DARK SLOPE STREAKS AND ASSOCIATED LAYERED DEPOSITS ON THE SOUTHWESTERN FLOOR OF CASSINI IMPACT BASIN, MARS. E. F. Albin[1] and J. D. King[2], [1]Department of Space Sciences, Fernbank Science Center, Atlanta, GA 30307 (ed.albin@fernbank.edu), [2]School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, GA 30332 (gte144p@prism.gatech.edu).

Introduction: Cassini is a 400-km impact basin situated in the Arabia Terra region of Mars. Material units within and immediately surrounding the basin include a variety of deposits: basin ejecta, ridged plains, smooth plains, and etched terrain [1]. The study area consists of fresh appearing dark slope streaks (Figure 1) and layered deposits associated with a ridged plain unit in the southwestern quadrant of the basin's floor. Previous work [e.g., 2, 3] considered problems related to slope streak origin and suggested that they may be dust-based avalanche scars. In this investigation we describe in detail several recent slope streaks found within the Cassini impact basin and discuss a possible mechanism for producing such relatively long and continuous streaks.

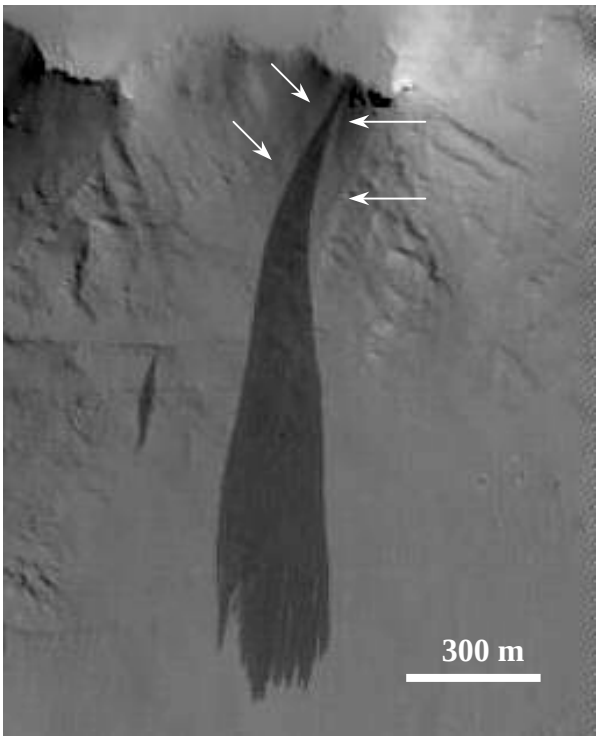

Figure 1. Dark slope streak found near the interior rim of the Cassini Impact Basin. Arrows mark underlying slump deposit. Also note small alcove just above the streak's point of origin (MOC Image M0402746).

Layered Deposits: Layered deposits are associated with a weathered flat-topped massif or mesa structure. The mesa is irregular in shape and approximately 2 x 3 km across and stands above ridged plains material on the basin floor. Several distinct layers may be discerned. These layers have a banded appearance -- consisting of alternating dark and light units of variable thickness. The darker bands are narrower and range in thickness between 20 - 30 m. Thicker, lighter layers, are typically at least 100 m in thickness.

Dark Slope Streaks: Six slope streaks are observed on the margins of the mesa (Figure 2). They appear as debris aprons with two flows having digitate flow lobes at their terminus. In all cases, each flow is acute or begins upslope at a point source and gradually spreads in width with increasing distance from its source. All flows originate from the bottom of thin darker layers; however, they do not seem to be associated with any one particular stratigraphic horizon. The largest dark flow is about 250 m at greatest width and 1500 m long. Other, lesser flows extend between 250 – 1200 m in length. Individual flows begin at various elevations but typically within 600 m of the top of the mesa. At least two flows have collapse slump debris near their sources. At the image resolution of six meters per pixel, no associated erosional channels or flow topographic relief is discernable.

Discussion: Single point origins for the slope streaks are inferred from the acute nature of upslope ends. Slope streaks in Cassini basin may have been initiated by the collapse of selected portions of the steep-walled mesa unit. We suggest that small-scale terrain collapse may have contributed to the release of small quantities of regolith CO_2 gas, which when mixed in with dust particles, served as a likely supporting medium for a "dusty" density flow. Slope streaks may have been produced as dust was removed and entrained by the tenuous density current as it worked its way downslope. Flow deflection around small topographic obstacles and the digitate terminus of many slope streaks imply such a ground-hugging flow. No deposits accumulated since the dust flow would eventually disipate as it spread across a wide area beyond the slope streak. Although dark slope streaks may be the product of dry dust avalanches alone, our model addresses the problem of producing long and continuos streaks.

References: [1] Albin E. F. (1997) *LPSC XXVIII*, 1151–1154. [2] Sullivan R. et al. (1999) *LPSC XXX, #1809*. [3] Sullivan R. et al. (2000) *LPSC XXXI, # 1911*.

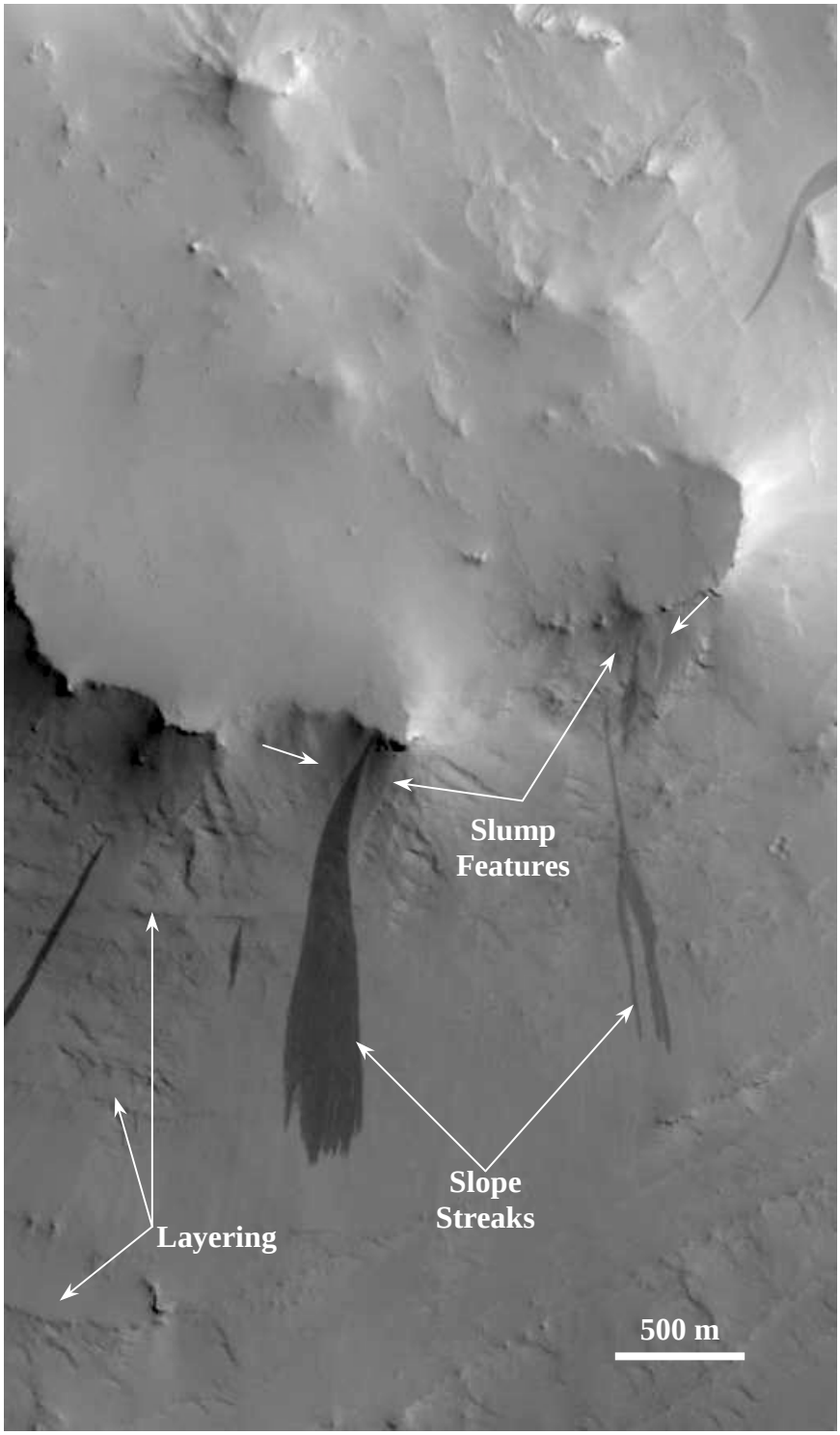

Figure 2. High resolution Mars Global Surveyor image centered at 20.9 N. and 329.7 W of a small portion of the southwestern floor of the Cassini Impact Basin. Illumination is from the upper right and image resolution is six meters per pixel (Excerpt from MOC Image M0402746).