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Singular climatic activity at Equinox over Titan's dunefields as seen by CASSINI

Sebastien Rodriguez (1), Stephane Le Mouélic (2), Jason W Barnes (3), Benjamin Charnay (4), Jasper F Kok (5), Ralph D Lorenz (6), Jani Radebaugh (7), Thomas Cornet (8), Olivier Bourgeois (2), Antoine Lucas (1), Pascal Rannou (9), Caitlin A Griffith (10), Athena Coustenis (11), Thomas Appéré (1,12), Mathieu Hirtzig (11), Christophe Sotin (13), Jason M Soderblom (14), Robert H Brown (10), Jacob Bow (3), and Graham Vixie (3)

(1) Laboratoire AIM - Université Paris 7, Planetology, Gif/Yvette, France (sebastien.rodriguez@cea.fr), (2) Laboratoire de Planétologie et Géodynamique (LPGNantes), CNRS-UMR 6112, Université de Nantes, 44322 Nantes, France, (3) University of Idaho, Department of Physics, 875 Perimeter Drive MS0903, Moscow, ID 83844-0903, USA, (4) Virtual Planetary Laboratory, University of Washington, Box 351580, Seattle, Washington 98195, USA, (5) Department of Atmospheric and Oceanic Sciences, University of California, Los Angeles, California, USA, (6) Johns Hopkins University Applied Physics Laboratory, Laurel, Maryland, USA, (7) Department of Geological Sciences, Brigham Young University, Provo, UT 84602, USA, (8) European Space Agency (ESA), European Space Astronomy Centre (ESAC), Villanueva de la Canada, Spain, (9) Groupe de Spectroscopie Moléculaire et Atmosphérique, UMR CNRS 6089, Université de Reims, U.F.R. Sciences Exactes et Naturelles, Moulin de la Housse B.P. 1039, 51687 Reims Cedex 2, France, (10) Department of Planetary Sciences, University of Arizona, Lunar and Planetary Laboratory, 1629 E. University Blvd., Tucson, AZ 85721, USA, (11) LESIA, Observatoire de Paris, PSL-Research Univ., CNRS, Univ. Pierre et Marie Curie Paris 06, Sorbonne Univ., Univ. Paris-Diderot, Sorbonne Paris-Cité, 5, place Jules Janssen, 92195 Meudon Cedex, France, (12) Institut de Planétologie et d'Astrophysique de Grenoble, Université J. Fourier, CNRS/INSU, Grenoble, France, (13) California Institute of Technology/Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109, USA, (14) Department of Earth, Atmospheric, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

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, but complete 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 tropics, 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 tropo-spheric clouds have been observed at Titan's tropics 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].
We present here the observation of intense brightening at Titan's tropics, very close to the equinox. These detec-tions 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. 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 tropical climatology and their probable link with particular geological features at Titan's surface.

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