

# Comparison between Elysium Fossae Ridges and Terrestrial Sub-ice Volcanoes

Ridges and mounds that resemble terrestrial sub-ice tinders occur at the east edge of the Utopia Planitia basin, just west of a long, linear scarp that trends northeast across the west flank of Elysium Mons from about 21° N to 30° N. (Chapman, 1994). Volcanic features and deposits that occur upslope and east of the scarp show no evidence of interaction with surface ice. West of the scarp, channels and other fluidized-appearing materials are prominent on Utopia Planitia. The ridges follow the same northeast trend as the Elysium Fossae troughs on the west flank of the Elysium Mons volcano.

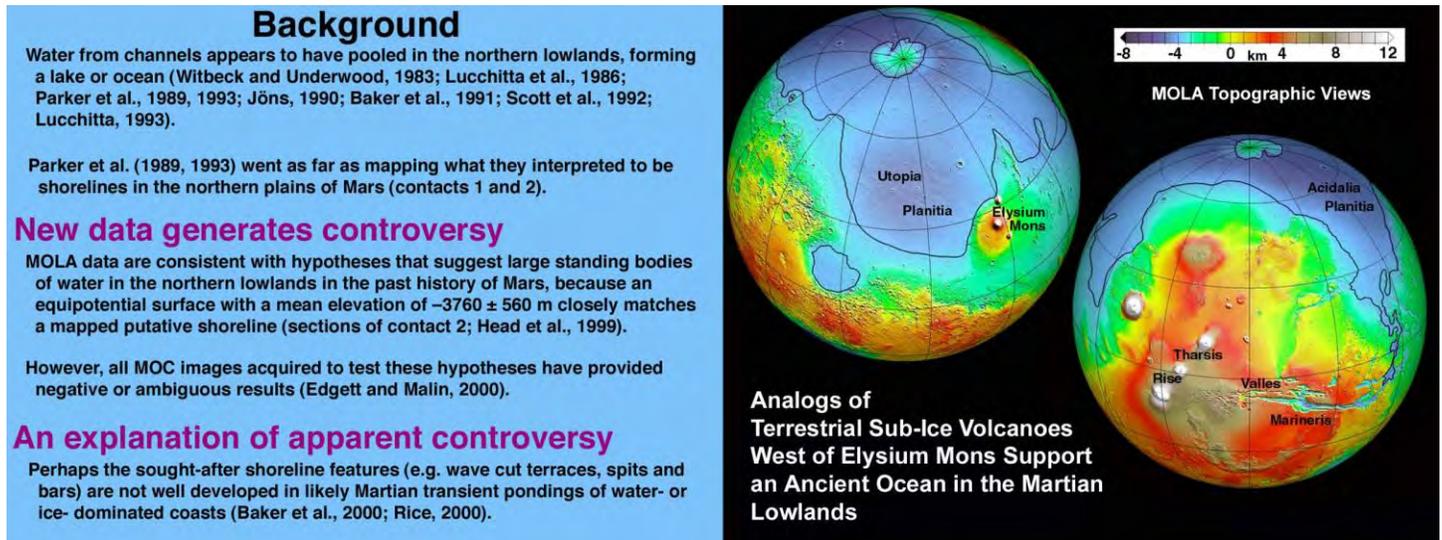


Figure 1: Discussion of relative importance of analog subice volcanoes west of Elysium Mons (taken from Chapman, 1994 and Chapman, 2003).

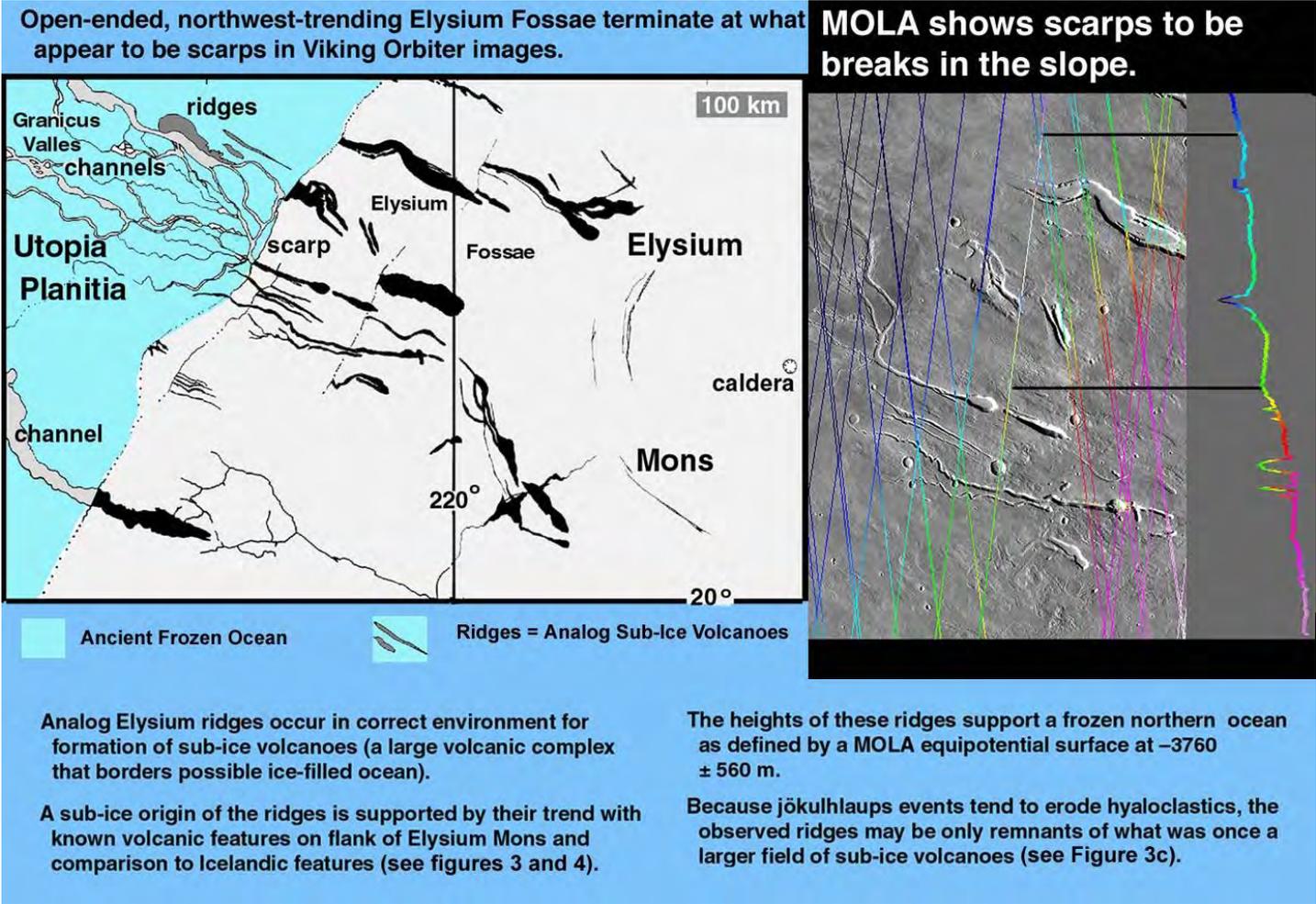


Figure 2: No caption.

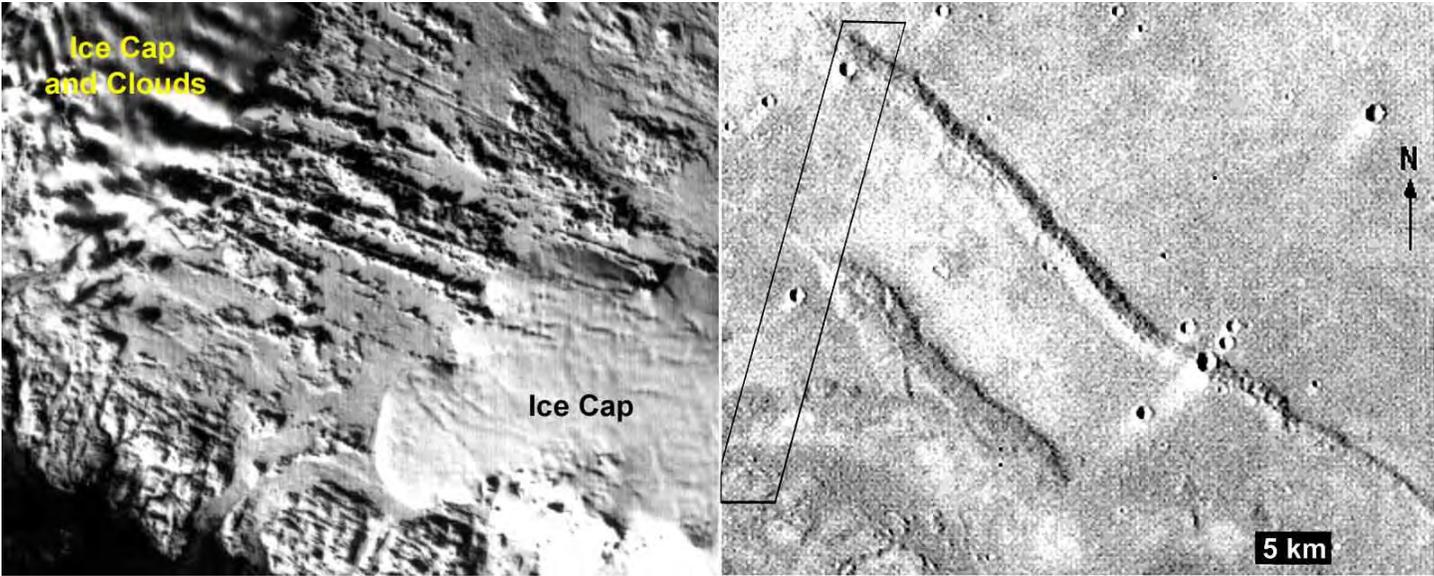


Figure 3: Comparison of uncapped sub-ice volcanoes (tindars or hyaloclastic ridges) and ridges west of Elysium Fossae; (a) 2-3 km wide, parallel hyaloclastic ridges erupted from fissures south of Vatna ice cap (illumination from the bottom); (b) part of Viking Orbiter image 541A20 (illumination from left) showing ridges adjacent to west flank of Elysium Mons, note central pits on ridges and narrow internal ridge that extends away from central mound, box indicates location of c.

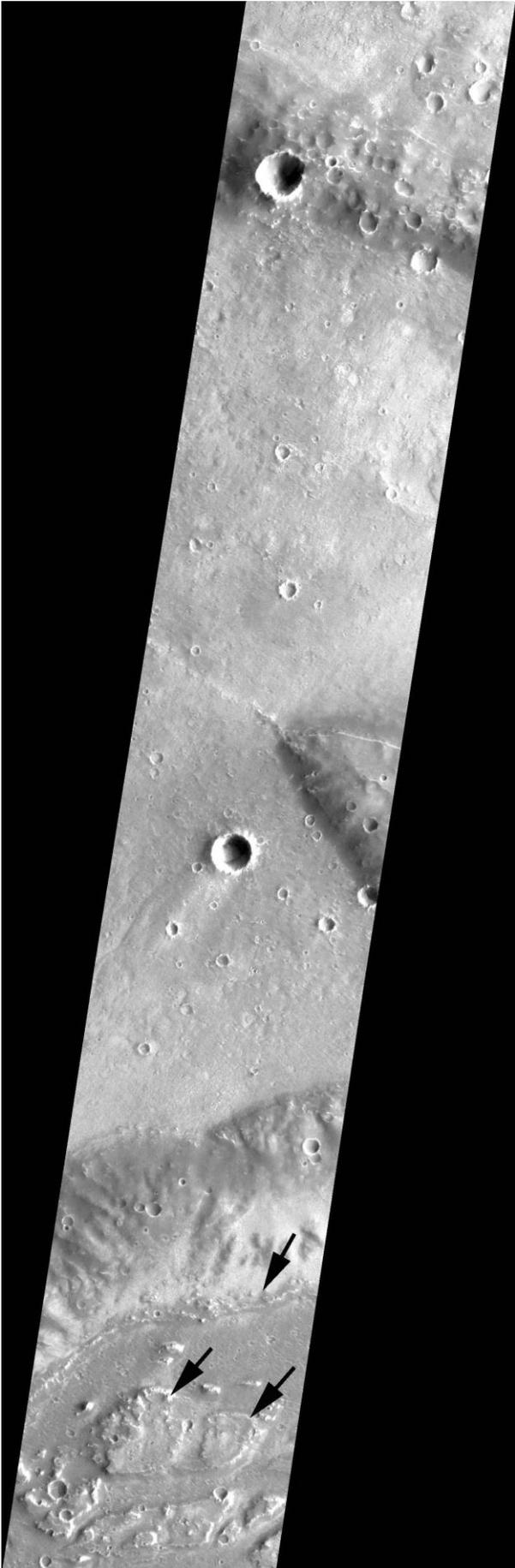


Figure 3c: MOC image SP247504 (6.5 km wide) showing details of friable ridges, arrows indicate channel eroded lower ridge (courtesy of Malin Space Science Systems).

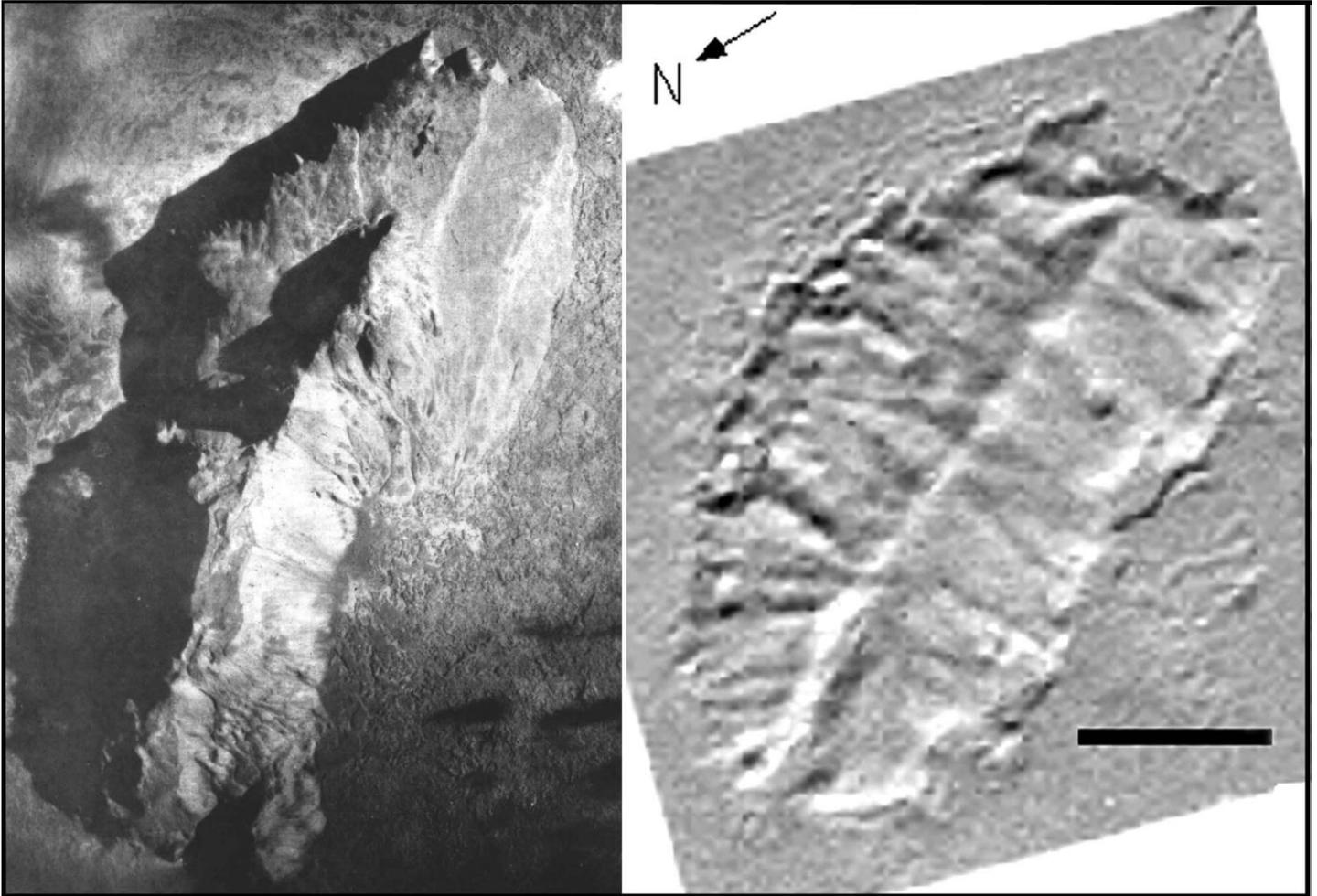


Figure 4: Comparison of a sub-ice volcano and ridge northwest of Elysium Fossae; (a) narrow central fissure vent on 4-km-wide Herdubreidartögl, a ridge-shaped tuya with resistant caprock (adapted from Van Bemmelen and Rutten, 1955); (b) narrow inner ridge on friable, uncapped Martian mound, rotated to match (a).

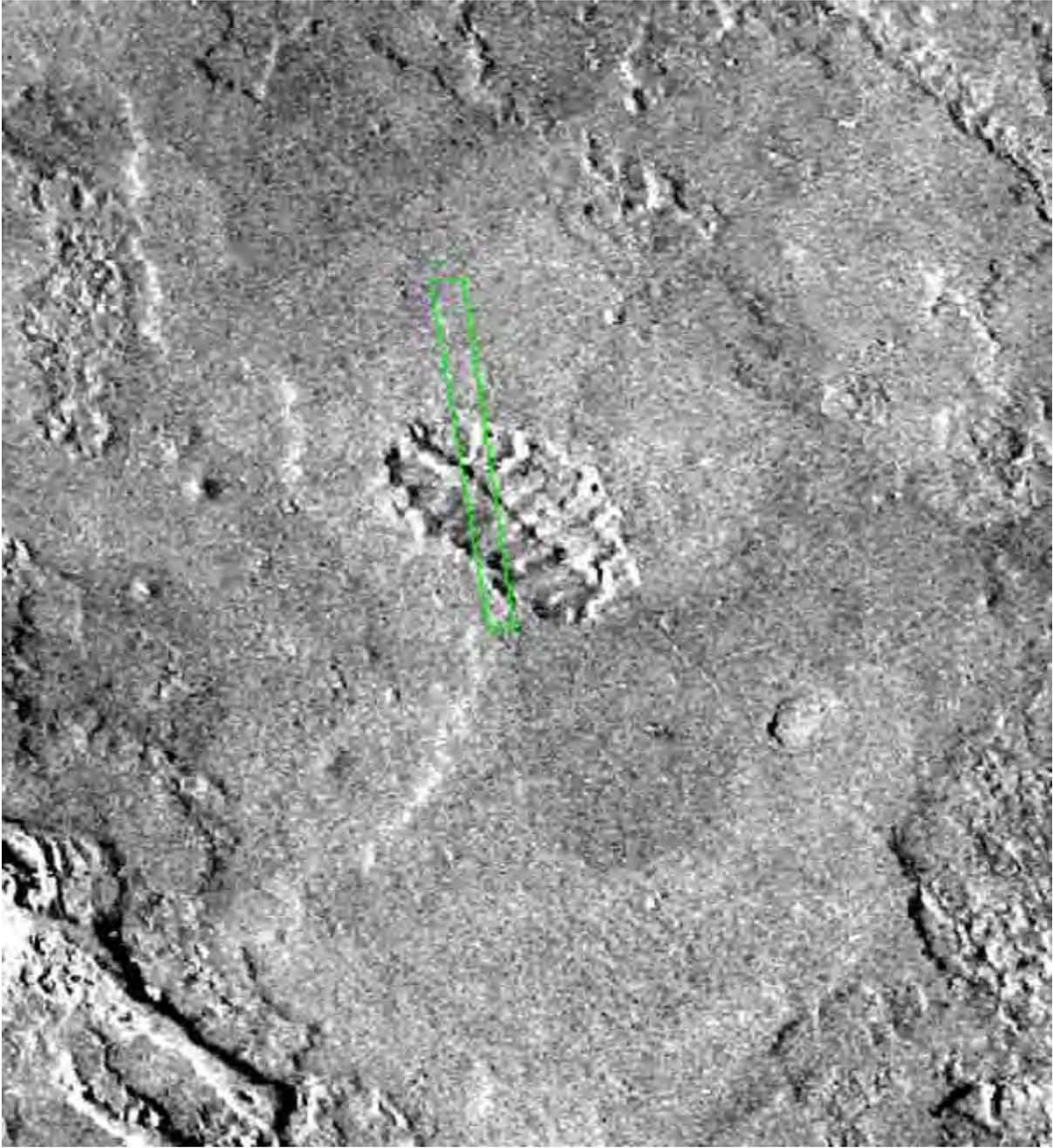


Figure 4c: Viking context image shows Martian ridge, box denotes location of (d).

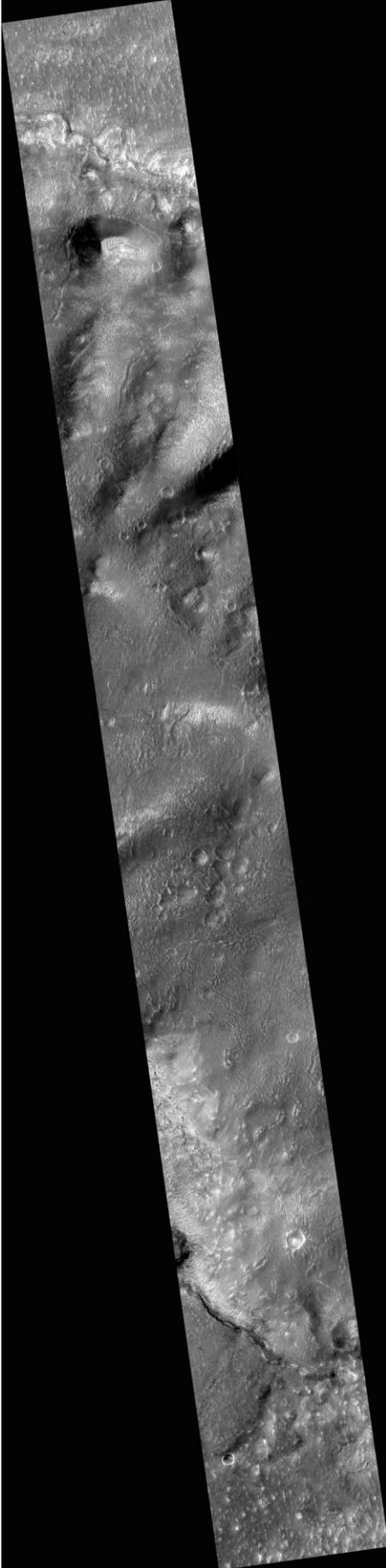


Figure 4d: MOC image 2200153 showing details of friable ridge (courtesy of Malin Space Science Systems).

## Reference for Sub-ice Volcanic Origin of Elysium/Utopia Deposits

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