Using MOLA Data to Improve Earth-based Radar Scattering Model
Retrievals

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The Goldstone Solar System Radar (GSSR) has successfully collected radar echoes
from the surface of Mars for some 30 years
now. These data have been used in support of landing site selection and certific
ation for Viking, Pathfinder, and the 2003
Mars Exploration Rovers. A recent re-analysis of the entire radar dataset availa
ble brought to light a shortcoming of
previous analyses. The technique used to date to fit the Hagfors scattering mode
l to the radar echoes did not account for
local slopes. In fact, it fails to fit a model to slopes over about 3 degrees, a
nd gives good fits for regions with slopes
less than about 1 degree. While landing sites are all in flat regions, understan
ding the surface roughness on the flanks of
Martian volcanos would be of significant interest. Generally the signal-to-noise
 of the radar echoes is insufficient to
cleanly fit a fourth parameter, east-west slope, in addition to the parameters o
f range, reflectivity and roughness. The MOLA
 topography offers an elegant solution. We will report on our study of the impro
vement in scattering model fitting at the
meeting.