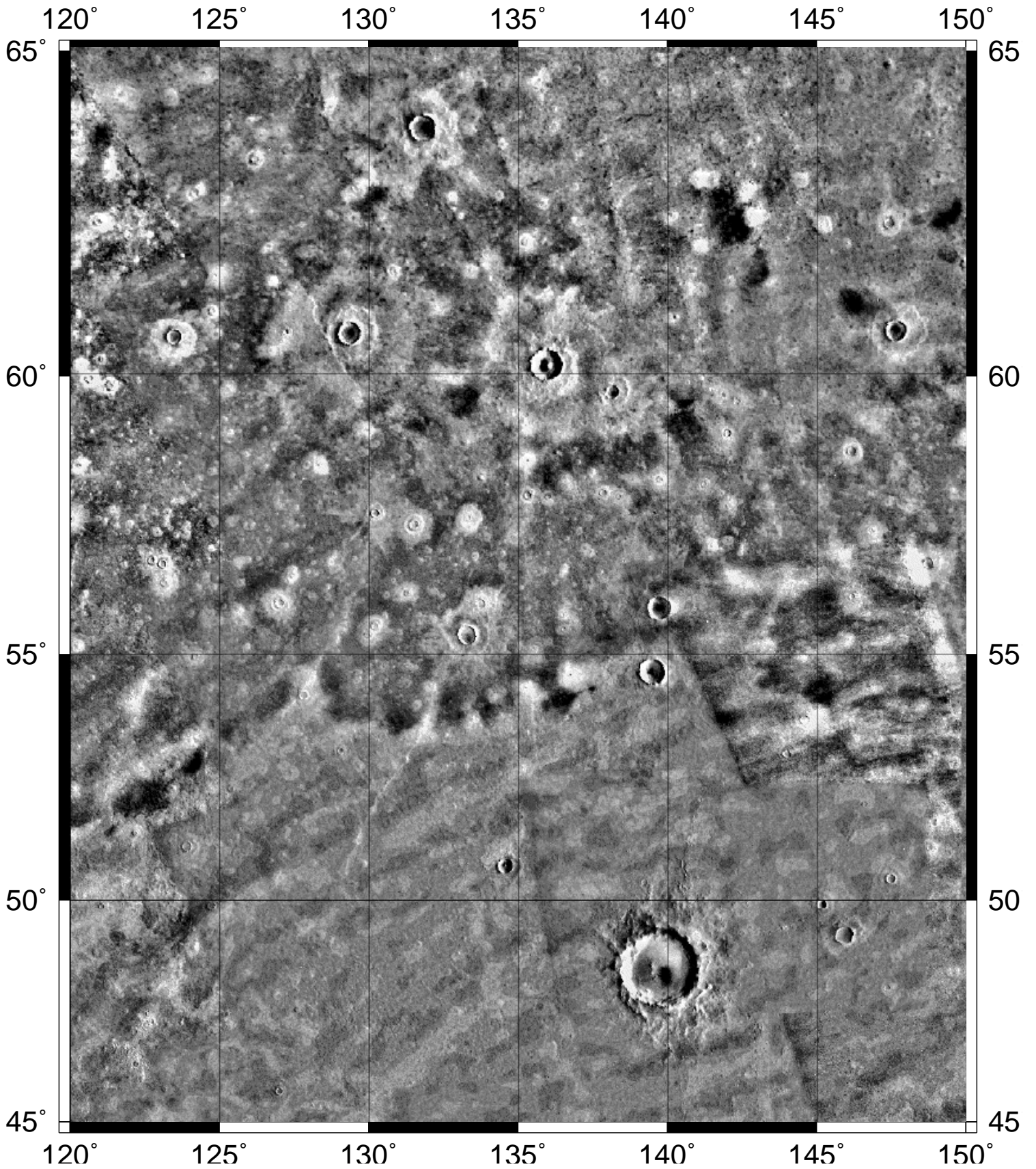


Ridges in the Martian
northern plains
Paul Withers
(University of Arizona)
and Greg Neumann
(MIT and NASA/GSFC)
Brown-Vernadsky
Microsymposium 33 on
Hesperian Mars
2001.03.10

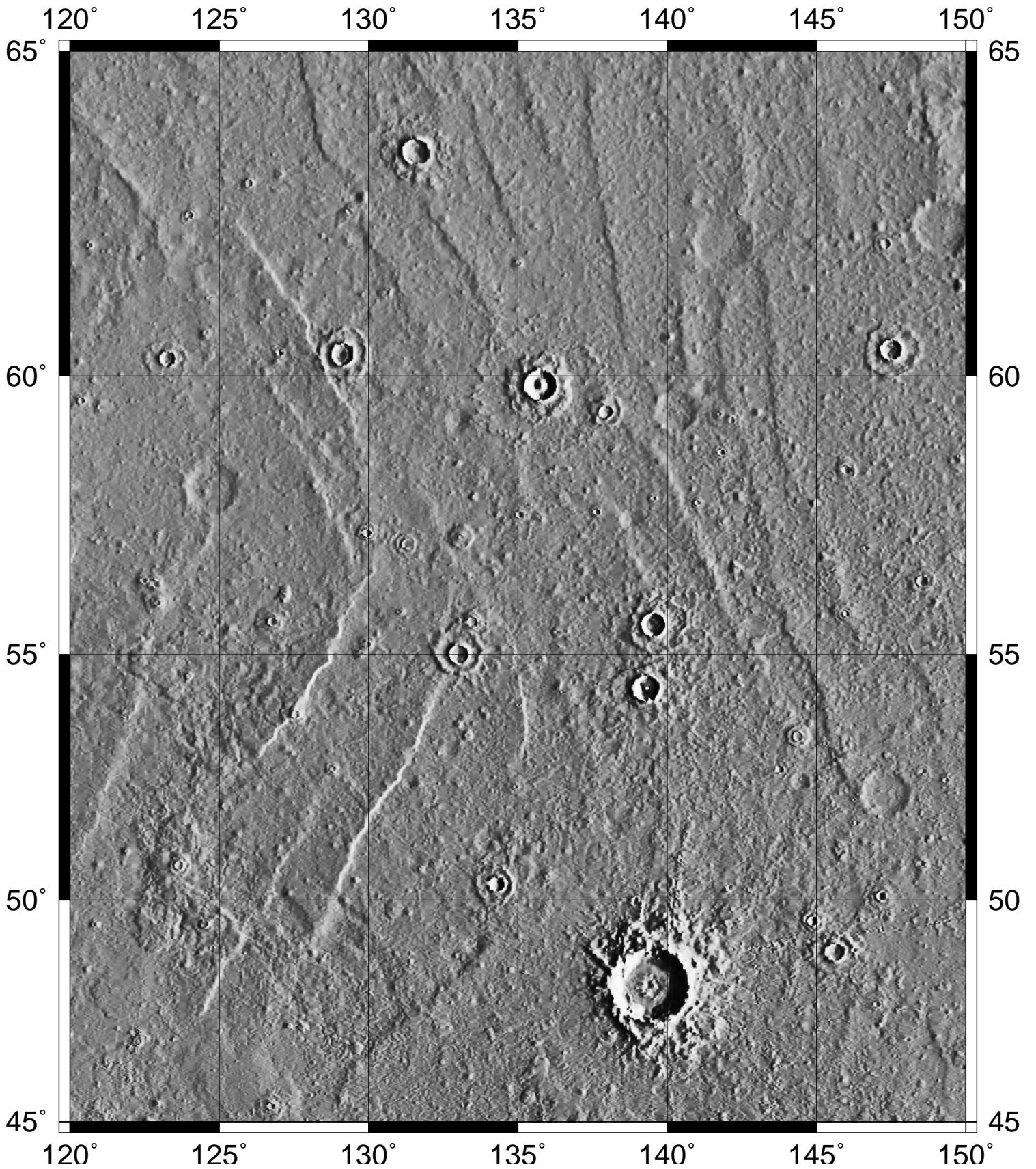
Acknowledgements

The proverbial cast of thousands, including anyone who has anything to do with MOLA, and Tom Watters
\$ - GSFC/USRA Graduate Student Summer Program

Viking Photograph



MOLA Data



Linear slope changes have been interpreted as shorelines of an ocean. However, these changes are ubiquitous in the northern plains and are primarily seen in association with tectonic structures such as Alba or Utopia. They are not preferentially parallel to topographic contours. Specifically, terrace/ridge pairs have been interpreted as shoreline indicators. However, terraces are sometimes upslope from ridges and sometimes vice versa, which is hard to understand in the context of shorelines.

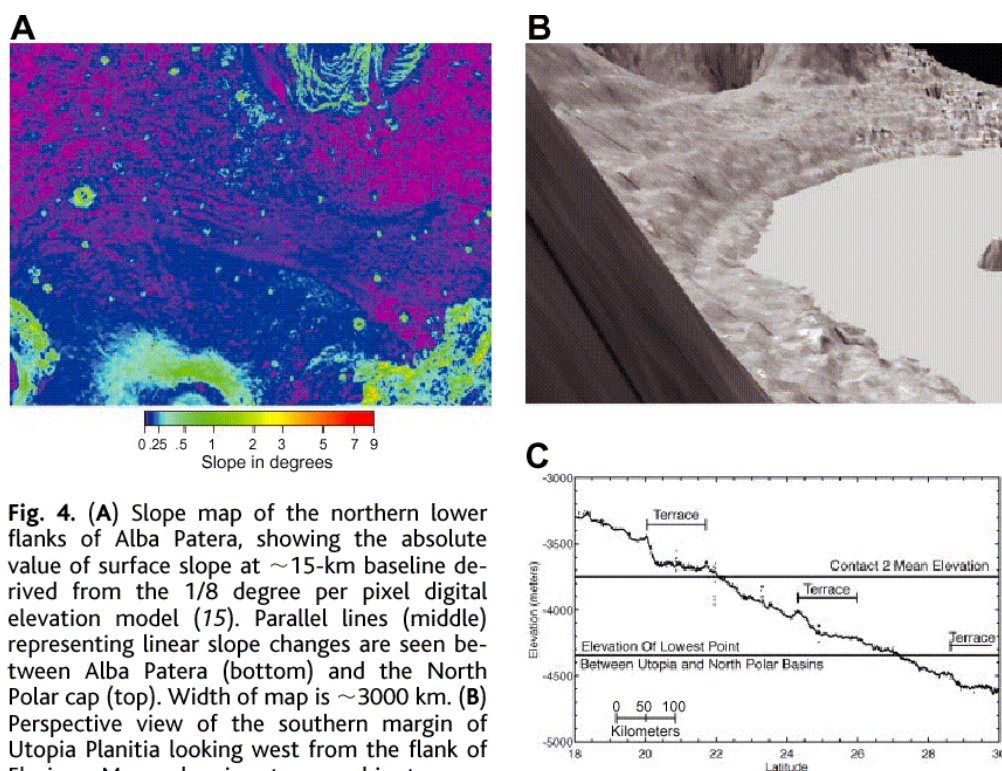
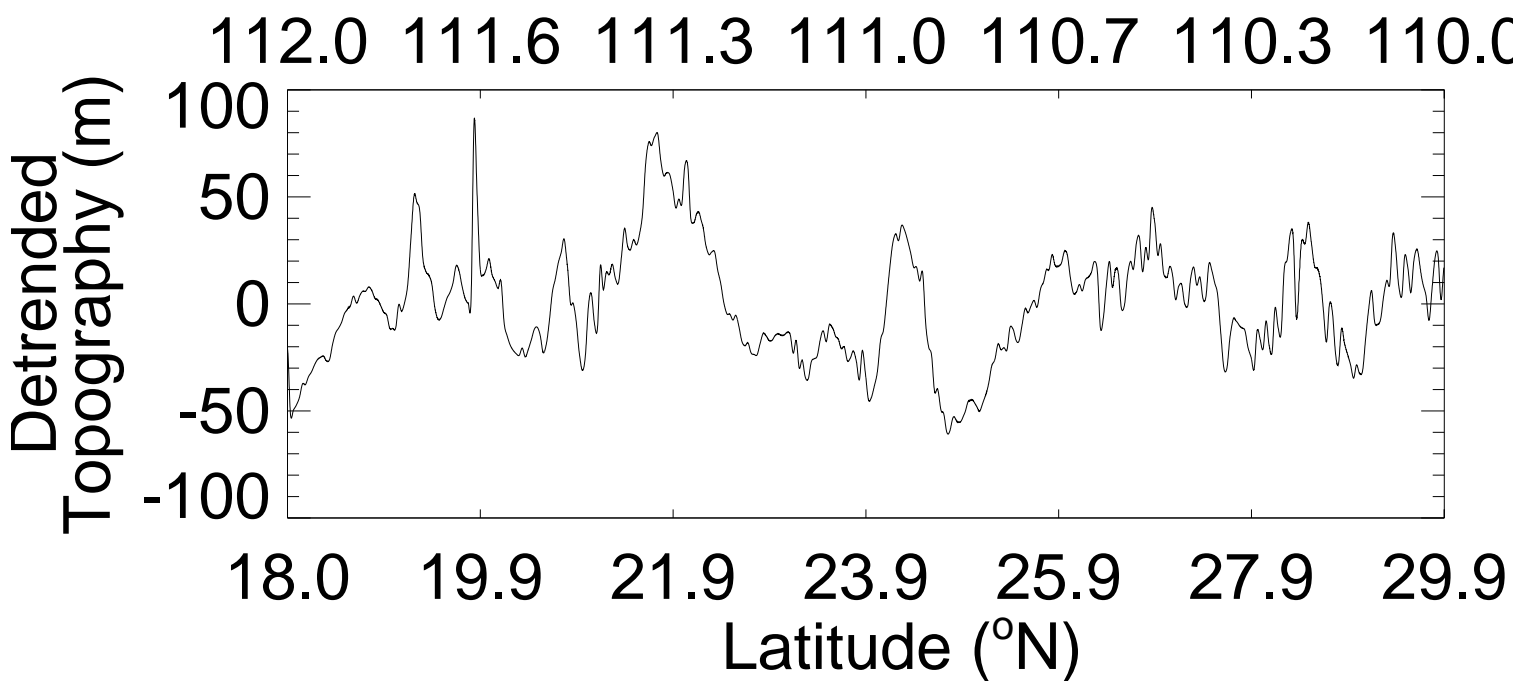
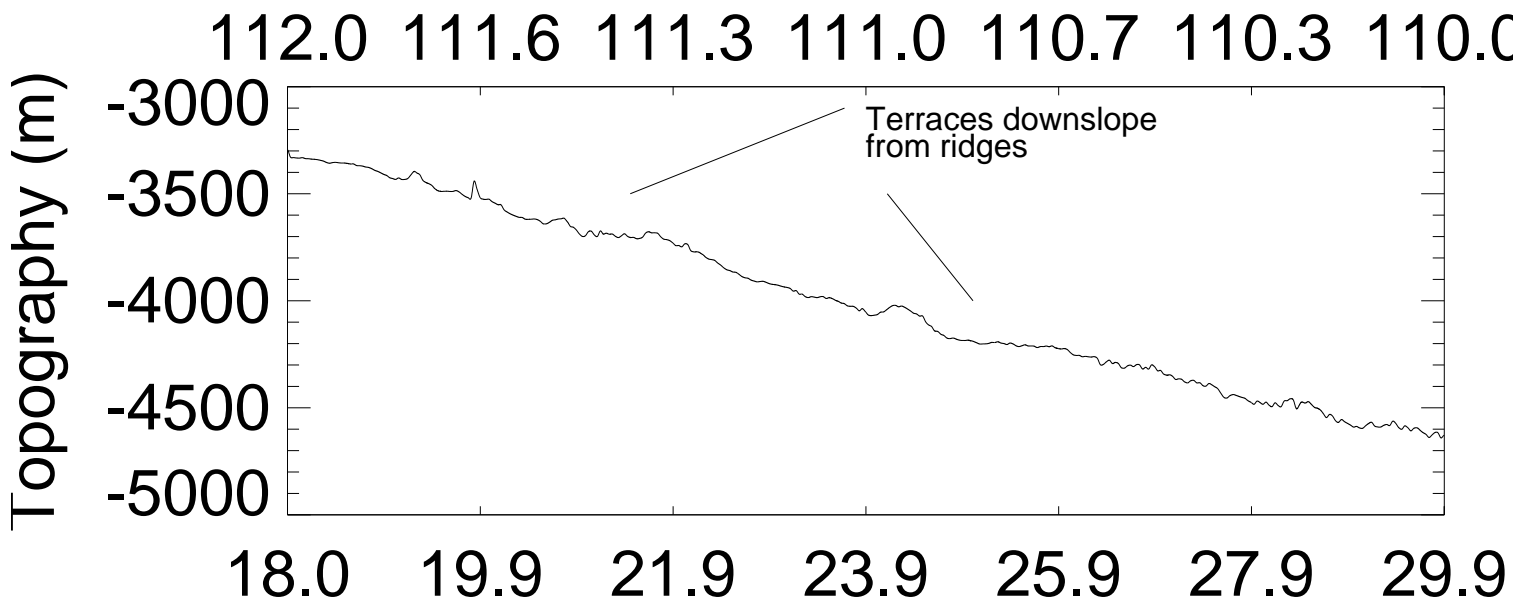
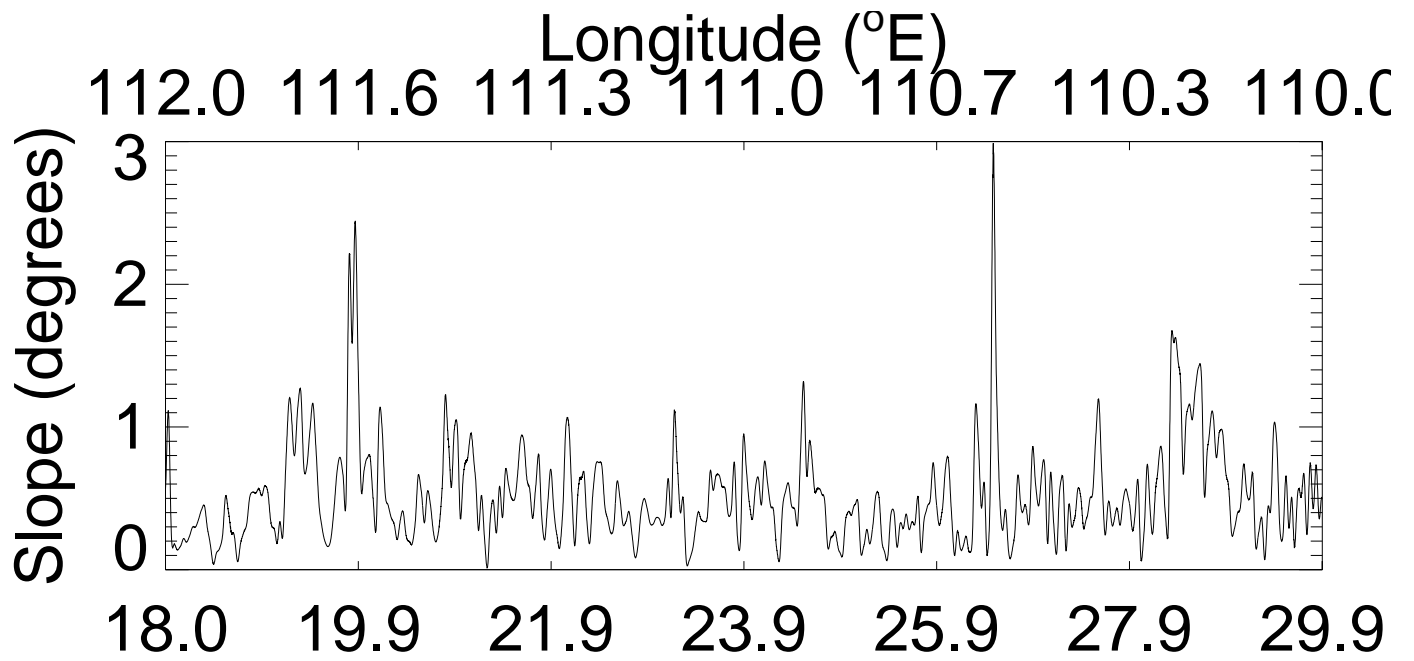


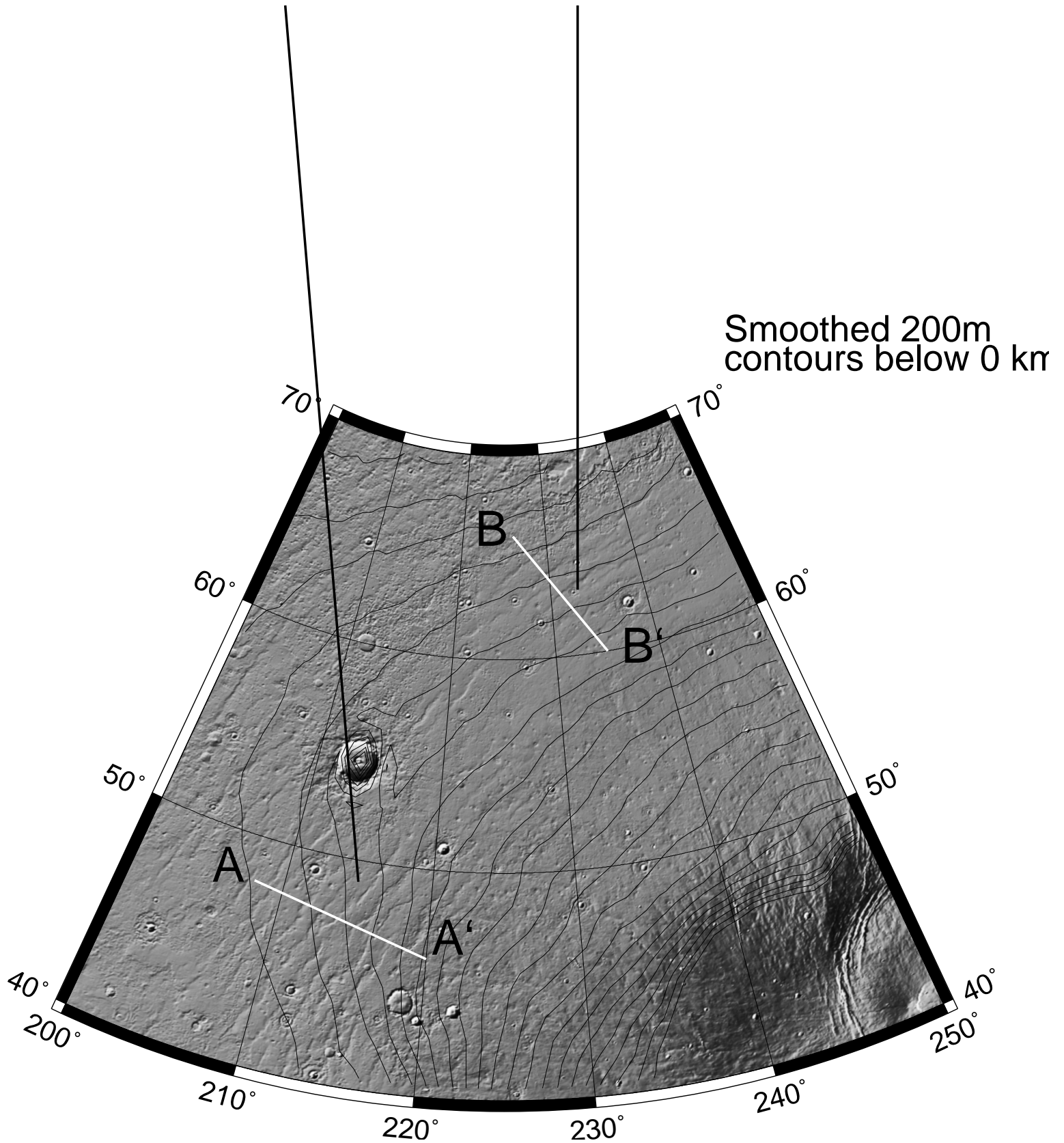
Fig. 4. (A) Slope map of the northern lower flanks of Alba Patera, showing the absolute value of surface slope at ~ 15 -km baseline derived from the $1/8$ degree per pixel digital elevation model (15). Parallel lines (middle) representing linear slope changes are seen between Alba Patera (bottom) and the North Polar cap (top). Width of map is ~ 3000 km. (B) Perspective view of the southern margin of Utopia Planitia looking west from the flank of Elysium Mons showing topographic terraces parallel to contact 2; MOLA digital elevation model with Viking Orbiter mosaic superposed, and the basin flooded to just below the -4350 -m contour, the elevation where the Utopia and North Polar basins become interconnected. Vertical exaggeration is $\sim \times 200$. (C) MOLA profile (10190) in southern Utopia Planitia.

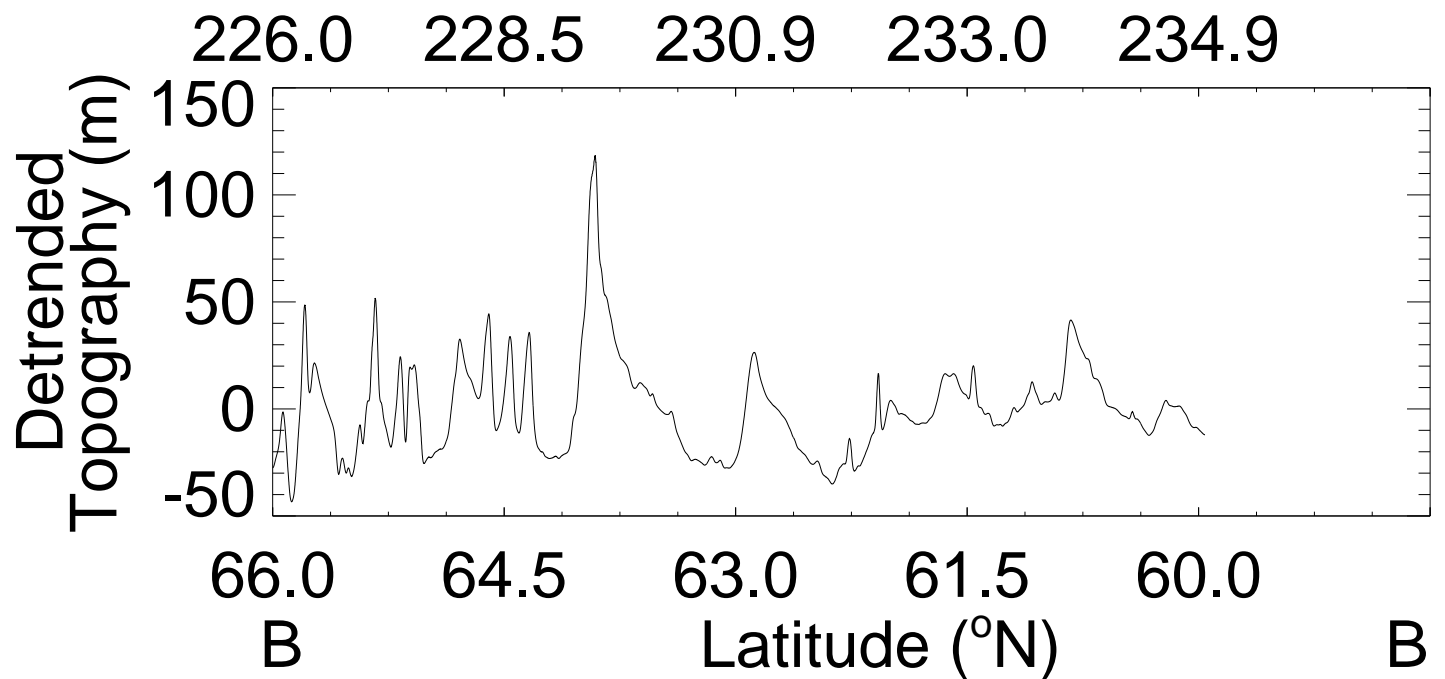
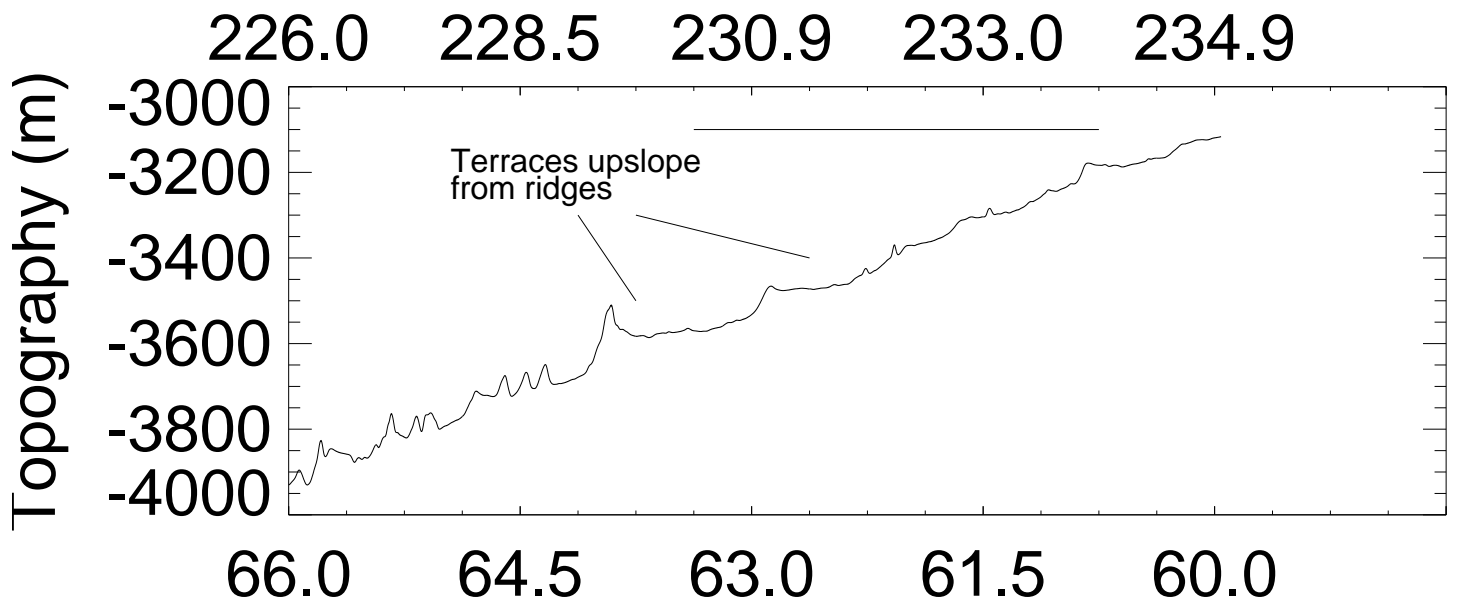
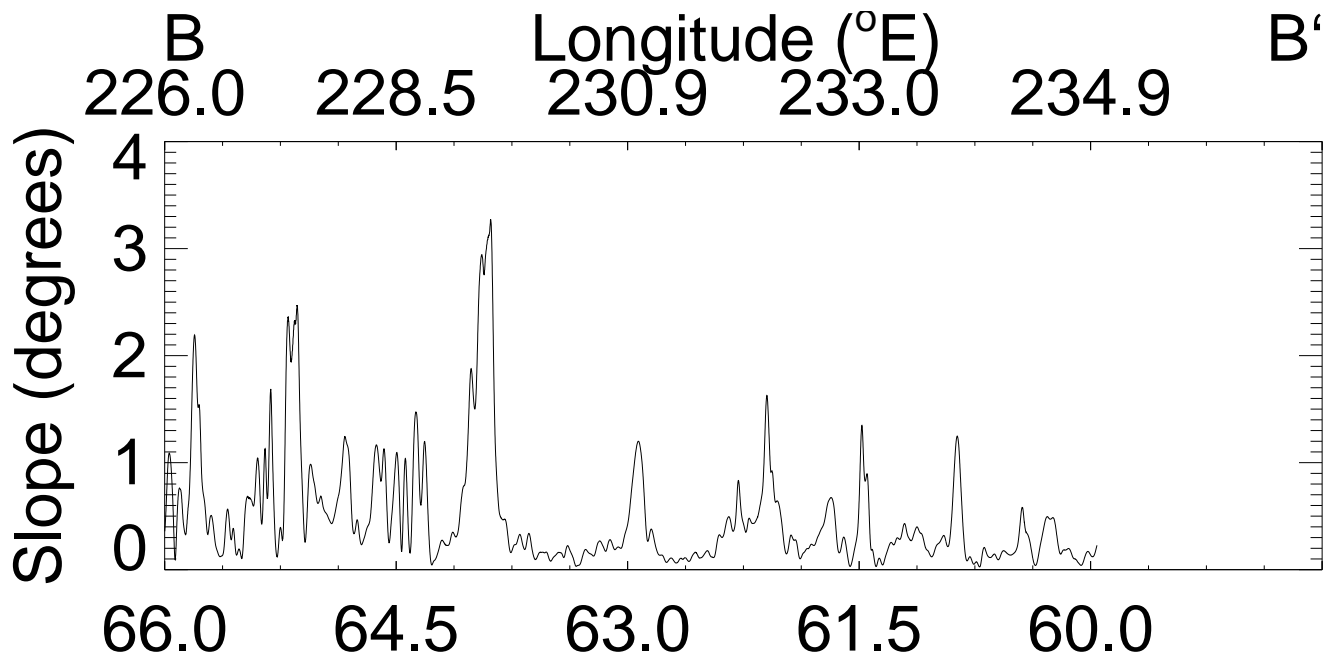
Possible Ancient Oceans on Mars: Evidence from Mars Orbiter Laser Altimeter Data

James W. Head III,^{1*} Harald Hiesinger,¹ Mikhail A. Ivanov,^{1,2} Mikhail A. Kreslavsky,^{1,3} Stephen Pratt,¹ Bradley J. Thomson¹



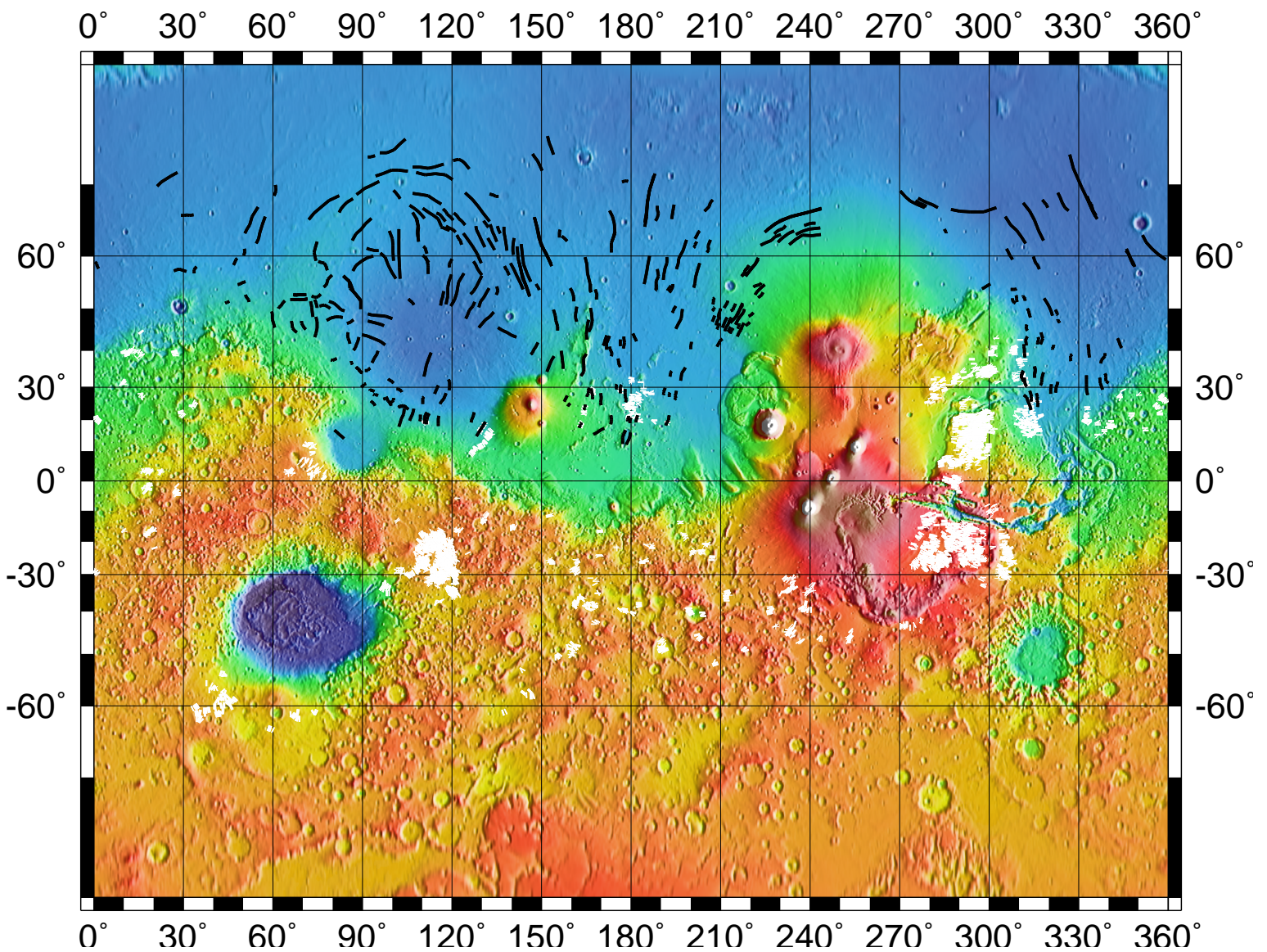
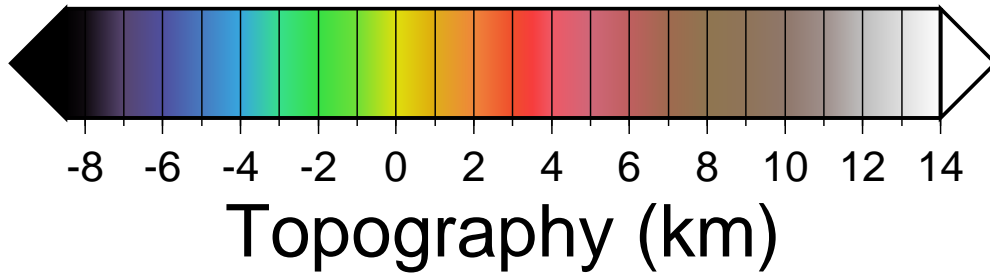
Putative shorelines





White Ridges from Tom Watters

Ridge Locations



White Ridges from Tom Watters

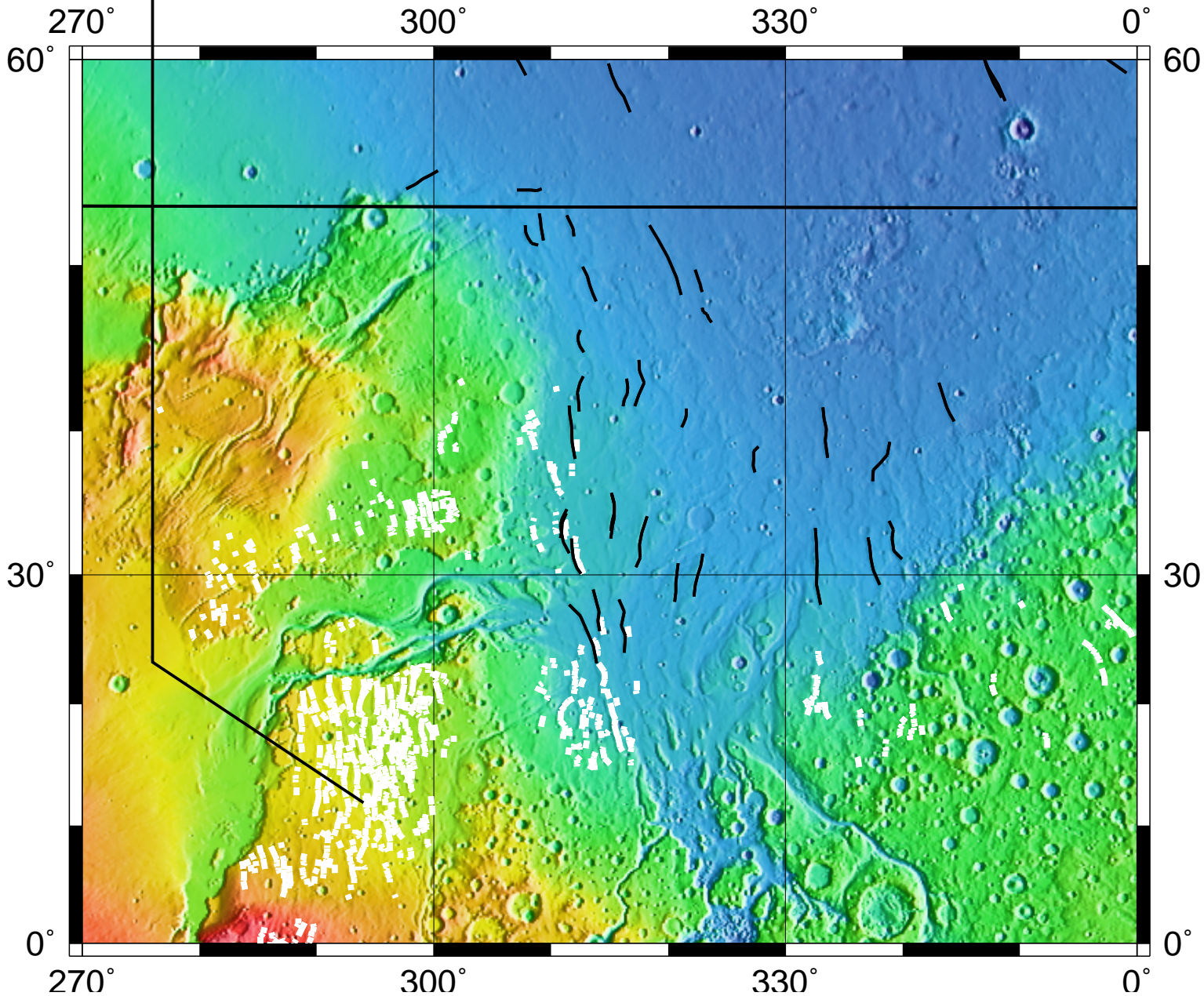
Approx strain of 1.5×10^{-3}

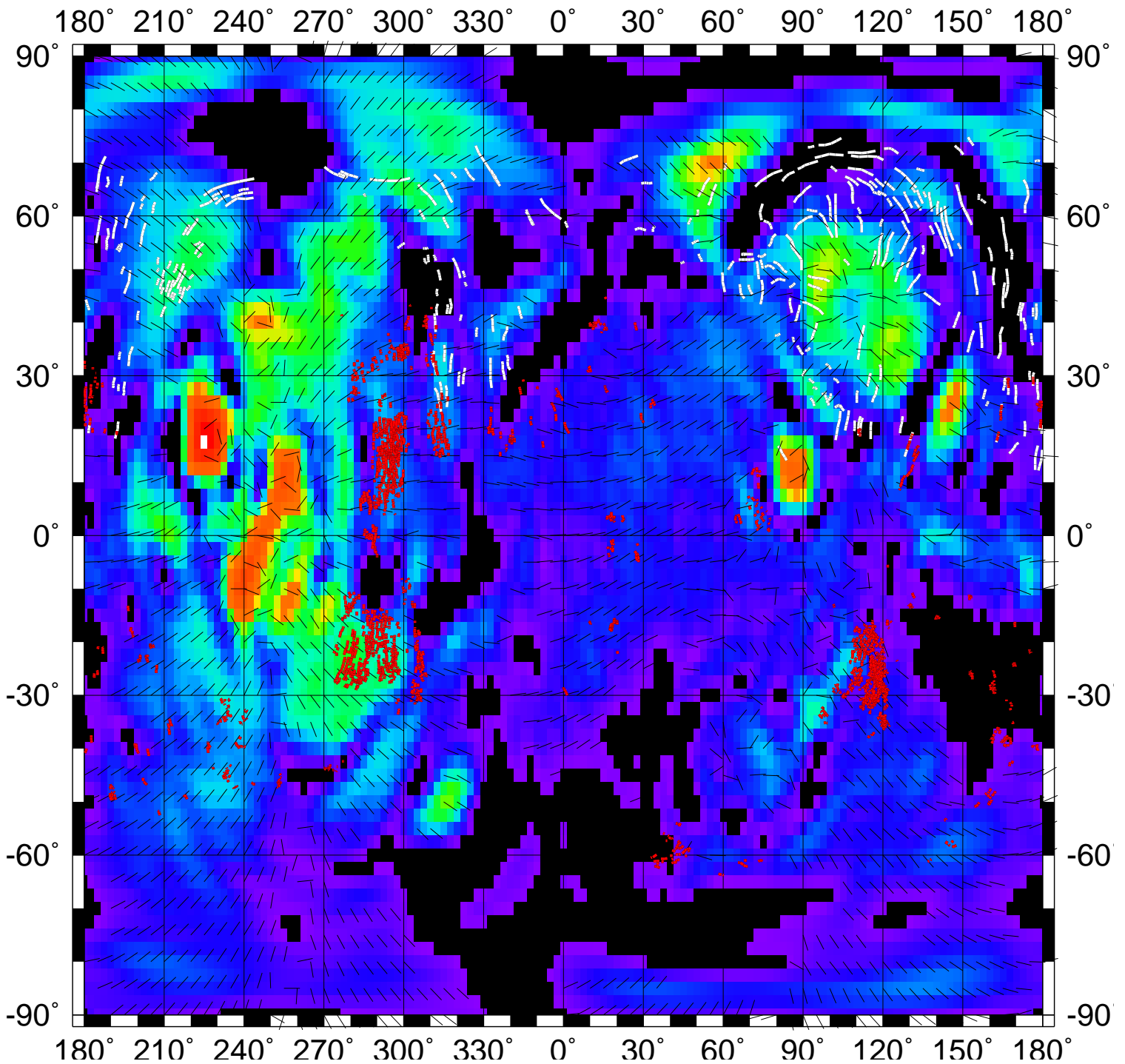
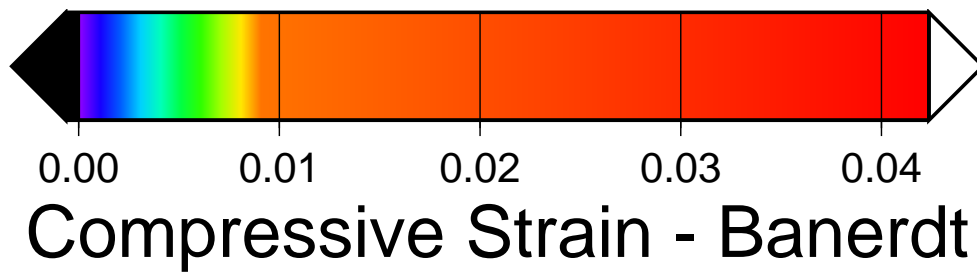
Lunae Planum

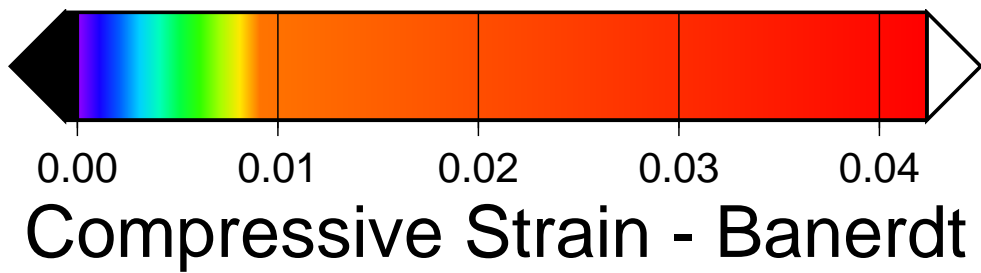


-8 -6 -4 -2 0 2 4 6 8 10 12 14

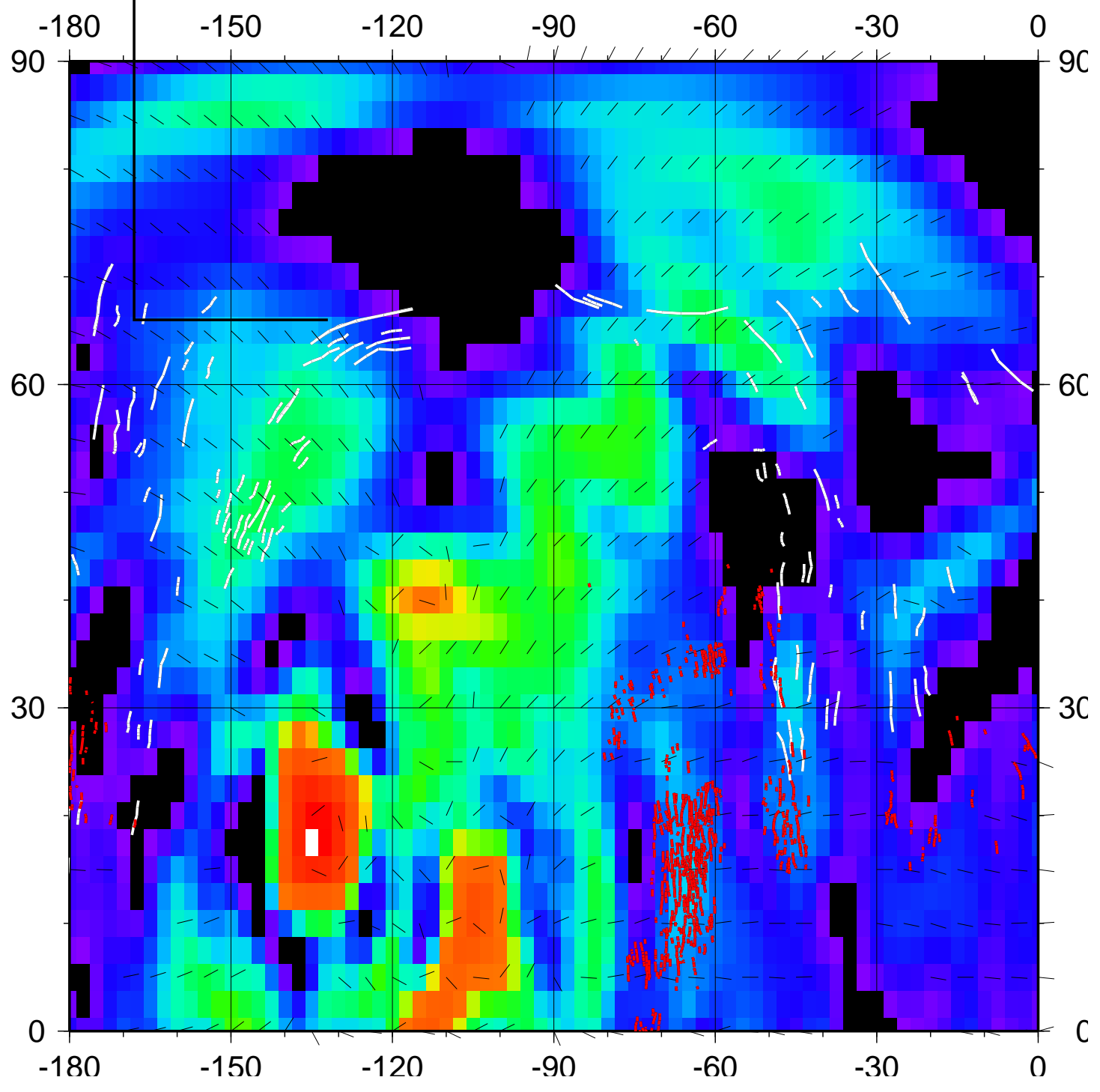
Topography (km)



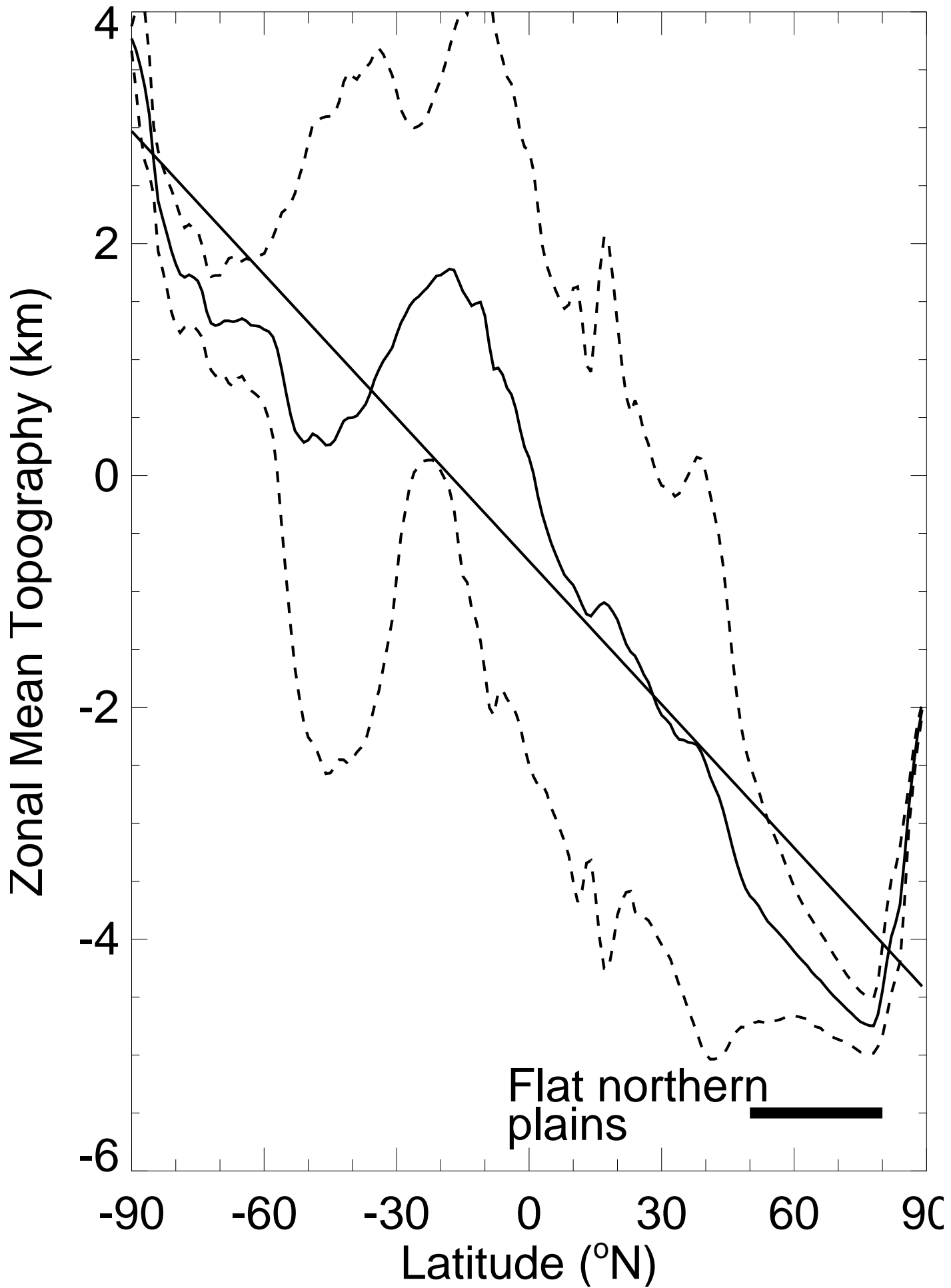




Approx strain of 5 E-4



Flat?



Pole-to-Pole Slope

Definition: Something that is FLAT is an equipotential surface with respect to the current geoid.

The northern plains are not flat, despite being the flattest known surface in the Solar System. Instead, they are level with the current pole-to-pole slope of 0.03 degrees
Is this a coincidence?