CASSINI SOST SEGMENT

Rev 228 (E22) Handoff Package

Segment Boundary 2015-353T03:44:00 to 2015-355T07:44:00

3 June 2015

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Science Highlights

Notes & Liens

CDA is focusing on radial scans of the composition of E ring ice grains. In contrast to previous measurements this is done with much higher spatial resolution and we are thus are more sensitive to compositional variations. The science goals are: high frequency recording of ice grains mass spectra to infer their composition independent of their radial position in the E ring, and by rocking the space craft we can infer the inclination of each of these ice grains: in contrast to the dense rings the E ring is „puffed up“ and particles are expected to show have a wide variety of inclinations at any given point. If we combine both measurements we get a 3 dimensional compositional profile of the E-ring.

The Aegaeon PIE observation corresponds to the closest encounter with the tiny (750 by 250 by 250 meter) moon Aegaeon in the Cassini mission. With a minimum range of around 2500 km, this observation provides the opportunity to actually resolve the moon's shape. We also hope to see whether this moon is as smooth as Saturn's other small moons Methone and Pallene. Furthermore, a previous encounter showed that this moon is as dark as the dark side of Iapetus. During the flyby we will obtain extensive measurements of the objects' brightness over a range of phase angles that will help clarify the origin of this dark material. This object is also embedded in an arc of debris, and this close encounter provides a chance for us to study the detailed interactions between Aegaeon and the ring material, as well as search for other small bodies in its vicinity.

CIRS_228DI_DIONE001 is is a distant (~200,000 km) flyby of the western edge of Dione's weak thermally anomalous region and the edge of its wispy terrain. CIRS will use FP3 to scan Dione, focusing on the sunlit areas where the signal-to-noise will be highest. The observations will be use to help constrain the magnitude of Dione's thermal anomaly and to search for endogenic activity across Dione's wispy terrain.

Inbound to E22 CIRS is prime with all ORS riding. Over its 2 hour duration the spacecraft range decreases from over 117,000 km to 26,000 km. The viewing perspective remains relatively constant: Cassini will be viewing the trailing side of Enceladus above the equator at a moderately low phase angle of about 47-degrees. During approach, ISS will alternate with CIRS to obtain high-resolution multi-filter mosaics. An important scientific objective is to obtain high-resolution color imaging of the leading hemisphere with sufficient spectral range from UV through Near-IR so that the data may be tied to UVIS and VIMS observations. In addition, the ISS mosaics will be important for improving the fidelity of stereo-derived topographic maps of the surface.

ALPBOO is a VIMS look at Arctutus (Alpha Boo) passing through the plumes, a red star too dim for CIRS to see. This occultation would be the first ever by VIMS, and is designed to understand the opacity of the plume as a function of wavelength. The results from a previous solar occultation suggest that the VIMS data is sensitive to dust particles, and that the opacity gets smaller at longer wavelengths, as one would expect for micron-sized particles. VIMS can also detect the water vapor in the plume so with simultaneous detection of water vapor and ice particles in the same wavelength region (2.7 to 3.2 microns), the vapor/solid ratio can be constrained. The column density of dust particles (as opposed to gas molecules) will be measured, to better compute the dust-to-gas ratio at specific locations in the plume

ENCELOUTB001 is the outbound leg of the E22 Enceladus flyby covering the closest approach period over the South Pole of Enceladus. It picks up from the inbound CIRS observation at 2015-353T17:23:00 and extends for 02:52:00. During closest approach, it will not be possible for the spacecraft to stably track Enceladus with the ORS instruments or to target a specific feature with the ISS NAC. Enceladus. Instead, ISS will conduct boresight-drag imaging in which the camera is shuttered as rapidly as possible in the CL1:CL2 filter bandpass. The objective is to obtain very high-resolution imaging (as fine as 31 m/pixel) of active South Polar Terrain features. At this time, the active tiger stripes will be in shadow. However, in earlier encounters ISS successfully obtained useful low-light level exposures.

The two plume observations are part of a campaign to monitor Enceladus's plume activity, and are spread throughout the orbit to help test theories of what causes the plume to vary, providing insight into Enceladus's interior and interactions with other satellites.

DIONE_COMPGLBL001 uses an opportunity to observe Dione at high phase angle (127-136°) and moderate spatial resolution (~2.3 km/pxl) to seek for signs of potential outgassing, similar (but much less extensive) as the plume observations of Enceladus. The viewing perspective is equatorial/ leading anti-Saturn side, thus the poles and meridians near ~10-50°W (illuminated side) and ~190-230°W (dark side) appear near the limb.

The observation ISS_228OT_HATSID026_PRIME is a disk-resolved, distant observation (14.7 million km range) of irregular moon Hati (diameter guess ~6 km). It is part of several Hati observations with the goal to determine the sidereal period, pole direction, and shape of this moon from lightcurves. The first two Hati observations in 2013 revealed a period of ~5.5 h, this is the fastest spin of all moons in the solar system where a rotation period is reliably known (which even led to a "nugget"). From the five Hati observations planned for August to December 2015, the one in SOST rev 228 is the final one and also the last ever observation of this object by Cassini.

UVIS_ZETAORI PIE: Occultations by UV-bright stars sense atomic and molecular hydrogen and some light hydrocarbons in Saturn's upper atmosphere. They are especially valuable because they provide detailed vertical profiles of these constituents and temperature in the region of the atmosphere (pressures around 1 nbar) where the heating mechanism is still unexplained, and where much of the conversion of methane to other hydrocarbons occurs. No other instrument senses this region. The near-equatorial samples are also important for mission operations because they give a measure of the density of the atmosphere where the orbiter will sample in the final five orbits. Previous UV occultations in this region showed expansion of the atmosphere until about 2011 and a small amount of shrinkage after that time. If the atmosphere is too dense when the orbiter enters it will tumble. If too rarefied the INMS instrument will not obtain a good in situ measure of the constituents.

Notes

- Pointing:
  - CDA plans to do some sort of “rocking” around –Y. It was supposed to be cooperative with CIRS but that pointing caused too much heating during the rocking. The secondary during CIRS Rhea CompGlobal is for CDA
  - Originally the closest approach time was going to be split between ISS and CIRS but then we noticed Arcturus (AlpBoo) passing through the plumes so that was worked in. Strangely enough CIRS is prime even though it’s too red for them to see it, but it was easier to have CIRS prime for 3 requests in a row so they can do internal custom handoffs.
  - ENCELOUTB has 157 degrees target motion over less than 3 hours, CIRS or the following ISS will include a 20 minute quiescent period
- Data Volume: no issues
- DSN:
  - I added a 3.5 hour DSS43 pass as the final two downlinks just barely empty an SSR. Could not fit in a dual playback. There is margin so with VCUT you should have flexibility during negotiations OR if there are RBOT issues you could shorten this downlink to squeeze in a YBIAS perhaps.
- Resource checker: none
- Opmodes: N/A
- Hydrazine: N/A
- Special Activities: None
- Liens: None