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Radar Imaging of Sand Dunes on Titan and Earth

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One of the most surprising findings from the NASA/ESA/ASI Cassini-Huygens mission to the Saturnian system has been the discovery (Science, 312, 724-727, 2006) of massive sand seas at Titan's low latitudes. These dark areas ppear to be covered (perhaps 40% of the terrain at low latitudes) in organic particulates that have been sculpted, probably by winds driven by Saturn's gravitational tide, into giant linear (longitudinal) dunes.

Although the Cassini RADAR image resolution is only ˜350m, the morphology (topographic shading and glints from the dune crests can be seen) is observed well enough to see interactions of the dune pattern with pre-existing topography. Titan, with its thick atmosphere and low gravity, makes an outstanding laboratory for aeolian studies.

Spaceborne Synthetic Aperture Radar (SAR) imaging is a datatype that has perhaps not been fully exploited in terrestrial aeolian studies. We present here imaging from the SIR-C and XSAR instruments flown on the space shuttle in 1994, together with more recent SRTM topography, of the well-known linear dunes in the Namib desert, which are morphologically one of the most compelling analogs of the dunes on Titan. These data, as well as showing the terrestrial structures in a new way, also provide a window into how Titan may look close-up.