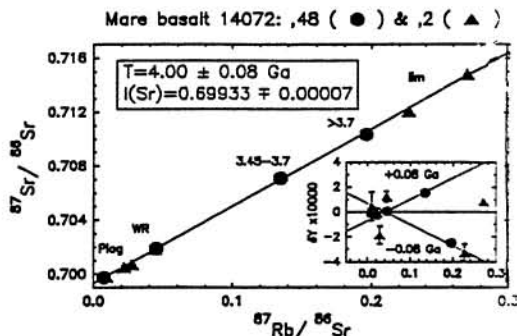


PETROGENESIS OF A14 ALUMINOUS MARE BASALTS: RESULTS FROM 14072,48. E.J. Dasch/1, C.-Y. Shih/2, H. Wiesmann/2, B.M. Bansal/2, and L.E. Nyquist/3 (1/NASA Headquarters, Mail Code XEU, Washington, D.C., 20546; 2/Lockheed Engineering and Science Co., 2400 NASA Road 1, Houston, TX, 77258; 3/NASA/Johnson Space Center, Houston, TX, 77058)

Continuing studies of Apollo 14 mare basalt fragments (eg. 14321) have yielded an increasing variety of chemical compositions which have led to simple, then increasingly complex models for possible petrogenic relations (1-5). Dasch et al. (2) presented Rb/Sr and limited Sm/Nd isotopic data for the five "group" samples of (1). On a T-I (Sr) plot (Rb/Sr time of crystallization vs. initial isotopic composition of Sr), these data form a linear trend with a time-averaged Rb/Sr of about 0.02, consistent with the undifferentiated, whole-moon value proposed by (6). Though qualified as "simplistic" (2) thus suggested that such a result was consistent with partial melting of a common, undifferentiated lunar mantle source. More complex scenarios have since been presented, for example the assimilation/fractional crystallization model of (7) and the replenishment/fractional crystallization model of (5). A deficit of the (2) paper was the lack of certifiably consistent age and isotopic data for group 4 of (1). In (1), group 4 was represented by sample 14072, partly on the basis of literature data; this sample had been analyzed by (8), but plotted below the Rb/Sr regression represented by the other groups. We have analyzed another split of 14072, to determine if laboratory bias between studies (2) and (8) could be ruled out or whether the sample was a petrogenic sibling of the other groups of (1). This sample, from a rock described by (9) as a subophitic basalt with large, partly resorbed phenocrysts showing some evidence of post-crystallization reduction, was allocated to the JSC laboratory. Subsamples obtained by sieving and density separation were spiked for Rb/Sr and Sm/Nd isotopic analysis.



The Rb/Sr data for 14072,48 are shown in Fig. 1 and define a mineral isochron (10) with  $T = 4.00 \pm 0.08 \text{ Ga}$  and  $I(\text{Sr}) = 0.69933 \pm 0.00007$ . These values are thus identical to those reported by (8), indicating no significant interlaboratory bias.

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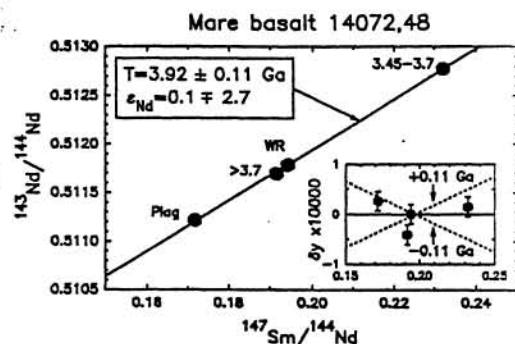
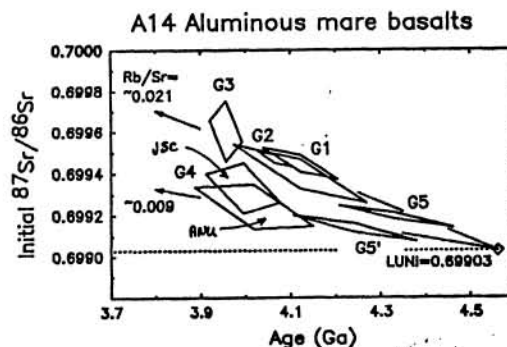


Fig. 2 shows Sm/Nd isotopic results for 14072,48, again defining a mineral isochron with  $T=3.92\pm0.11$  Ga and  $I(Nd)=0.1\pm2.7$  epsilon units. The Rb/Sr and Sm/Nd ages thus are identical within analytical uncertainties, further supporting (8).

T(Sr) vs. I(Sr) for 14072,48 and other A14 basaltic samples of interest are shown in Fig. 3. Though most of the grouped samples of (1, 2) define the time-averaged Rb/Sr  $\sim 0.02$ , duplicate samples of 14072 and "G5" lie along a trend significantly less, about 0.009. ("G5" may not be related to the other groups (see 2)).



These data suggest that, at least for 14072, the trace element and Sr-isotopic characteristics are decoupled. This is easily accommodated by models in which the trace element abundances are determined by varying degrees of partial melting of heterogeneous sources. On the other hand, models involving partial melting of a single homogeneous source followed by variable degrees of assimilation of KREEPY material, enriched in trace elements and radiogenic Sr87, would be expected to lead to strong coupling between trace elements and Sr isotopic compositions. Further elemental and isotopic analyses should be obtained for these interesting rocks, which contain the earliest records of lunar volcanism, to provide better hypotheses.

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