Singular activity over Titan's equatorial dunefields at equinox. S. Rodriguez[1*], S. Le Mouélic[2], J. W. Barnes[3], B. Charnay[4], J. F. Kok[5], R. D. Lorenz[6], J. Radebaugh[7], C. Narteau[8], T . Cornet[9], O. Bourgeois[2], A. Lucas[1], P. Rannou[10], C. A. Griffith[11], A. Coustenis[12], T. Appéré[1,13], M. Hirtzig[12†], C. Sotin[14], J. M. Soderblom[15], R. H. Brown[11], J. Bow[3], G. Vixie[3], L. Maltagliati[1], S. Courrech du Pont[16], R. Jaumann[17], K. Stephan[17], K. H. Baines[18], B. J. Buratti[14], R. N. Clark[19], P. D. Nicholson[20].
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Introduction: Titan, the largest satellite of Saturn, is the only satellite in the solar system with a dense atmosphere. The close and continuous observations of Titan by the Cassini spacecraft, in orbit around Saturn since July 2004, bring us evidences that Titan troposphere and low stratosphere experience an exotic meteorological cycle similar to the Earth hydrological cycle, with hydrocarbons evaporation, condensation in clouds, and rainfall. Cassini monitoring campaigns also demonstrate that Titan's cloud coverage and climate vary with latitude. Titan's equatorial regions, with globally weak meteorological activity and widespread dune fields, seem to be slightly more arid than the poles, where extensive and numerous liquid reservoirs and sustained cloud activity were discovered.

Only a few tropospheric clouds have been observed at Titan's equatorial regions during the southern summer [2-4]. As equinox was approaching (in August 2009), they occurred more frequently and appeared to grow in strength and size [5-7], suggesting that those regions may experience a more energetic meteorology around the equinoxes, as suggested by the Global Climate Models for Titan.

VIMS observations: We present here the observation of intense brightening near Titan's equator, very close to the equinox. These detections were conducted with the Visual and Infrared Mapping Spectrometer [8] (VIMS) onboard Cassini. Figure 1 presents the VIMS color composite images of the three individual events detected so far, observed during the Titan's flybys T56 (22 May 2009), T65 (13 January 2010) and T70 (21 June 2010). T56, T65 and T70 observations show an intense and transient brightening of large regions very close to the equator, which all appear spectrally and morphologically different from all previous observed surface features or atmospheric phenomena. These events share in particular a strong brightening at wavelengths greater than 2 μm (especially at 5 μm), making them spectrally distinct from the few large storms observed near the equator.

Discussion: We will discuss the possibility that these singular events may have occurred very close to the surface, having a very local origin. We will also discuss the possible implication of the equinoctial occurrence of such events for Titan's equatorial climate and their probable link with the underlying dunefields.

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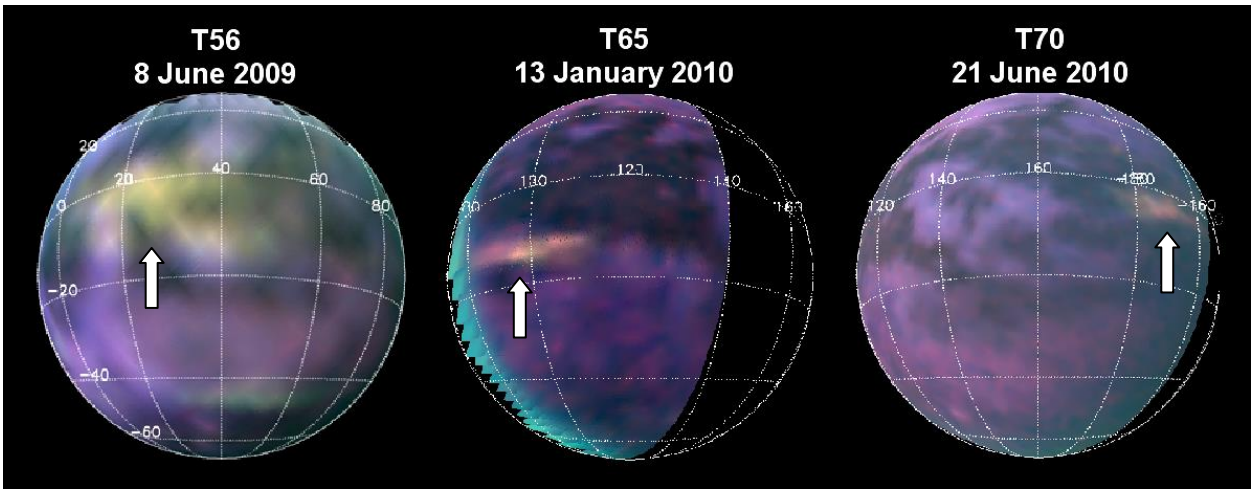

Figure 1. Orthographic reprojection of VIMS observations of Titan during the T56, T65 and T70 flybys. These images are RGB color composites, using the VIMS 5 μm channel as red, the 2.78 μm as green and 2 μm as blue. The yellowish/pinkish areas, also marked by the white arrows, denote the unusual spectral behaviour of large regions within Titan's tropics.