



Dunes on Titan : Cassini RADAR Overview

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Thousands of longitudinal dunes have recently been discovered [1,2] by the Titan Radar Mapper on the surface of Saturn's atmosphere-shrouded moon Titan. These are found within ± 30 degrees of the equator in optically- and radar-dark regions and may cover close to 20 per cent of Titan's surface, making Titan more dune-covered than Mars or the Earth. Their longitudinal form indicates minor fluctuations about a single, dominant wind direction aligned with the dune axis. Based on global compilations of dune orientations, the mean wind direction has slight regional variations from strictly Eastwards, and stronger local variations where winds are diverted around topographically high features, such as mountain blocks or broad landforms. Global winds may carry hydrocarbon or water ice particulates from humid, polar regions to equatorial regions, where relatively drier conditions prevail, and the particles are reworked into dunes. On Titan, adequate sediment supply, sufficient wind, and the absence of sediment carriage and trapping by fluids are the dominant factors in the presence of dunes.

An emerging puzzle is the relationship of fluvial and aeolian processes. The Huygens landing site was gullied and damp, yet dunes were present only a few tens of km away. We explore the idea that Titan's climate has changed substantially over time. A further puzzle, not yet resolved, is that the dunes indicate generally Eastwards transport, yet global circulation models favor westwards flow at low latitudes.

[1] Lorenz et al., *Science*, 260, 312, 724-727 (2006) [2] Radebaugh et al., *Icarus*, in Press (2008)