

RELATIVE AGES OF LUNAR NEARSIDE PLAINS, J. M. Boyce, A. L. Dial, L. A. Soderblom, U. S. Geological Survey, Flagstaff, Arizona 86001.

A study was conducted to map the distribution of mare and light plains units of uniform age over the entire lunar frontside. The technique used is that described by Soderblom and Lebofsky (1) and Boyce and Dial (2) which involves a quantitative determination of the "softness" of craters. "Softness" is quantitatively defined as a maximum slope of the interior wall. The softness of all craters of a particular diameter is expressed as a ratio of craters with unshadowed interiors to those without. An erosion model developed by Soderblom (3) is used to reduce this information to estimate the total areal accumulation of small impacts which have eroded these craters. The erosion is caused by both primaries and background secondaries, the latter being the more predominant. The smoothing is effected by craters much smaller than the eroded craters. Hence, the eroding craters are so abundant that they have saturated the surface several times over and statistical error produced by secondary swarms are averaged out. This is not true for most crater-counting techniques. Boyce and Dial (2) developed a procedure for using this technique as a mapping tool and applied it to a limited set of Apollo 17 metric photographs. The results presented in this study are based on all available photographs and provide a preliminary distribution and sequence of emplacement of volcanic units throughout the lunar frontside.

The results indicate that the light plains deposits (i.e., Cayley Formation) pre-dates the emplacement of the maria. In general, the mare basalts decrease in age westward. This probably accounts for the uniformity in antiquity of the Apollo basalts as Apollo tended to land in the eastern frontside. The oldest lunar maria sampled is Mare Tranquillitatis. The large ring-mare (Mare Serenitatis, Mare Imbrium and Mare Humorum) were next filled with lavas like the Apollo 15 basalts during the period between 3.3 to 3.5 b. y. ago. Finally, a series of young flows invaded the western maria (Oceanus Procellarum); a few patches were superimposed on southwestern Mare Imbrium, northern Mare Humorum, and northwestern Mare Serenitatis. These young units may have crystallization ages as young as 2.0 b.y. based on current knowledge of the lunar flux history.

REFERENCES

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