Cassini Solstice Mission Quick-Look Flyby Facts

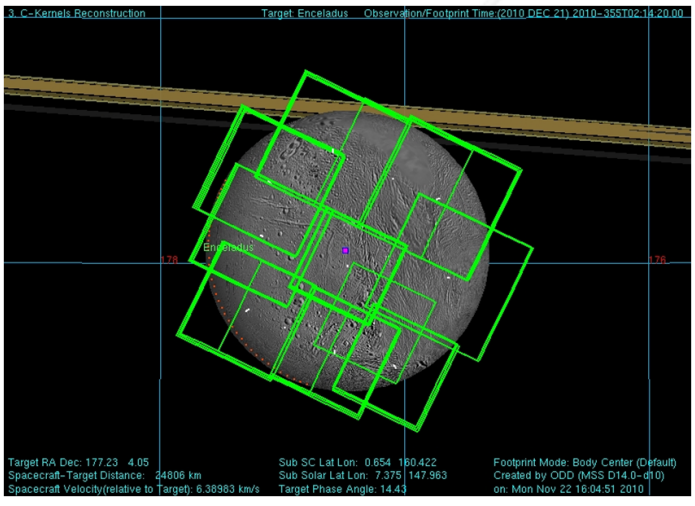
Enceladus E-13 Encounter (Rev 142)

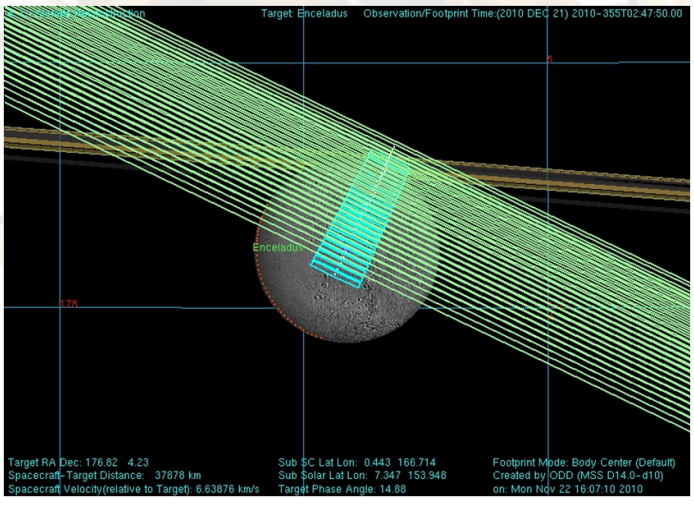
Closest Approach at 2010-355T01:08:26
December 21, 2010 (spacecraft event time)
Altitude: 48 km (29.8 miles)
Speed: 6.2 km/sec (~14,000 mph)
Closest Approach latitude: 61° N

- Closest Approach occurs just 2 hours after Periapse
- Third targeted Enceladus encounter in the Solstice Mission
- "Twin" flyby was E-12 in November 2010 – nearly exactly the same geometry

Science Highlights

The focus of this approximately 48-kilometer (30-mile) altitude, northern hemisphere flyby is the study of Enceladus's environment. Cassini has performed several Enceladus passes near the south pole, where the active plume spews vapor and water ice particles high above the surface. The south polar fly-bys have focused on studying plume composition and density, along with surface temperatures and geology. This northern hemisphere pass (E-13) will provide important comparative measurements to the south polar data. In particular, the fields-and-particles instruments will sample the environment at the northern hemisphere, searching for neutral and ionized gases, that could provide evidence for a global thin atmosphere, distinct from the south polar plume gases; instruments will also search for icy grains that have been ejected from the surface by micrometeoroid bombardment.





After closest approach, ISS will mosaic the dayside of Enceladus, and then CIRS and UVIS will scan the surface to make thermal and compositional maps.

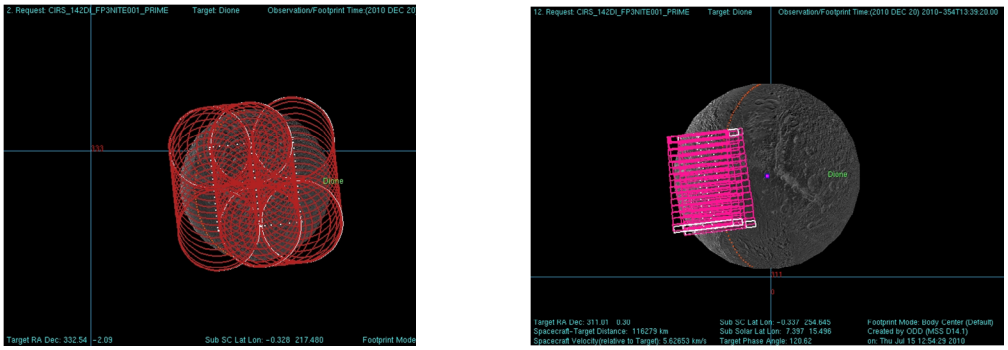
Sequence of Events

Prior to the Enceladus encounter, the Cassini spacecraft will fly by Enceladus's sister moon Dione at an altitude of approximately 100,000 kilometers (about 62,000 miles), allowing the remote sensing instruments great views of the trailing hemisphere of this interesting satellite, which is home to the "wispy" terrain – formerly thought to be possibly cryovolcanic deposits but now understood to be vast regions of bright tectonic fractures.

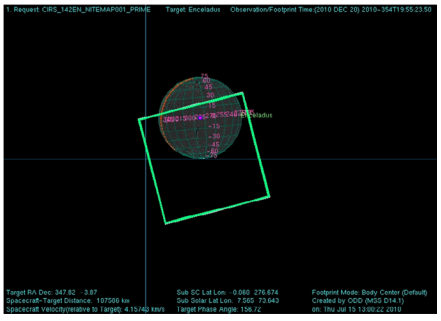
On the inbound leg of the trajectory by Enceladus, the instruments will make measurements of the Enceladus plume, as the surface will be in darkness while the plume, and jets that make up the plume, are illuminated by the sun. The composite infrared mapping spectrometer (CIRS) will do scans of nighttime temperatures at low latitudes, to better understand the thermophysical properties of the surface, to confirm heat flow models, and look for any hot spots away from the south pole.

During the closest approach period, the spacecraft will be oriented such that the fields-and-particles instruments obtain optimal measurements as the spacecraft whizzes by Enceladus at about 6.2 km/sec (about 14,000 mph).

On the outbound leg, ISS will image the dayside for geological mapping, while CIRS looks for hot spots and VIMS and UVIS make compositional measurements.



Prior to the Enceladus flyby, Cassini will encounter Dione at a distance of ~100,000 kilometers. The CIRS instrument will make temperature maps of the surface during scans such as those pictured here.



On the inbound leg of the Enceladus flyby trajectory, the phase angle is very high, enabling plume observations. Here, the ISS NAC is centered on the Enceladus south pole to observe the plume.