Characterizing impact melt deposits within the Schrödinger impact basin

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Abstract. The Schrödinger impact basin (Fig. 1), located within the larger South Pole-Aitken basin, has a rim-to-rim diameter of 312 km, and a rim-to-floor depth of 2–3 km.[1] Features observed within Schrödinger, such as rough and smooth shocked materials[1], indicate that a substantial impact-related melt unit was generated.

Using newly released laser altimeter (LOLA) and high resolution narrow angle camera (LROC-NAC) data from the Lunar Reconnaissance Orbiter (LRO) mission, we determine the location and extent of melt ponds within Schrödinger. Models predict that, for large complex craters, impact melt deposits should occur as sheets on basin floors, ponds on the crater rims and terraced surfaces, and thin veneers coating continuous ejecta deposits.[2] Our preliminary observations suggest that, in Schrodinger crater, melts are found on terrace surfaces and appear to have flowed down slope along terrace walls. The presence of melts is inferred from their generally smooth nature, chill crust fractures at terrace edges (Fig. 2a), and a lack of unconsolidated target materials along sloped surfaces (Fig. 2b). Downward flow is inferred from ropey textures akin to pahoehoe-type flows that are found on the sloped portions (Fig. 2b). The timing of melt pond emplacement relative to the terrace-forming events is still poorly understood. Two scenarios may explain our present observations: 1) the melt layer, emplaced prior to terrace formation, was thick enough to preserve its rheology and deform in a ductile manner during the terrace-forming event; or 2) the terraces formed prior to the emplacement of melt deposits, which draped over the existing topography and were thin enough to cool before they could completely drain from the sloped surfaces. Further identification and quantification of melt ponds associated with Schrödinger will allow us to differentiate between these two scenarios, which have implications for models of impact melt emplacement mechanisms.

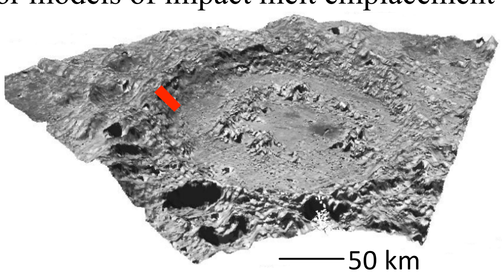

Figure 1: 3-D view of Schrödinger using Clementine 750nm basemap and LOLA topography data. Red box shows location of Figure 2.

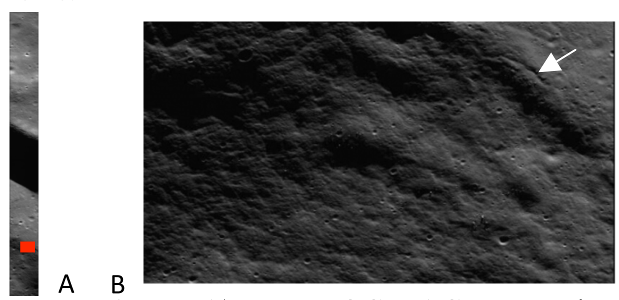

Figure 2: A) LROC-NAC product *M108455895RC*. Red box shows location of Figure 2B. Width of complete image is ~4 km.
B) Smooth surfaces on the top terrace block (top right), ropey flow textures on the terrace slope (western half), and chill crust fracture (arrow).

[1] E.S. Shoemaker, M.S. Robinson, E.M. Eliason, *Science* 266, #5192, 1851 (1994).
[2] M.J. Cintala, R.A.F. Grieve, *MAPS* 33, 889 (1998).