Seasonal changes in Titan's meteorology and surface features

E.P. Turtle (1), J.E. Perry (2), A.S. McEwen (2), J. Barbara (3), A. Del Genio (3), R.A. West (4), A. Hayes (5), E. Schaller (2)

(1) Johns Hopkins Univ. Applied Physics Lab., Laurel, MD (Elizabeth.Turtle@jhuapl.edu)
(2) Lunar and Planetary Lab., Univ. Arizona, Tucson, AZ
(3) NASA Goddard Institute for Space Studies, New York, NY
(4) Jet Propulsion Lab., Pasadena, CA
(5) Caltech, Pasadena, CA

Since Cassini's arrival at Saturn, the Titan's season has progressed from southern summer to just past the southern autumnal equinox (the equivalent of 12 January to 26 March), and accompanying changes in meteorology have been observed. Through 2004, large convective cloud systems were common over Titan's South Pole (e.g., Schaller et al., 2006); since 2005 such storms have been less common. Elongated streaks of clouds have been observed consistently at mid-southern latitudes, and became common at high northern latitudes in 2007. Only recently have clouds been detected at mid-northern latitudes. Changes have also been observed in surface features at high southern latitudes. A large dark area appeared between July 2004 and June 2005 (Turtle et al., 2009), and may have subsequently faded. Recent observations of Ontario Lacus suggest that its shoreline may have receded (e.g., Hayes et al., 2009). No changes have been observed to date in lakes and seas at high northern latitudes. Intriguingly, Cassini RADAR observations of Titan's South Pole reveal far fewer lakes than have been identified in the north (Stofan et al., 2007) and fewer than suggested by the number of dark features observed by ISS in this area (Turtle et al., 2009). This apparent discrepancy may indicate that not all of the dark south-polar features identified by ISS are filled with liquid. Alternatively, some lakes may be ephemeral: differences may be the result of precipitation and ponding of liquid methane and subsequent evaporation or infiltration thereof (Turtle et al., 2009) in the time between observations: ISS in mid-2004 and mid-2005 (equivalent of ~12 and ~25 January) and the RADAR observations starting in late 2007 (equivalent of ~28 February). We will present observations of Titan's meteorology and surface features, documenting seasonal changes and their implications for Titan's active methane cycle and atmospheric circulation.