

Saturn's Titan: Evidence for Surface Reflectance Change: Implications for Atmospheric and Volcanic Activity

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Significant regional changes in the near-infrared reflectance of a 2800 km² area on Titan occurred between July 2004 and October of 2005. The flux increased by a factor of two between July 2004 and March-April 2005; it then decreased through October 2005. The character is inconsistent with tropospheric clouds of the type observed at Titan's South pole and high mid-latitudes. Application of a comprehensive radiative transfer model finds that it is unlikely to be caused by a ground fog and most likely occurred at Titan's surface. This is the first direct evidence of short-term surface change on Titan. Inspection of the spectral differences between the spot and its surrounding terrain rules out changes in the distribution of the ices of H₂O, CO₂, and CH₄ as the cause. Interpretations include changing surface deposits due to abrupt tectonic or volcanic activity. This is the first evidence for currently active tectonic processes such as volcanism on Titan. This work done at JPL/CALTECH under contract with NASA