Cassini Equinox Mission Quick-Look Flyby Facts

Enceladus E10 Encounter (Rev131)

Quick Facts

May 18, 2010 06:04:39 – Spacecraft Event Time -- (May 17, 11:04 p.m. Pacific Daylight Time [PDT])

Target: Enceladus

Altitude: 438 kilometers (272 miles)

High-res Enceladus

Computer generated view showing the "footprints," or areas of focus, for the narrow angle camera on the outbound leg.

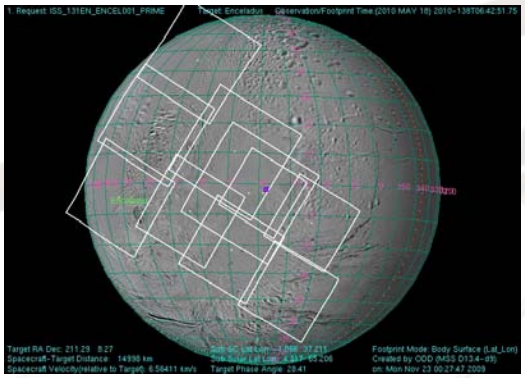
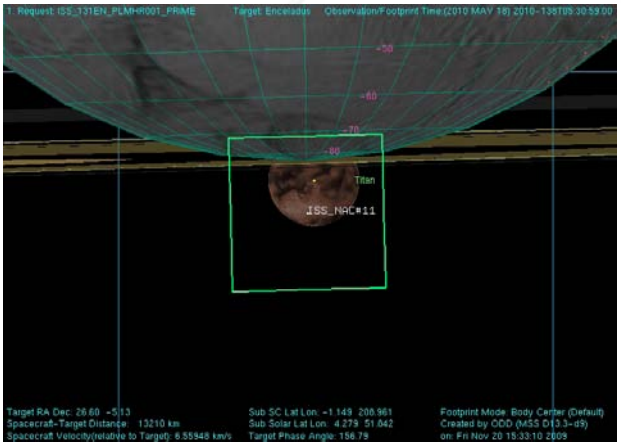


Image Opportunity

The last image of the observation will include a "Kodak moment" image opportunity as a crescent Titan and Saturn's rings pass through the field-of-view.



Science Highlights

Cassini will approach Enceladus on the moon's dark side and depart on the sunlit side providing optimal views of the plume and surface under different lighting conditions by optical remote sensing instruments.

The ultraviolet imaging spectrograph (UVIS) will observe the plume while backlit by the sun. Its main goal in this flyby is to search for and measure nitrogen in the plume. Enceladus, not Titan as originally expected, appears to be the source of nitrogen found in Saturn's inner magnetosphere. Identifying the presence and determining the source of nitrogen in Enceladus can provide clues to its subsurface composition and the processes that create the plume.

Surface temperatures will be mapped by the composite infrared spectrometer (CIRS) and obtain a global view of the moon's activity. The imaging science subsystem will also view the plume backlit by the sun.

On Enceladus' sunlit side, the imaging science subsystem will home in on the south polar jets that produce the plume. Looking back at Enceladus during Cassini's outbound leg, the optical remote sensing instruments will view the equatorial region of the illuminated hemisphere to map surface geology and will continue the search for light hydrocarbons and ices other than water ice.

Though data-taking by the optical instruments is the prime focus of this flyby, the cosmic dust analyzer (CDA) and the ion and neutral mass spectrometer (INMS) will also be active during closest approach to detect plume particles.

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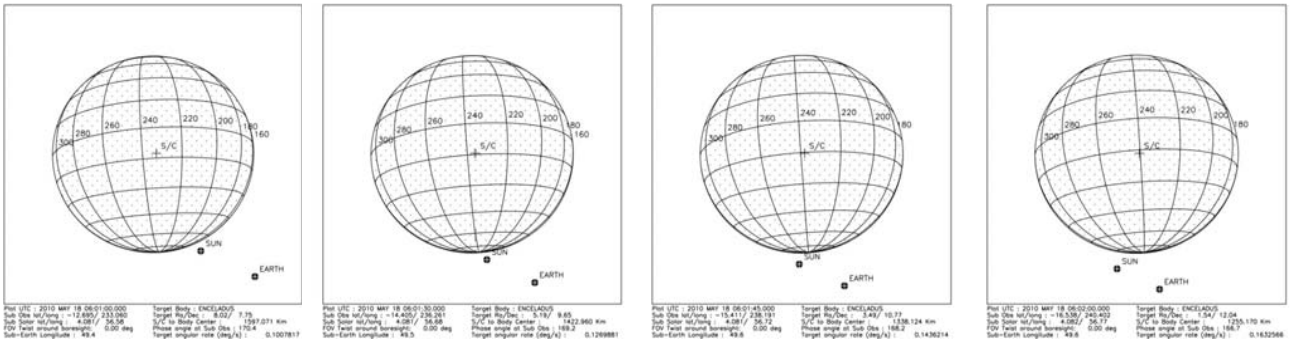
Significance of This Flyby

- During a clolse Enceladus flyby, the ultraviolet imaging spectrograph (UVIS) watches the sun go behind the plume to understand whether there is any nitrogen in the plume material.

Solar Occultation by the Plume

- Performing a solar occultation allows the UVIS to probe EUV (extreme ultraviolet) wavelengths, which is where nitrogen exhibits a distinctive spectral feature. Previously, UVIS has successfully performed stellar occultations, which probe the far-ultraviolet (FUV) wavelengths and allow for detection of species such as H_2O.
- The big scientific payoff is the chance to definitively detect / measure nitrogen in the plume, which is important for models of chemistry-driven dynamics in the interior of the moon.



The view from the spacecraft as it approaches Enceladus. Note that the sun passes below Enceladus (as seen by Cassini), through the plume.

Sequence of Events

- Dark approach
  - Thermal mapping by CIRS to search for variability in heat flux from Enceladus and to get a global view of the current activity of Enceladus
  - Plume observations by the imaging science subsystem to search for structure in the plumes and to relate them to hotspots on the surface. Variability will also be sought.
- UVIS solar occultation at closest approach
  - The big scientific payoff is the chance to definitively detect / measure nitrogen in the plume, which is important for models of chemistry-driven dynamics in the interior and to understand the source on nitrogen in the region of Saturn. ,
- Illuminated outbound
  - Optical Remote Sensing (ORS) mapping of equatorial leading hemisphere to map geologic features on the surface of Enceladus and to continue to search for light hydrocarbons and ices other than water ice.