CHARM: Cassini-Huygens Mission to Saturn 8th Anniversary, Titan Highlights

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Cassini Mission Overview Four-Year Prime Tour, Equinox Mission, and Solstice Mission (Proposed), May 2004 - September 2017

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Year of Tour	P r i 1 '04-'05	2	M is s 3 '06-'07	4	5	x Mission 6 '09-'10	7	8 '11-'12	t i c 9 '12-'13	10 '13-'14	M i s 11 '14-'15	12 15-'16	o n 13 '16-'17
Orbits	11	15	22	27	39	21	16	19	25	12	12	20	56
Titan *Huygens	***							•	•••				Proximal Orbits
Enceladus	9 9	•		•	9 9	• • • •	• •	0 0 0 0 0 0				• •	
Other Icy Satellites (under 10,000 km)	≫ Phoebe	Tethys Hyperion Dione Telesto Rhea		●Rhea ■ lapetus ③ Epimetheus		Mimas Rhea Helene Dione G arc	●Rhea ●Helene	Dione Dione Tethys Methone Telesto	Rhea		Dione Tethys	● Dione ∰Epimetheus ✓ G arc	50 03 03 05 05 05 05 05 05 05 05 05 05 05 05 05

(seen from Sun) 25 September 2012

CHARM: Cassini's 8th Anniversary -- Titan!



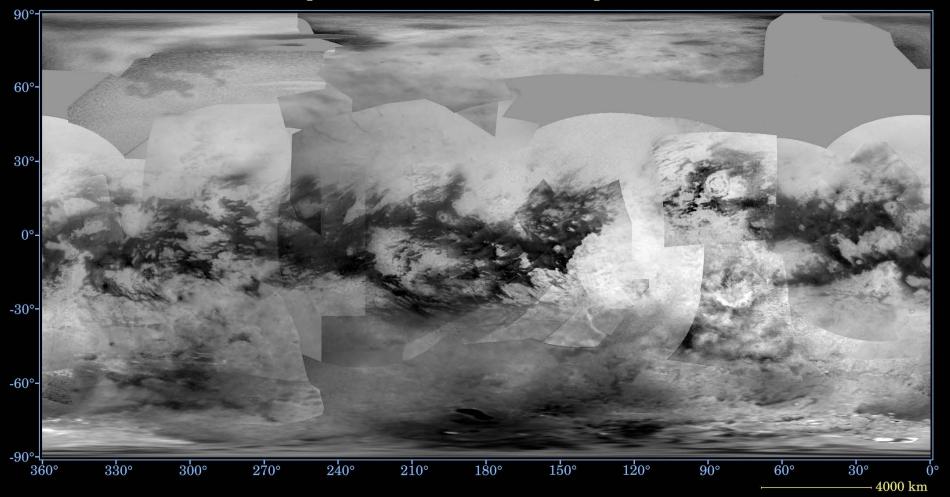
Titan Encounters:

T78, 12 Sept 2011 T79, 13 Dec 2011 T80, 2 Jan 2012 T81, 30 Jan 2012 T82, 19 Feb 2012 T83, 22 May 2012

T84, 6 June 2012 T85, 24 July 2012 T86, 26 Sept 2012

ISS map of Titan

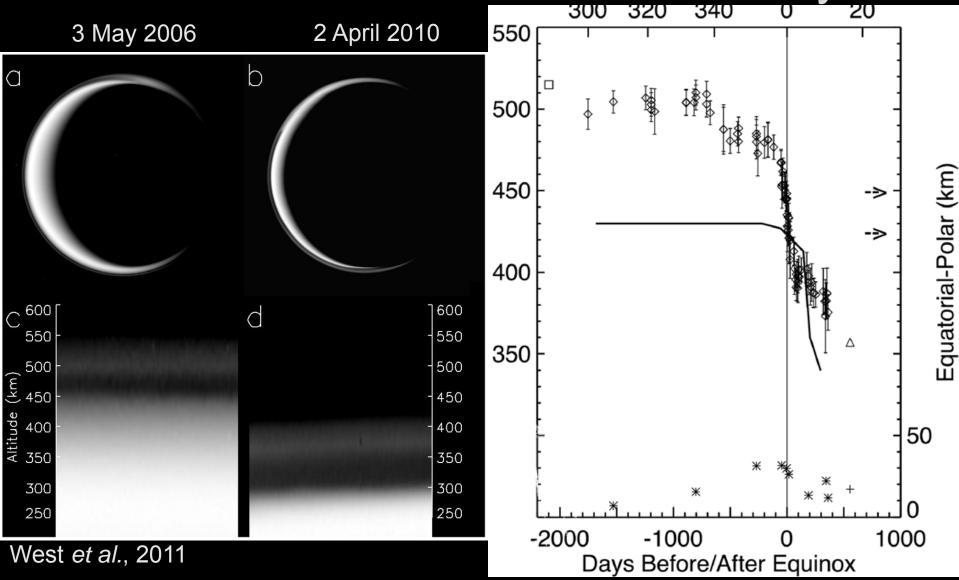
Map of Saturn's Moon Titan - April 2011



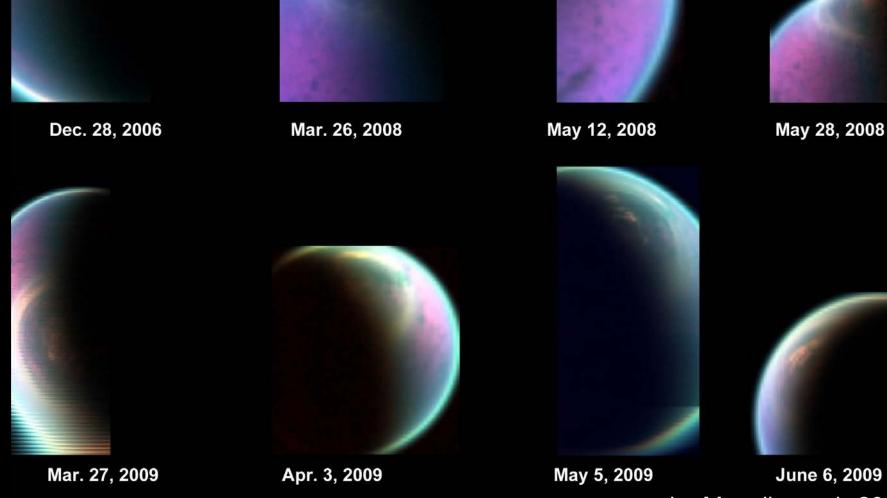
Seasonal changes

- Voyager 1, Nov. 1980 ≈ March 29
- Voyager 2, Aug. 1981 ≈ April 8
- Cassini SOI, 2 July 2004 ≈ mid-January
- 11 August 2009 ≈ Northern vernal equinox
- 27 Sept. 2010 ≈ early April; low-latitude storm
- 25 Sept. 2012 ≈ late April
- May 2017 ≈ Northern summer solstice

Seasonal changes: altitude of Titan's detached haze layer

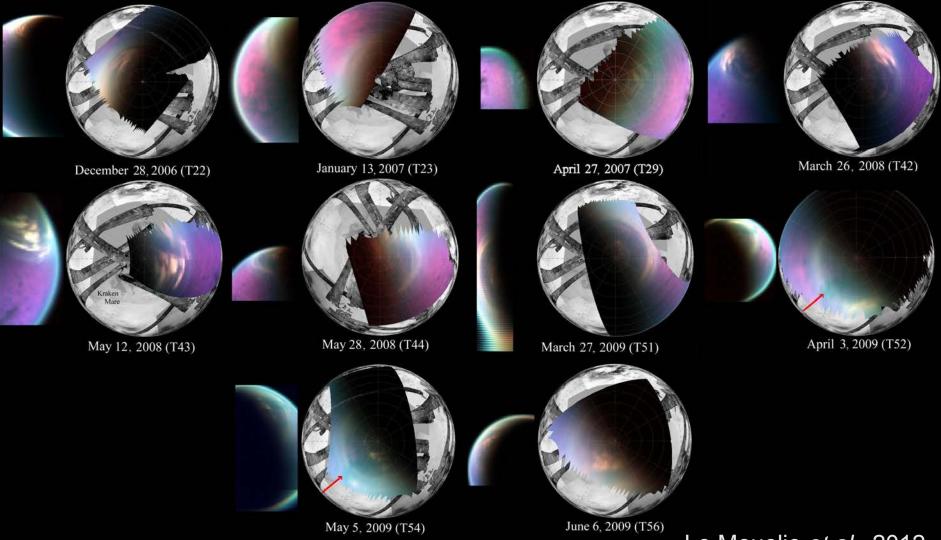


Seasonal changes: Dissipation of north-polar ethane cloud



June 6, 2009

Seasonal changes: Dissipation of north-polar ethane cloud

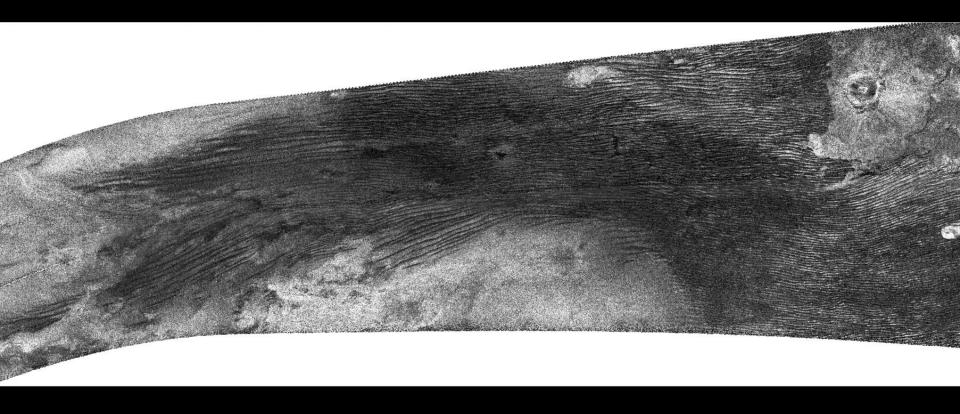


Seasonal changes: Development of southpolar vortex and hood of high-altitude haze

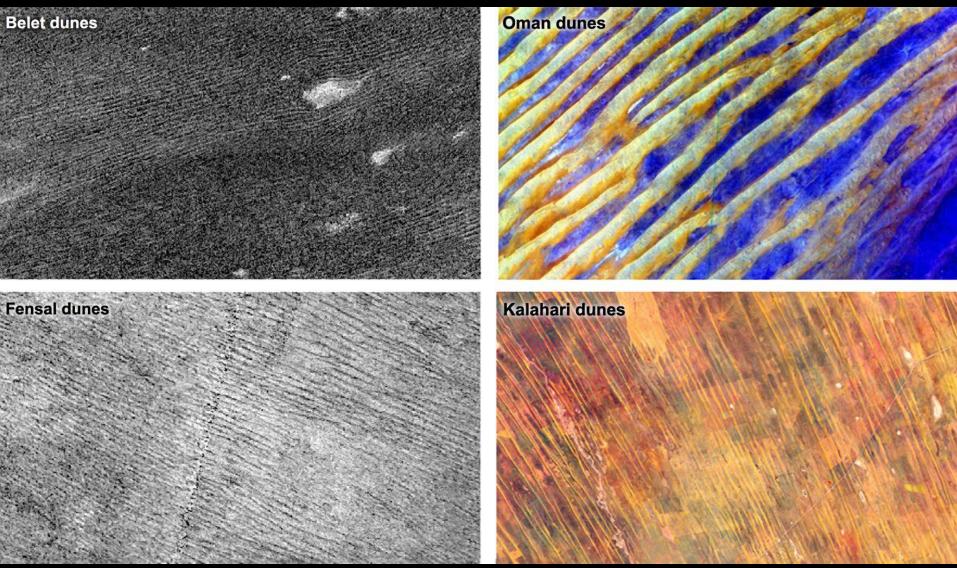


ISS, 27 June 2012

Dunes, Ksa Crater, and northwest Xanadu



Dunes exhibit variations with latitude and altitude (Le Gall *et al.*, *Icarus*, 2012)

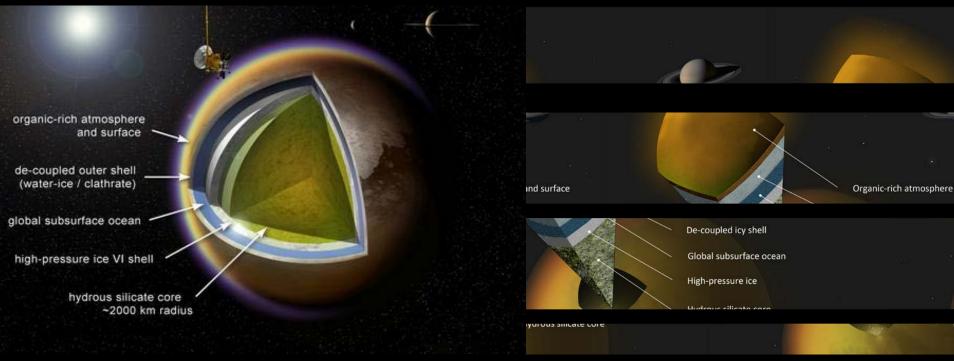


Lakes and methane supply



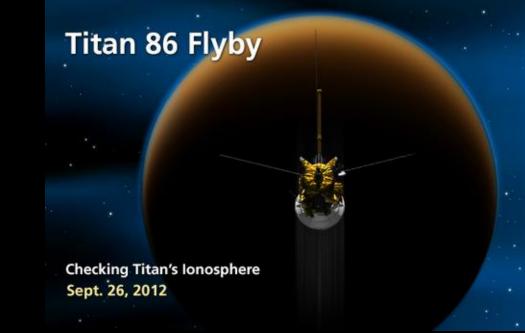
- Comparison of Ontario Lacus with Earth's Etosha salt pan (Cornet et al., 2012)
- Low-latitude oases near Shangri-La? (Griffith et al., 2012)
- Methane age <1 Gyr (CIRS data: Nixon et al., 2012; Cassini INMS, & Huygens GCMS data: Mandt et al., 2012)</p>

Shape and internal structure



- Moment of inertia and 10-m tides consistent with differentiated interior and internal global ocean (Fortes, PSS, 2012; less et al., Science 2012)
- (Animated illustration of tides @ http://saturn.jpl.nasa.gov/video/videodetails/?videoID=246)
- Extra global flattening due to Titan's weather and carbon cycle? (Choukroun and Sotin, GRL, 2012)

T86 26 Sept. 2011



- C/A altitude = 956 km
- INMS profile through ionosphere
- RADAR SAR imaging of southwest Ligeia Mare
- ISS, UVIS, CIRS observations including coverage of Adiri and the region where extensive surface changes were observed in the fall of 2010
- ISS cloud-tracking for an extra day after the encounter

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Prime Mission Equinox Mission Solstice Mission													
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Saturn (seen from Sun) 25 September 2012

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