

ORIGIN OF DARK SLOPE STREAKS WITHIN THE SCHIAPARELLI IMPACT BASIN, MARS. E. F. Albin¹ and J. D. King², ¹Department of Space Sciences, Fernbank Science Center, Atlanta, GA 30307 (ed.albin@fernbank.edu), ²School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, GA 30332 (gte144p@prism.gatech.edu).

Introduction: Schiaparelli basin is a prominent 470-km impact feature situated in the equatorial cratered uplands of Mars. Previous mapping, based on Viking Orbiter imagery, has revealed a host of terrain units including basin ejecta, ridged plains, smooth plains, and etched terrain [1]. A recent survey of high resolution imaging by the Mars Observer Camera (MOC) of the Mars Global Surveyor (MGS) spacecraft has revealed a series of curious dark slope streaks on the basin's floor (Figure 1). Previous studies [e.g., 2, 3] describe slope streaks as scars produced by dry dusty avalanches. Our research considers the detailed nature and origin of slope streaks in Schiaparelli basin.

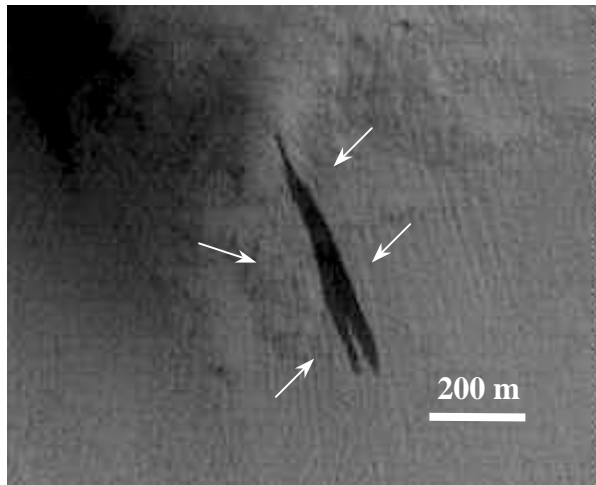


Figure 1. Dark slope streak above a slump or debris flow unit (Excerpt from MOC Image M0703937).

Dark Slope Streaks: At least two areas within the Schiaparelli basin contain dark slope streaks. The first region is associated with a massif structure located on a ridged plains unit on the northern floor of the basin. In this area a prominent streak begins from a point source at the top of the massif and gradually increases in width and has a digitate downslope end (Figure 2). This feature measures approximately 50 m wide and 800 m in length. The second area where slope streaks occur resides near the floor-wall contact on the eastern rim of Schiaparelli basin. At this site, at least a dozen individual streaks are observed (Figures 3 and 4). The longest slope streak extends for about 500 m in length. Most streaks are associated with a sinuous ridge-like feature. No topographic relief is discernable for any slope streaks at either site, however.

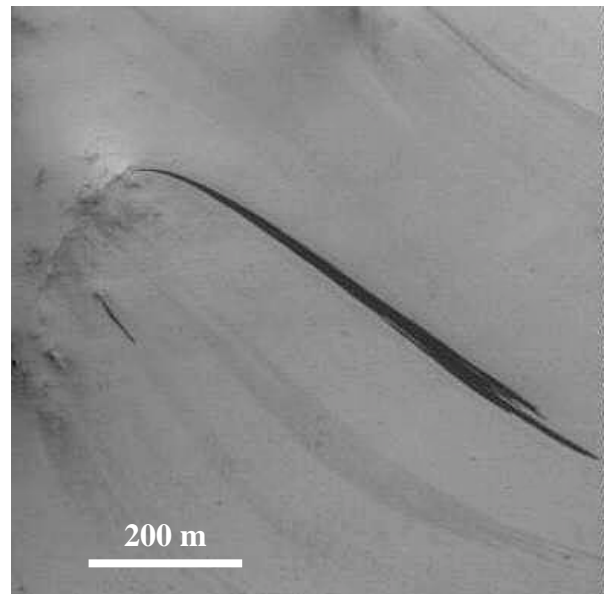


Figure 2. Slope streaks associated with a massif on the northern floor of Schiaparelli basin. Note evidence for older "faded" slope streaks (Excerpt from MOC Image M1103547).

Interpretation: Dark slope streaks within Schiaparelli basin appear to originate from point sources at acute upslope ends. Since slope streaks do not show evidence of topographic relief, it is inferred that they are not deposits but scars where thin layers of dust were removed. Apparent deflection about small topographic features and digitate downslope ends imply that slope streaks were produced by a ground-hugging flow. Streaks may have been produced by a simple dust avalanche; however, we suggest that dust removal may have also been accomplished by the passage of a tenuous "dusty" density current. In this scenario, small-scale slumping of the steep-walled massif may have initiated slope streak formation. Regolith enriched in dust and CO₂ gas was exhumed in the process -- resulting in a gas supported dust flow that moved as a tenuous density current downslope. Dark slope streaks were possibly formed as surface dust was scoured away by the flow.

References: [1] Edgett K. S. (1991) *Proc. Lunar Planet. Sci. Conf.*, 21, 657 - 667. [2] Sullivan R. et al. (1999) *LPSC XXX*, #1809. [3] Sullivan R. et al. (2000) *LPSC XXXI*, # 1911.

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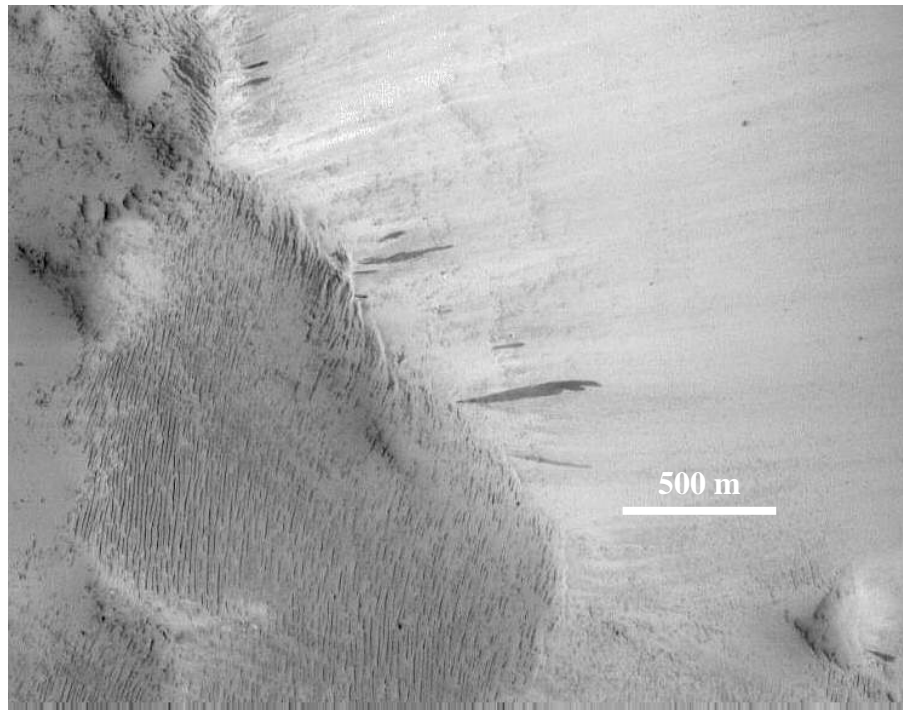


Figure 3. High resolution Mars Global Surveyor image, centered at 1.8° S. and 339.6° W, of a small portion of the eastern floor of the Schiaparelli impact basin. Note curious ridge and dome features of unknown origin (Excerpt from MOC Image M0703937).

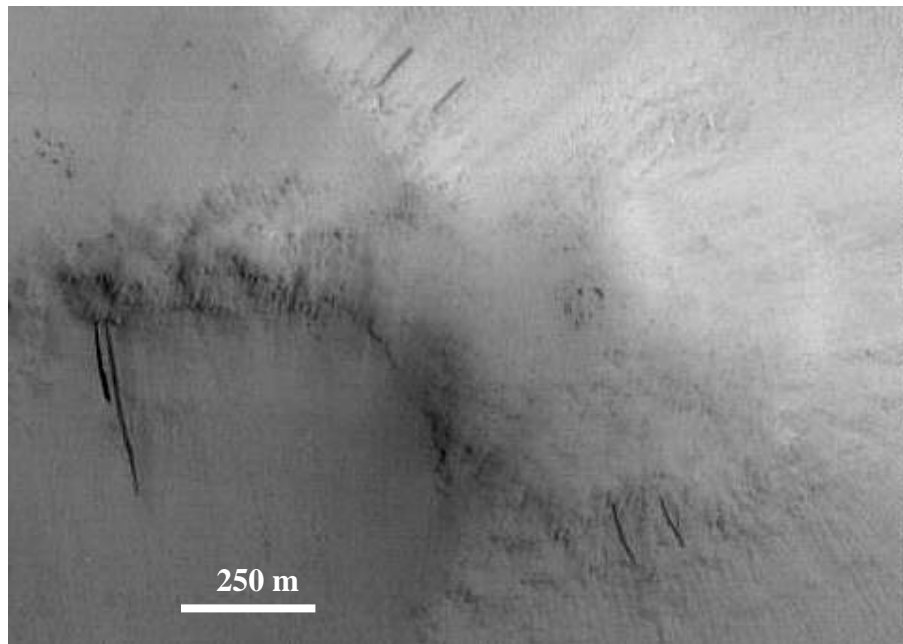


Figure 4. High resolution Mars Global Surveyor image of a massif and several associated thin dark slope streaks on the eastern floor of the Schiaparelli impact basin. (Excerpt from MOC Image M0703937).