

SURFACE ROUGHNESS AND SLOPES ON THE MOON AT 5-METER SCALE. D. E. Smith¹, M. T. Zuber¹, G. A. Neumann², E. Mazarico¹, J. W. Head III³, and the LOLA Science Team, ¹MIT, Cambridge, MA 02139 smithde@mit.edu, zuber@mit.edu, ²NASA Goddard Space Flight Center, Greenbelt, MD 20771, ³Brown Univ., Providence, RI 02912.

Introduction: The multi-beam laser altimeter (LOLA) on the Lunar Reconnaissance Orbiter (LRO) spacecraft has been mapping the lunar topography for over two years. In addition, LOLA is acquiring laser pulsewidth data that we are using to map the slopes and surface roughness on a 5-m scale, the size of the laser footprint of each beam on the lunar surface.

LOLA Data: The altimeter has 5 beams and makes altimeter and pulsewidth at 28Hz on each of the 5 beams. The width of the laser spots on the surface from 50 km is 5 meters and the measurement of pulse width provides a measure of the topographic variation within the spot which we can interpret with caution as a roughness on the scale of the footprint. The quality of the pulsespread measurement is limited by the instrument to about 20 to 30 cm on a single measurement so we usually average 5 or 10 measurements, equivalent to a spatial average of the 5-meter scale measurements over 50 to 100 meters.

Roughness Variation: The most prominent variation in surface roughness at these small scales is between surfaces inside relatively young craters and basins compared to some of the maria. The smoother areas indicate a roughness of approximately 1 meter or less, and for the roughest areas suggest values of approximately 4 meters, possibly indicative of a boulder type environment.

References:

[1] Smith D. E. et al (2010) *GRL*,
doi:10.1029/2010GL043751.