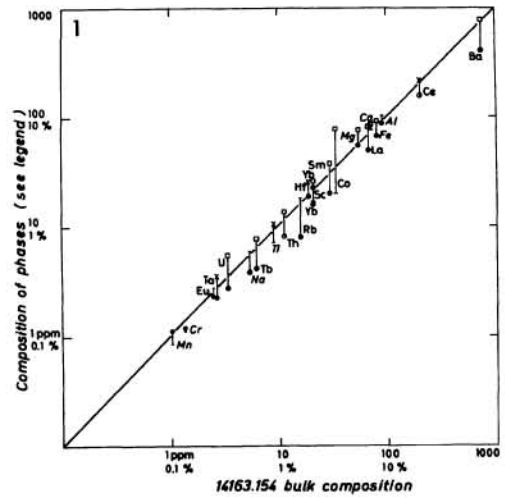
Rock 1431o: Ortho-pyroxene and plagioclase fractions were obtained 95 % pure. REE patterns of these and of bulk rock are shown in Fig 6.

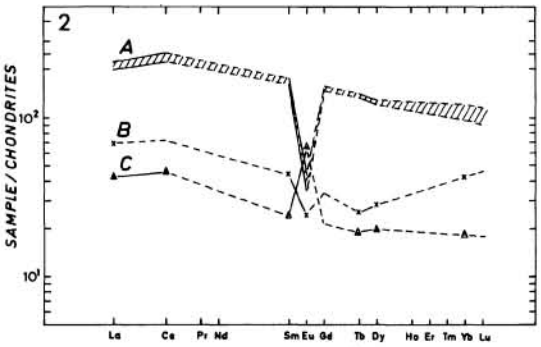
Modal analyses (2, 3) indicate 61 % plag. vs 31 % px. and 5o % plag. vs 4o % px. respectively in this rock. The authors report clinopyroxene as the pyroxene phase while orthopyroxene dominates in 1431o,123 (cpx < 1 %). Element concentrations of plag. + px. (calculated as 2/3 plag. and 1/3 px.) vs bulk rock are shown in Fig 7. (K in px and Ti in plag. taken as zero; Sr and Ga in px. as 10 and 1.1 ppm respectively). Assuming the other remaining phases to constitute 5 % of the rock, the average composition of these phases is in %: Mg (3o.2), Fe (49.2), Ti (11.6), K (4.8), Mn (o.6), Cr (o.2o); in ppm: Sc (132), Co (166), Rb (216), Ba (664o), La (854), Sm (36o), Tb (159), Dy (434), Yb (172), Hf (266), Ta (41), Th (148), U (48.6).

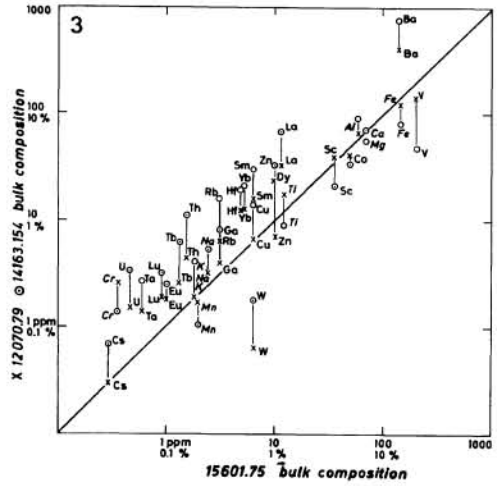
BRIEF TITLE: Distribution of elements.

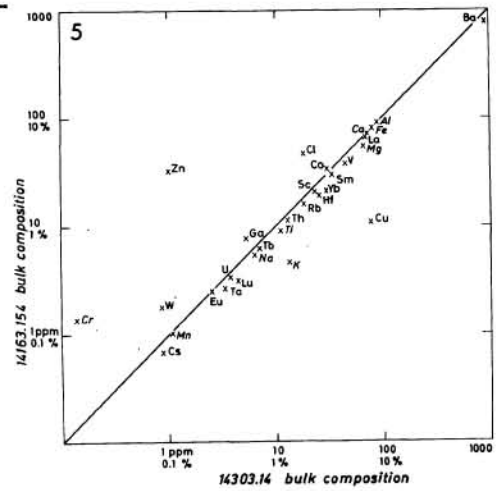
INITIAL AUTHOR: A. O. Brunfelt

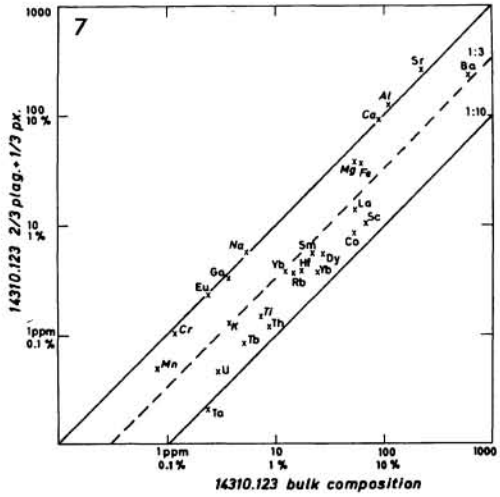
P.100

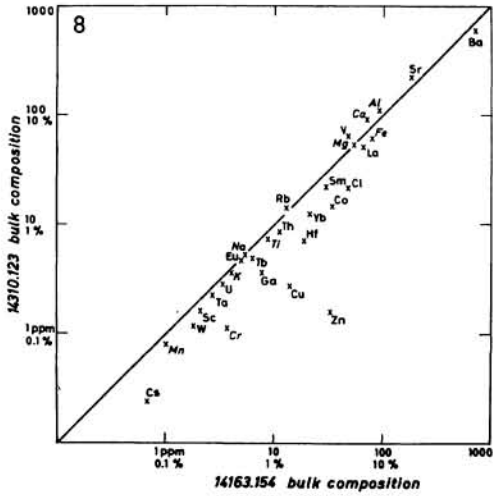








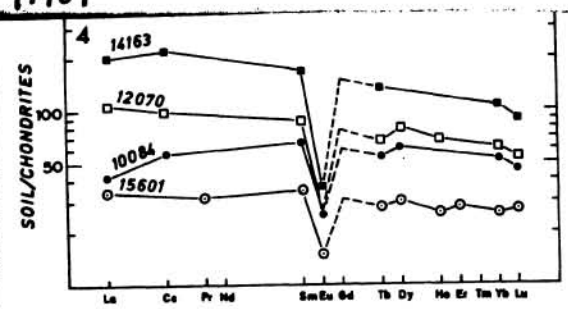




Distribution of elements.

A. O. Brunfelt

P. 101



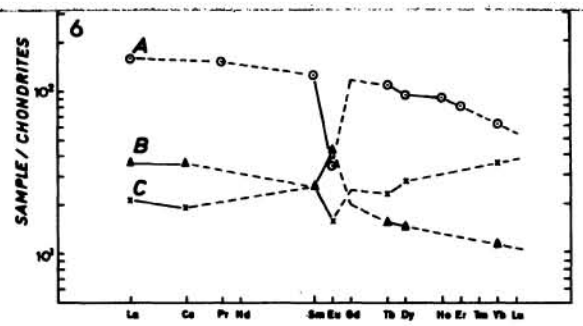


Fig 1. Distribution of elements between various fractions of 14163,154 and bulk fines. Phases showing maximum and minimum values are shown, remaining phases plot in the indicated range (□ dark rock fragments, - light rock fragments, x dark irregular glass fragments, V twisted glass fragments, o glass spheres), Na, Mg, Al, K, Ca, Ti, Cr, Mn, Fe in percent.

Fig 2. REE distribution in 14163,154 pyroxene (B), plagioclase (C), bulk fines and other separated fractions (A, shaded area).

Fig 3. Distribution of elements between 12o7o (X) and 14163 (o) vs 156o1 bulk fine.

Fig 4. REE distribution in 10084, 12070, 14163, and 15601.

Fig 5. Diagram comparing the compositions of breccia 14303 with soil 14163.

Fig 6. REE distribution in 14310, bulk rock (A), plagioclase (B) and pyroxene (C).

Fig 7. Distribution of elements between plag. + px. and bulk rock in 14310,123.

Fig 8. Distribution of elements between 14310 and 14163.

Note the high concentration of Ta; which is of interest in view of the Nb rich phase β" reported earlier (4) on rock 12o13 Nb was not determined by us.

The distribution of elements between 1431o and 14163 is shown on Fig 8.

(1) A. O. Brunfelt, K. S. Heier, E. Steinnes, B. Sundvoll, Earth Planet.Sci.Letters, 11, 351 (1971).

(2) LSPET, Science, 173, 681 (1971).

(3) A. J. Gancarz, A. L. Albee, A. A. Chodos, Earth Planet. Sci.Letters, 12, 1 (1971).

(4) E. L. Haines, A. L. Albee, A. A. Chodos, G. J. Wasserburg, Earth Planet.Sci.Letters, 12, 145 (1971).