

The projected landing point is within the unit mapped as smooth terrain material (unit Is). This unit is similar in texture, topographic relief, and albedo (moderately low) to plains units that overlie the Fra Mauro Formation outside the map area. Such plains materials are probably volcanic, but it is also possible that the smooth terrain unit is a facies of the Fra Mauro, smoother than normal because it was ponded in topographically low areas as the formation flowed across the pre-Imbrian surface during deposition.

Individual craters in the site are assigned ages according to the criteria shown in figure 1 (modified after Trask, 1969). The age criteria are based on observed crater superposition relationships, which indicate that craters are sharp and fresh in appearance when formed but become increasingly degraded by lunar erosion processes through time. Small craters are degraded faster than large craters, so that a small subdued crater may be the same age as a larger less subdued one.

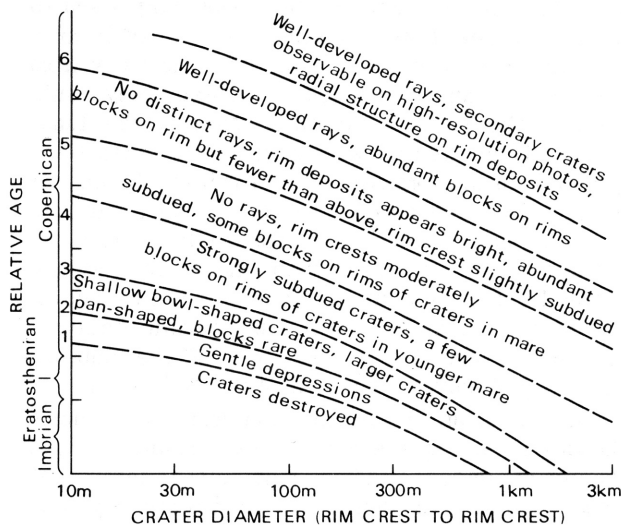


Figure 1.--Relationship between crater morphologies, crater diameters, and postulated ages (modified from Trask, 1969).

The graph in figure 1 was developed for craters on mare surfaces; some uncertainty is introduced when the graph is applied to craters formed on hummocky surfaces like the Fra Mauro Formation.

Much of the surface of the map area appears to be covered by ray deposits from the crater Copernicus. The material is probably similar to the apparent ray deposit seen at the Apollo 12 landing site, where it consisted of a light-colored fine-grained layer a few centimeters thick (E.M. Shoemaker and others, 1970, written commun.). In walls of craters younger than the Copernicus event, this light layer may be exposed beneath darker ejecta layers.

Lineaments are not conspicuous in the site, perhaps because they are obscured by the abundance of curved, irregular lines in patterned ground re-

sulting from slumping and downslope creep of unconsolidated surficial materials. Most mapped lineaments trend northeast and northwest, coinciding with the lunar tectonic grid system (Strom, 1964) or with the radial pattern of sculpture lines emanating from the Imbrium basin. The large belt of Fra Mauro (unit Ifr) in the site is roughly bounded by lines radial to the basin; the ridge may be defined by Imbrian sculpture or it may be a radial flow ridge or filament in the basin ejecta blanket.

REFERENCES

- Eggleton, R.E., 1964, Preliminary geology of the Rhiphaeus quadrangle of the Moon and definition of the Fra Mauro Formation, *in* *Astrogeol. Studies Ann. Prog. Rept.*, Aug. 25, 1962 to July 1, 1963, pt. A: U.S. Geol. Survey open-file report, p. 46-63.
- _____, 1970, Geologic map of the Fra Mauro region of the Moon--Apollo 14 pre-mission map: U.S. Geol. Survey Misc. Geol. Inv. Map I-708
- Gilbert, G.K., 1893, *The Moon's face*: Philos. Soc. Wash., Bull. 12, p. 241-292.
- Lunar Sample Analysis Planning Team, 1970, Summary of Apollo 11 lunar science conference: *Science*, v. 167, no. 3918, p. 449-451.
- Masursky, Harold, 1968, Preliminary geologic interpretations of Lunar Orbiter photography: U.S. 90th Cong., Space Sci. Applications Hearings, Sci. and Astronautics Comm., no. 3, pt. 3, p. 664-691.
- McCauley, J.F., 1967, The nature of the lunar surface as determined by systematic geologic mapping, *in* S.K. Runcorn, ed., *Mantles of the Earth and terrestrial planets*: New York, John Wiley and Sons, p. 431-460.
- McCauley, J.F., and Masursky, Harold, 1968, The Orientale basin and associated base-surge deposits [abs.]: *Geol. Soc. America, Cordilleran Sec.*, 64th Ann. Mtg., Tucson, Ariz., 1968, Program, p. 79-80.
- Offield, T.W., 1970, Geologic map of the Fra Mauro landing site--Apollo 13: U.S. Geol. Survey open-file report, scale 1:5,000.
- Quaide, W.L., and Oberbeck, V.R., 1968, Thickness determinations of the lunar surface layer from lunar impact craters: *Jour. Geophys. Research*, v. 74, p. 5247-5270.
- Strom, R.G., 1964, Analysis of lunar lineaments, I--Tectonic maps of the Moon: Tucson, Univ. Arizona, Lunar and Planetary Lab. Commun., v. 2, no. 39, p. 205-216.
- Trask, N.J., 1969, Geologic maps of early Apollo landing sites of set C: U.S. Geol. Survey open-file report, 27 p.
- Wilhelms, D.E., and McCauley, J.F., 1970, Geologic map of the near side of the Moon: U.S. Geol. Survey Misc. Geol. Inv. Map I-703, scale 1:5,000,000 [in press].