MONOMINERALIC FRAGMENTS IN THE 90-150 MICRON FRACTION OF SOILS IN THE APOLLO 15 DRILL CORE SECTIONS 15007/8 FROM STATION 2;
A. Basu and T. Gerke, Dept. Geol., Indiana University, Bloomington, IN. 47405; and D. S. McKay, NASA-JSC, Houston, TX. 77058.

Compositional characterization of monomineralic particles is essential to the inference of provenance of lunar soils, especially drill core soils, which lack large rock fragments. We report here new electron microprobe data on monomineralic plagioclase, pyroxene, and olivine in the 90-150 um size fraction of Apollo 15 soils of the drill core 15007/8 (1-6). In addition to detailed modal analyses (6) we have also performed six element (Na, Al, Si, K, Ca, Fe) analysis of 407 plagioclases, and eight element (Mg, Al, Si, Ca, Ti, Cr, Mn, Fe) analyses of 460 pyroxenes and 126 olivines from thirteen different levels of this core.

Four petrologic units have been recognized in this core (6), which correspond to sharp breaks in the relative abundances of total monomineralic particles that happen to show a negative correlation with agglutinate abundance. However, the increase in the population of monomineralic particles at the bottom of the core has been temporarily ignored in this study. Note that the modal ratio of plagioclase to pyroxene is high in Units 2 and 4, suggesting a possible depletion of mare basalt contribution to these two units (6).

Our probe data are presented graphically for the four petrologic units (figs. 1-3). Two clusters of olivine populations in a plot of FeO vs. Fo signify derivation from highland and mare basalt sources (fig.1). The same may be inferred from the plagioclase population in plots of FeO vs. An. No distinct clusters are present here because contributions of KREEP basalt plagioclases presumably stradle compostional fields between those of highland plagioclase and mare basalt plagioclase. But there is a distinct depletion of the high-Fe population of plagioclases in Units 2 and 4, suggesting a depletion of mare basalt contribution in these two units in conformity with our modal data. Relative paucity of high-Fe pyroxenes in these two units (fig. 3) confirms the above. Interestingly, however, the distribution of the two olivine populations in Unit 4 does not readily suggest any depletion of mare basalt contribution. Warren et al. (7,8) have described pristine ferroan anorthosites from this core. But olivines from such a rock are not likely to contain >0.2% FeO. We suspect that a relatively slowly cooled body of mare basalt composition, which would not have produced strongly zoned pyroxenes and perhaps also did not incorporate Fe in the structure of their plagioclase, may have contributed a segment of the monomineralic particles in Unit 4, if not also to Unit 2. If so, this body could be a minor pluton that has not been sampled in larger fragments, or if sampled, may not have been recognized as such.

REFERENCES : (1) Nagle,J.S. (1980) PLPSC 11, 1479-1496. (2) Nagle,J.S. (1981) PLPSC 12B, 463-473. (3) Bogard,D.D. et al. (1982) PLPSC 13, A221-A231. (4) McKay,D.S. et al. (1981) LPSci. XII, 688-690. (5) McKay,D.S. and Basu,A. (1982) LPSci. XIII, 491-492. (6) Basu,A. and McKay,D.S. (1987) this vol. (7) Warren,P.H. (1983) LPSci. XIV, 830-831. (8) Warren,P.H. et al. (1983) PLPSC 14, B151-B164.

MONOMINERALIC FRAGMENTS IN 15007/8

Basu, A. et al.

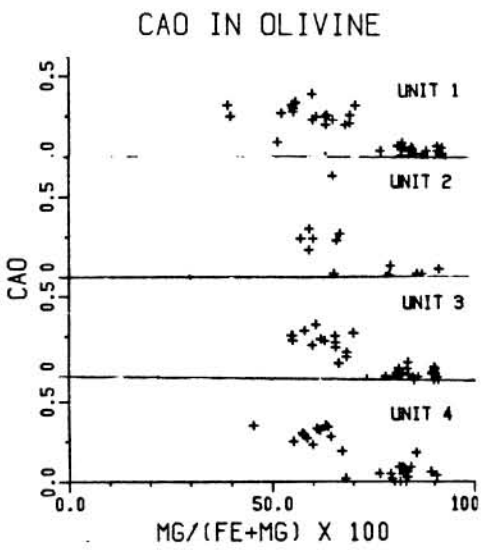

Figure 1.

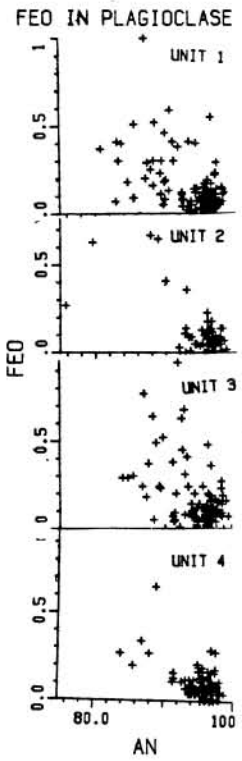

Figure 2.

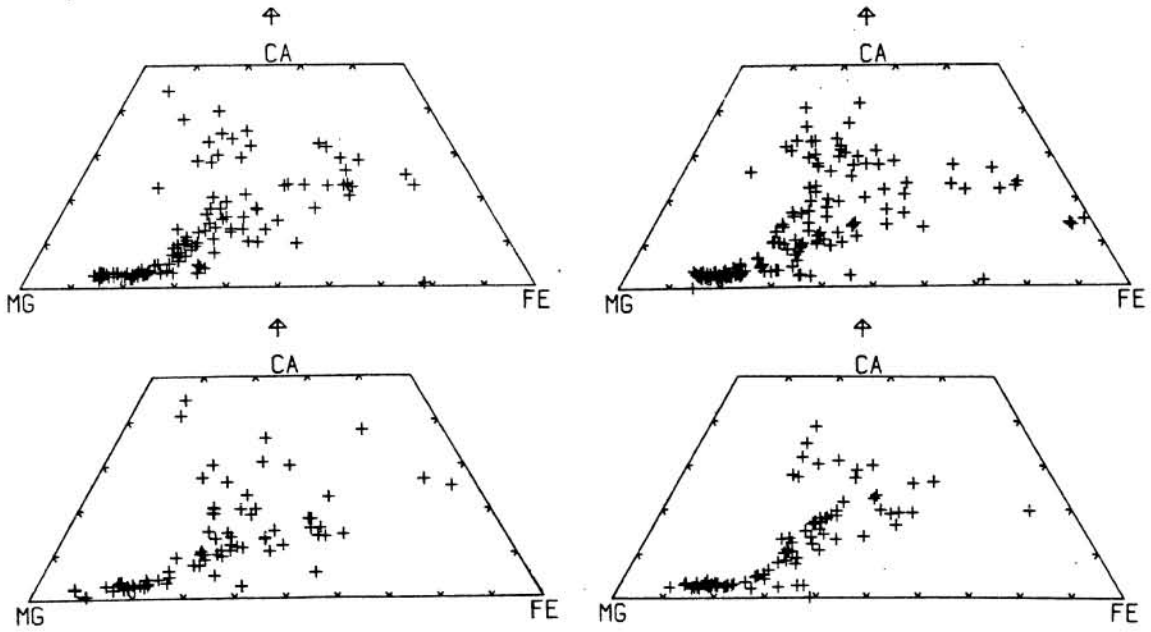

Figure 3.