APPENDIX
On the Classification of High-Ti Mare Basalts from Apollo 17

All the large Apollo 17 basalts have very high TiO_2 contents (8-14%). On the basis of differences in trace element concentrations (quality data from large splits of fine-grain-size samples), Rhodes et al. (1976) recognized three types (A, B and Q. They found the Ba/Rb ratio to be especially useful (Fig. 1). Since then, other authors (Lindstrom and Haskin, 1978; Pratt et al., 1978) have proceeded to continue to classify the high-Ti mare basalts (often on the basis of data from sample splits as small as 50 mg). Some authors (Warner et al., 1978) have used petrographic differences to distinguish "olivine porphyritic ilmenite basalt" from "plagioclase-poikilitic ilmenite basalt," but these differences are mostly due to variable cooling rates of the volcanic liquid.

Neal and Taylor (1992) have recently reviewed the petrogenesis of lunar basalts. On the basis of La versus La/Sm and Hf versus Cr/La plots, Neal et al. (1990) have distinguished Types A and B Apollo 17 basalts. Figs. 2 and 3 plot the data for the basalt samples included in this volume.

Isotopic data have also been used to help classify the Apollo 17 basalts (Fig. 4, Paces et al., 1991). However, for those samples whose ages have not been determined by internal isochron technique, classification based on isotopic data is model dependent assuming an age of ~3.7 b.y.!

Very low Ti basalt (VLT), a rare but important rock type at Apollo 17, is found only in the core tubes and as clasts in some of the breccias (Fig. 5, Vaniman and Papike, 1977; Wentworth et al., 1979; Lindstrom et al., 1994). The only large sample of VLT basalt is the glass breccia 78526.

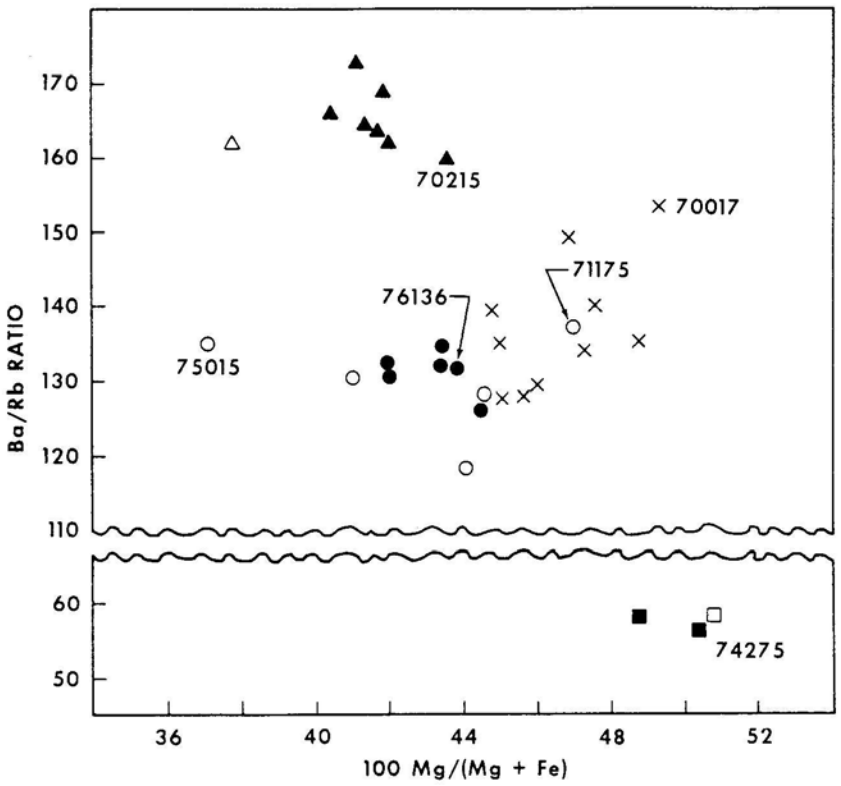

Figure 1: Ba/Rb ratios for some Apollo 17 basalts (from Rhodes et al., 1976). In this diagram the circles are Type A, triangles are Type B, and squares are Type C.

CAUTIONARY NOTE

The quality of analytical data depend critically on sample size versus grain size, analytical technique, and cleanliness of sample. Basalts that were clasts in breccias, or have regolith attached, will not accurately provide the composition of the: original basaltic liquid. Sample splits that are too small with respect to their grain size will yield questionable data (Clanton and Fletcher, 1976).

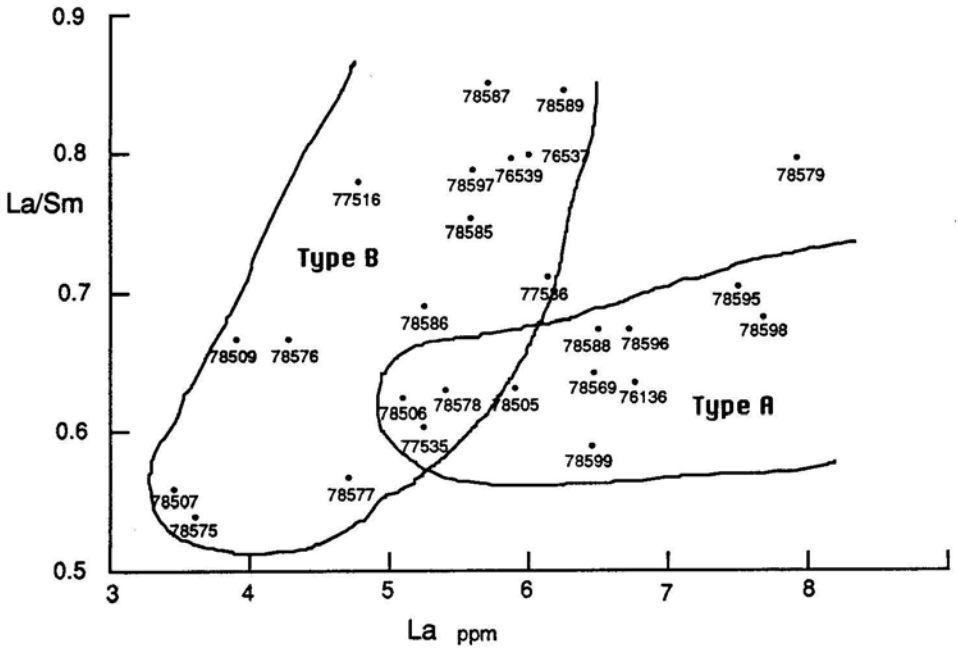

Figure 2: La versus La/Sm for Apollo 17 basalts (this volume only). Fields from Neal et al. (1992).

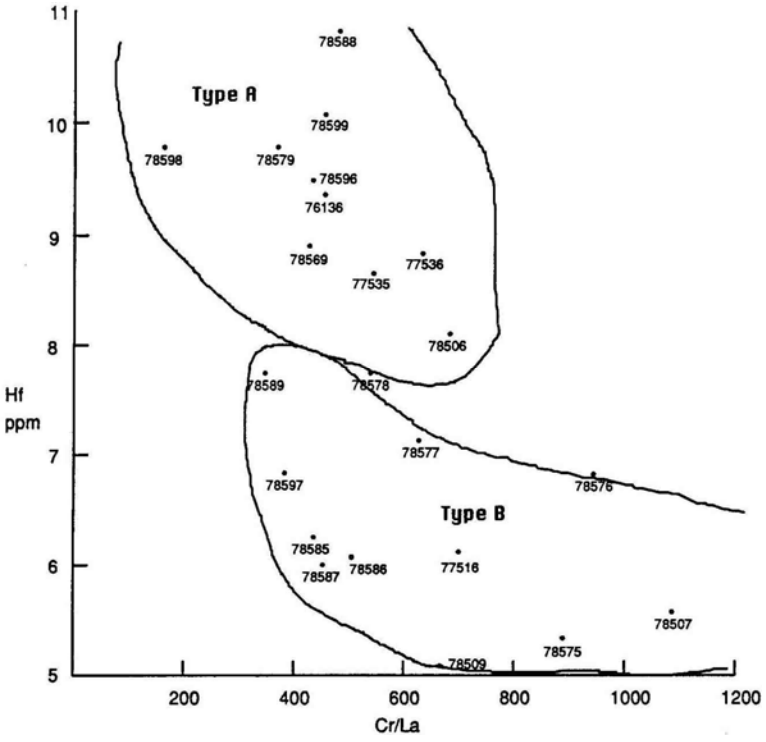

Figure 3: Hf versus Cr/La for Apollo 17 basalts (this volume only). Fields from Neal et al. (1992).

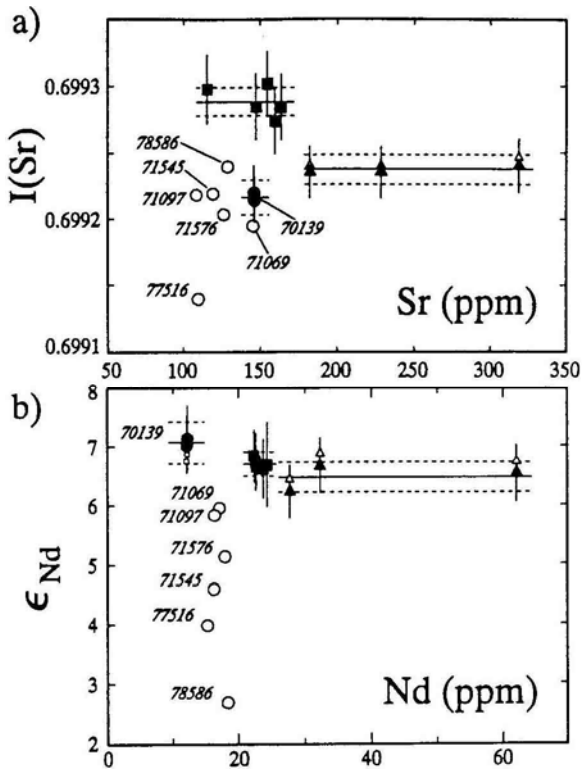

Figure 4: Initial isotopic ratio (calculated at the age of presumed eruption) versus element plots for some Apollo 17 basalts. From Paces et al. (1991).

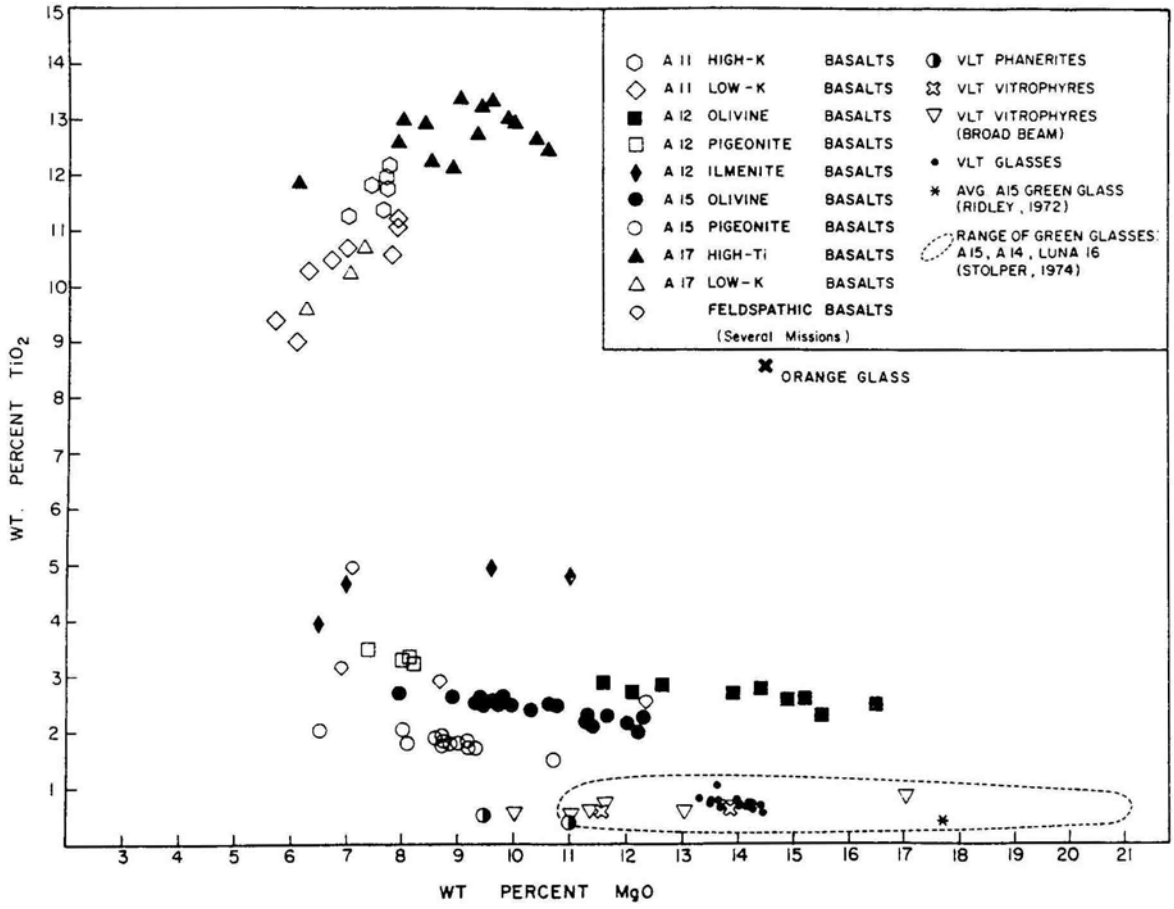

Figure 5: MgO versus TiO_2 for lunar basalts, Field of very low Ti basalt is shown. From Vaniman and Papike (1977).