TEST FOR BURIED REGOLITH SURFACES IN APOLLO 16 CORES. Heymann, D.,Ray, J., Dziczkaniec,M., and Palma R. Rice University, Houston, Texas, 77001.

A buried surface in a core can be defined as a regolith surface which existed long enough-without having been overlain by a significant soil column-to exhibit the imprimaturs of its existence: reworking, maturation, mixing, and cosmic ray gradients. Figure 1 shows a plot of I_s/FeO(1,2) against Ar-40/Ar-36(3-7) for surface soils and for soils from the Apollo 16 drill core and the double drive tube 60009/10. At a first glance, the data appear to be randomly scattered, but closer inspection shows several, probably significant trends. The solid curve is a mixing curve between 61220 and the average of 60600, 64420,66040,66080,68500,and 69940. We have assumed that ΔH of mixtures is a linear function of weight % and ΔH of the two end members. The light soils 61240, 61180,62280, and 64500 are displaced from the curve. There is no doubt that 61180 and 62280 are much more mature than they would have been if they were simply mixtures of the two end members. A second trend is shown by the dashed line. All but three of the core samples from segment 60002 fall along this trend. Also two very plag-rich soils from 60009 and a North Ray Crater soil 67480. The second trend may be interpreted as mixing of soils of near-constant maturity, but different Ar-40/Ar-36 ratios. Elsewhere in this volume, we have shown (8) that the cores contain mixtures of three major soil types α, β, and γ. The approximate locations of these components are shown(exact locations cannot be defined). One crucial observation is this: the three samples from 60002 displaced from the dashed line come from modal petrologic unit B, whereas all the others come from unit A. Samples from segments 60003-60007 are all strung out along the solid curve(these are not shown to avoid overcrowding).

Suppose that a soil, somewhere in the figure, becomes exposed at the top of the regolith. How will it "move"? Provided that the soil is not yet in steady state, it responds by moving northward, as I_s/FeO increases. The response of Ar-40/Ar-36 to maturation is unknown. However, it would be miraculous if that response kept the soil always on one of the two mixing lines. In fact, 61180,62280,and 64500 suggest that-in general- soils generated by mixing, which are then matured move into the shaded region of the figure.

It is obvious that the test for *in situ* maturation becomes increasingly sensitive for greater Ar-40/Ar-36 ratios. Thus, the test can best be applied to the interface of modal units A and B. It has been argued that this is a buried surface(8), but it has also been concluded that it is not(2).

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When we apply the test to this surface, we find no evidence for extensive maturation, which would seem to say that this contact is not a buried surface. However, there is a catch. Figure 2 shows the positions of samples for tracks, magnetics, and inert gas work which straddle the contact. The figure shows that insufficient magnetic measurements are available for the zone in which gas and track data alone suggest the possibility of a buried surface. As for the remainder of the core, the Ar-40/Ar-36 ratios a generally too small for firm conclusions. However, continued studies in modal unit A may turn up new or additional buried surfaces in this part of the core.

References: 1. Morris, R.V. (1976) Proc. Lunar Sci. Conf. 7th, 315; 2. Gose, W.A. and Morris, R.V. (1977) Proc. Lunar Sci. Conf. 8th, 2909; 3. Bogard, D.D. and Hirsch, W.C. (1976) Proc. Lunar Sci. Conf. 7th, 259; 4. Bogard, D.D. and Hirsch, W.C. (1975) Proc. Lunar Sci. Conf. 6th, 2085; 5. Jordan, J. and Heymann, D. (1976) Lunar Science VII, 434; 6. Heymann, D., Ray, J., Walker, A., Dziczkaniec, M. and Palme, R. (1977) Lunar Science VIII, 441; 7. Ray, J. (1977), unpublished results; 8. Blanford, G.E. and Morrison, D.A. (1976) Proc. Lunar Sci. Conf. 7th, 141.

FIGURE 2

* from top of segment, cm

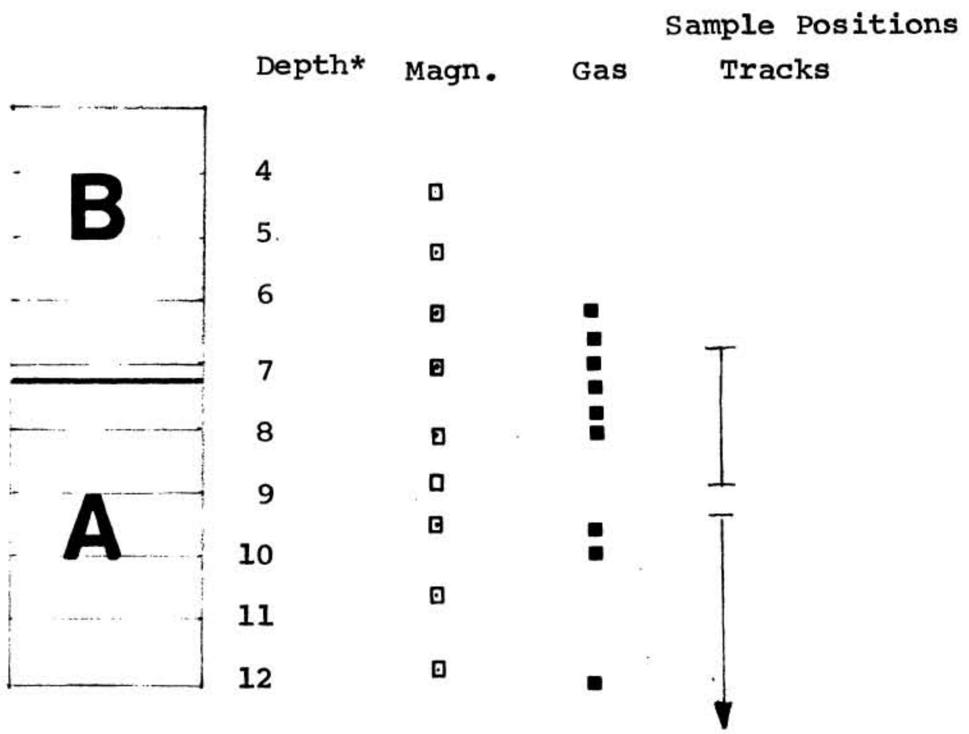

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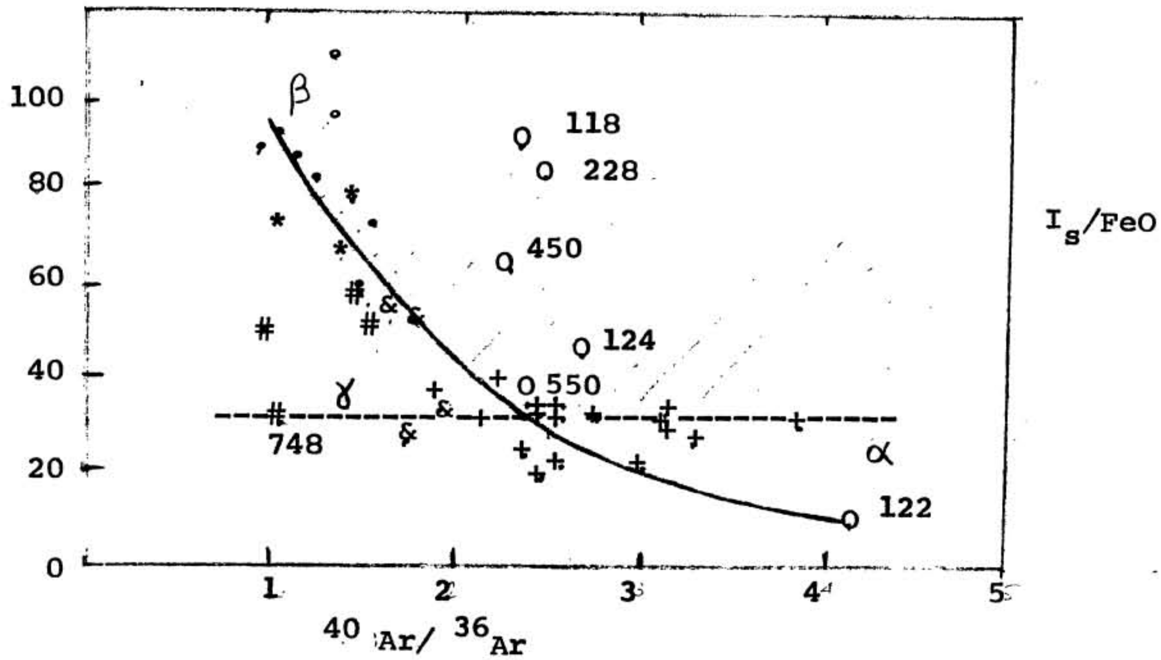
FIGURE 1



. = dark surface soils
O = light surface soils
+ = 60002, unit A
* = 60002, unit B
# = North Ray Crater Soils
& = 60009

Numbers are three middle digits of soil numbers, e.g. 122 stands for 61220, etc.

Note added in proof: The two variables chosen here are not the only one which can be used for the test. For example, one could plot I_s/FeO against FeO. However, Ar-40/Ar-36 is considerably more sensitive than most other variables.