CLEMENTINE OBSERVATIONS OF MELT ROCKS AND VOLCANIC MATERIALS IN THE SCHRÖDINGER BASIN. *E.M. Shoemaker and M.S. Robinson, USGS Astrogeology, 2255 N. Gemini Drive, Flagstaff, AZ, 86001.*

The Schrödinger multiring basin (320 km in diameter, centered at 138° E, 75° S) is the second youngest great multiring basin on the Moon [1]. It is the least modified lunar basin of its size. Though a few Orientale secondary craters are superposed on the basin and its ejecta blanket, we have not found any evidence that the terrain at Schrödinger is mantled by a thin veneer of Orientale ejecta [1]. Morphologic details of the basin floor and of the extensive ejecta blanket are crisp and fresh.

A thin melt sheet occupies most of the basin floor; a rough and a smooth facies have been mapped [1]. Both facies locally flood a few "ghost" craters ranging from 2 to 5 km in diameter. The "ghost" craters are interpreted to have been formed by late-falling Schrödinger secondary fragments arriving on very steep trajectories. In addition, there are local patches on the melt sheet with anomalously high crater densities. The excess craters on these patches may also be late Schrödinger secondaries. Their presence suggests that the duration of the steep rain of secondary fragments overlapped the period in which diverse parts of the melt sheet came to rest and stiffened sufficiently to retain craters (cf. [2]). The average thickness of the melt sheet, outside of a possible thick central lens, probably is no more than 100 - 300 m. An area of possibly thicker accumulation of melt rock, within the smooth facies and interior to the peak ring, is about 65 km across. This area is bounded by ghost craters and various protruding knobs of sub-melt sheet material. Even if the melt sheet thickens rapidly toward the center, it is clear that the volume of melt rocks within the Schrödinger Basin lies well below that which would be inferred from extrapolation of the relation between melt volume and crater diameter found for terrestrial craters (cf. [3]). Much of the shock melt probably lies outside the basin and is incorporated in a smooth-textured ejecta blanket.

A distinctive, low, lobate ridge or plateau rises above the central smooth floor of Schrödinger. Although it is similar in albedo, color, and crater density to the smooth facies of the melt sheet, we interpreted this feature as a flow of eruptive material [1]. It may have been extruded from a shallow reservoir of residual melt, as the central part of the melt sheet cooled, or it may have been derived from some deeper source of melt, perhaps produced by local shear heating of the highly deformed rocks beneath the central part of the basin. Alternatively, the plateau could be a structural feature, but its morphology is strongly suggestive of a flow.

Small patches of mare basalt are present in the northern part of the inner Schrödinger Basin [1]. They were initially interpreted by us to be of Late Imbrian age, but further examination of strips of high resolution images taken with Clementine's HIRES camera [4] has shown that we had erroneously included some of the smooth facies of the melt sheet as part of the mare patches in our initial study. The true mare units are younger than inferred in [1]; the upper limit of the steady state distribution of small craters on the mare surfaces is at diameters between 150 and 200 m. This places these mare basalts in the Eratosthenian [5].

A spectacular maar-type volcano, surrounded by a broad pyroclastic dark mantle deposit, occurs along a rille on the eastern floor of the inner Schrödinger basin [1]. As reported in [1] and [6], the dark mantle deposit is significantly redder than either the central melt sheet or the mare patches; most of the deposit does not exhibit the pronounced mafic absorption band near 1000 nm characteristic of mare basalts. However, a sharp-rimmed very fresh impact crater (870 m in diameter) on the northeast flank of the volcano is surrounded by a very dark ejecta blanket with strikingly different color (Fig. 1). This fresh ejecta is much redder than the average dark mantle surface and has a much deeper absorption feature near 1000 nm than seen even on the mare patches (Fig. 2). Probably this fresh dark material is derived largely or entirely from the pyroclastic deposit. The absorption band probably indicates the presence of olivine or pyroxene in the pyroclastic material.

We attribute the difference in albedo and color between the mature regolith on the dark mantle deposit and the fresh impact ejecta to be the consequence of the regolith-forming processes. It is well known that the mafic absorption bands of mature lunar soils are much weaker than those observed in fresh rock [7]. In the vast majority of cases, mature regolith also has a lower albedo than the fresh substrate on which it has formed. The fresh dark ejecta, on the other hand, is already very dark. The albedo of the regolith formed on the dark mantle deposit may have been increased either as a result of pulverization or by the admixture, perhaps up to 20%, of the higher albedo melt sheet material by ballistic diffusion from nearby parts of the central basin floor (cf. [8]).

The upper diameter limit of the steady state distribution of small craters on the dark mantle deposit is about 700 m, only slightly smaller than on the smooth facies of the melt sheet. This places the age of the maar in the Late Imbrian, not the Eratosthenian as reported in [1].

[1] Shoemaker,E.M. *et al.*, (1994) *Science*, 266, 1851. **[2]** Shoemaker, E.M. *et al.*, (1968) *NASA SP-173*, 13. **[3]** Cintala, M.J., R.A.F. Grieve, (1991) *LPSC XXII*, 215. **[4]** Nozette, S. *et al.*, (1994) *Science* 266, 1835. **[5]** Wilhelms, D.E. (1987) *USGS Prof. Paper* 1348. **[6]** Robinson, M.S., E.M. Shoemaker (1994) *EOS* 75, no. 44 supp., 399. **[7]** Charette, M.P. et al., (1976) *Proc. Lun. And Planet. Sci. Conf. 7th*, 2579. **[8]** Shoemaker, et al., (1970) *Proc. Apollo 11 Lunar Sci. Conf.*, 3, 2399.

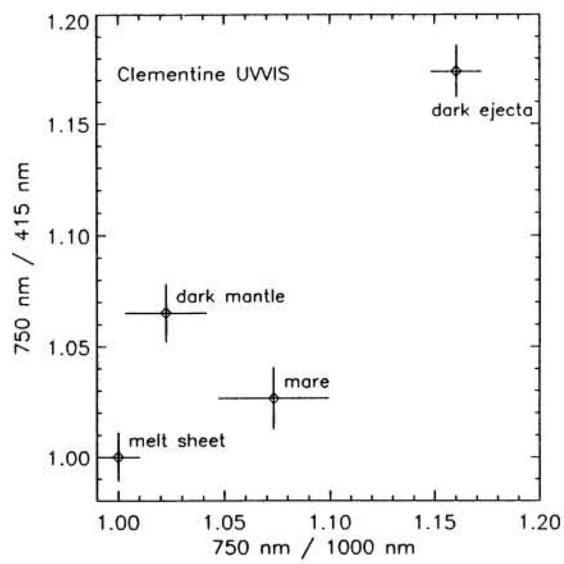

Fig. 2. Color of Schrödinger Basin volcanic units normalized to color of the melt sheet. Error bars are 95% confidence interval

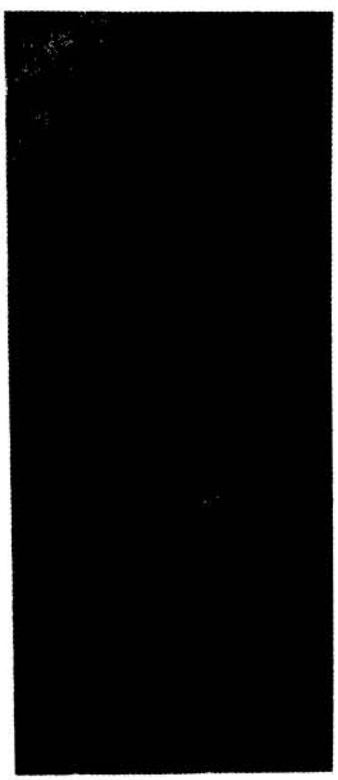

Fig.1. Mosaic of Clementine HIRES image data the showing dark ejecta blanket of an impact crater superposed on the dark mantle materials, width of strip is 2.8 km.