

**POLAR DUNES RESOLVED BY THE MARS ORBITER LASER ALTIMETER GRIDDED TOPOGRAPHY AND PULSE WIDTHS.** Gregory A. Neumann<sup>1,2</sup>, <sup>1</sup>*Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Building 54, 77 Massachusetts Avenue, Cambridge, MA 02139-4307, (neumann@tharsis.gsfc.nasa.gov),* <sup>2</sup>*Laboratory for Terrestrial Physics, Code 920, NASA/Goddard Space Flight Center, Greenbelt, MD 20771.*

The Mars Orbiter Laser Altimeter (MOLA) polar data have been refined to the extent that many features poorly imaged by Viking Orbiters are now resolved in densely gridded altimetry. Individual linear polar dunes with spacings of 0.5 km or more can be seen as well as sparsely distributed and partially mantled dunes. The refined altimetry will enable measurements of the extent and possibly volume of the north polar ergs.

MOLA pulse widths have been recalibrated using inflight data [2], and a robust algorithm applied to solve for the surface optical impulse response. Figure 1 shows the surface root-mean-square (RMS) roughness at the 75-m-diameter MOLA footprint scale, together with a geological map [4]. While the roughness is of vital interest for landing site safety studies, a variety of geomorphological studies may also be performed. Pulse widths corrected for regional slope clearly delineate the extent of the polar dunes.

The MOLA PEDR profile data have now been re-released in their entirety (Version L). The final Mission Experiment Gridded Data Records (MEGDR's) are now provided at up to 128 pixels per degree globally. Densities as high as 512 pixels per degree are available in a polar stereographic projection. A large computational effort has been expended in improving the accuracy of the MOLA altimetry themselves, both in improved orbital modeling and in after-the-fact adjustment of tracks to

improve their registration at crossovers [1]. The current release adopts the IAU2000 rotation model and cartographic frame [3] recommended by the Mars Cartography Working Group. Adoption of the current standard will allow registration of images and profiles globally with an uncertainty of < 100 m.

The MOLA detector is still operational and is currently collecting radiometric data at 1064 nm. Seasonal images of the reflectivity of the polar caps can be generated with a resolution of about 300 m per pixel.

### References

- [1] Neumann, G. A. et al., *J. Geophys. Res.*, 106, 23,753–23,768, 2001.
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- [3] Seidelmann, P. K., et al., *Cel. Mech. Dyn. Astron.*, 82, 83–110, 2002.
- [4] Tanaka, K. L., and D. H. Scott, Geologic map of the polar regions of mars, scale 1:15,000,000, 1987.

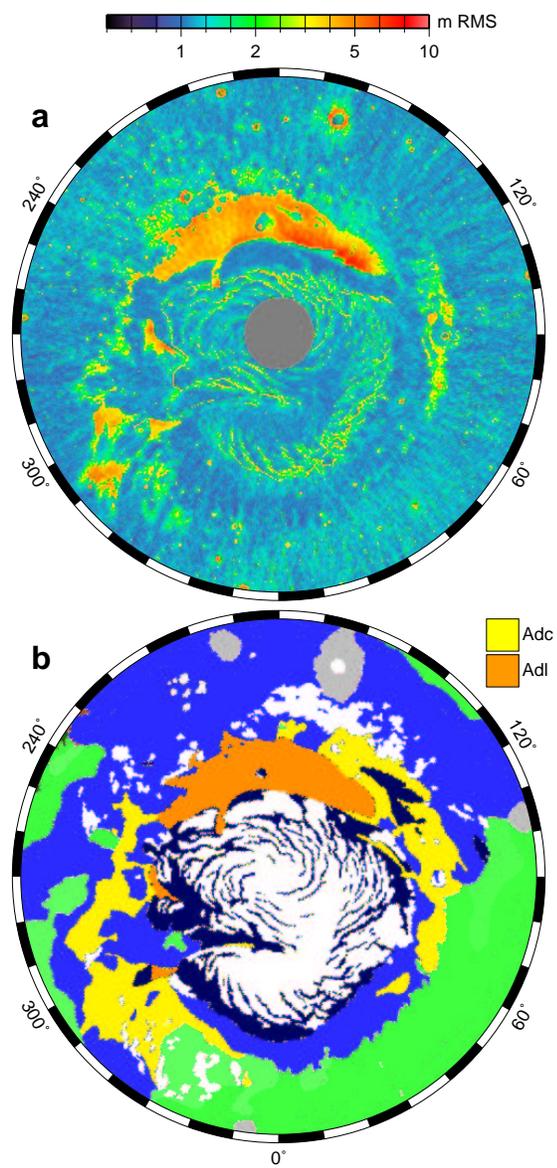


Figure 1: (a) North polar RMS roughness and (b) geological map, in polar stereographic projection.