Goldstone/VLA 3.5-cm Mars Radar Observations in 2003

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The opposition of Mars in 2003 provided a fantastic opportunity to use the combined Goldstone/VLA radar to probe the surface with the highest resolution ever obtained on Mars with that instrument (as good as 70 km). Observations were made on August 11, 19, 28, and September 8. We will present results from the first three of these epochs, including results related to volcanic regions (Tharsis and Elysium), "Stealths", and the south polar residual and seasonal ice caps.

The Tharsis and Elysium volcanic regions are the two most reflective non-polar areas on the planet, but they show marked differences in their brightness. While Olympus Mons and the Tharsis volcanoes are fairly bright reflectors, they are only a little more than half as bright as the caldera of Elysium Mons. The Elysium Planitia has a bright, well defined outline, much different than its surroundings. The Daedalia Planum is also extremely bright, near the base of Arsia Mons. Although the lava flows in these regions are of approximately the same age, they exhibit a wide range of reflectivity. We will present possible explanations for these differences, taking into account age, composition, and morphology variations between the regions.

The size, shape, and reflectivity characteristics of Stealth and "mega-Stealth" (Edgett et al. 1997) are reaffirmed, with a better viewing geometry of the western extent of the feature than had been obtained previously. Argyre Planitia is confirmed as a radar-dark region. It had been speculated previously that Hellas Planitia should also be radar-dark - this is confirmed by our imaging, though the reflectivity is not as low as for Stealth. We find a new radar-dark area to the west of Elysium Mons, which is likely an ash fall from that volcano (similar to the proposed relationship between Stealth and the Tharsis volcanoes).

The NRAO is a facility of the National Science Foundation, operated under cooperative agreement by Associated Universities, Inc.