CASSINI SOST SEGMENT

Rev 220 (D5) Handoff Package

Segment Boundary 2015-229T04:53:00 to 2015-231T04:53:00

6 Aug 14

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Science Highlights

Notes & Liens

Science Highlights

Dione:

While riding along with CIRS, ISS observes the anti-Saturn side of Dione at low phase angle during approach of this moon until 2:40 hrs before closest approach. While RSS is doing a gravity experiment at closest approach, we also have an ORS drag of Dione's surface from approximately C/A-00:35 min to C/A+2:35 min (18:32:51 to 18:36:01) via the secondary of NEG_Y to RA/DEC 85.5/-69.7. The ORS boresights are oriented so that tiny parts of Dione's northern hemisphere can be observed over a few minutes at very high resolution, although Cassini is not tracking the surface. The visible details on the surface have a size of only a few meters, depending on image smear and some other observation parameters

RSS: the combination of D3, D4, and D5 events would improve the determination of J_2 by more than a factor of 3 and the determination of C_{22} by more than an order of magnitude. Such substantial improvements would enable us to have much stronger constraints on the internal structure of Dione and the rigidity of the outer ice shell, and to enable insightful comparisons with Saturn's other icy satellites.
Both D4 and D5 are particularly favorable for radio science observations. First, the configuration of Earth, Saturn, and Sun at the event times is such that they both have large solar elongation (SEP) angles, greatly reducing the influence of solar plasma (often the most important limiting noise source for RSS gravity science) on the Doppler measurements. Moreover, for both D4 and D5 the closest approach is covered by the Madrid Deep Space Complex, where the effects of the Earth troposphere can be properly calibrated because station DSS-55 of the Madrid complex is equipped with a state-of-the-art Advanced Media Calibration system (AMC).

For CIRS, daytime mapping of the western boundary of the thermally anomalous region and trailing hemisphere at better than 20 km/pixel, and night time mapping of the thermally anomalous terrain on Dione's leading hemisphere at better than 220 km/pixel. These data will help to characterize the spatial extent and magnitude of the thermal inertia anomaly.

For CDA the main goal is to detect dust particles emitted from Dione. This emission could either be active or passive (ejecta from larger grains impacting onto Dione's surface). First we want to distinguish these endogenic Dione particles from the E ring background and then, if we succeed, determine their composition with CDA's spectrometer.

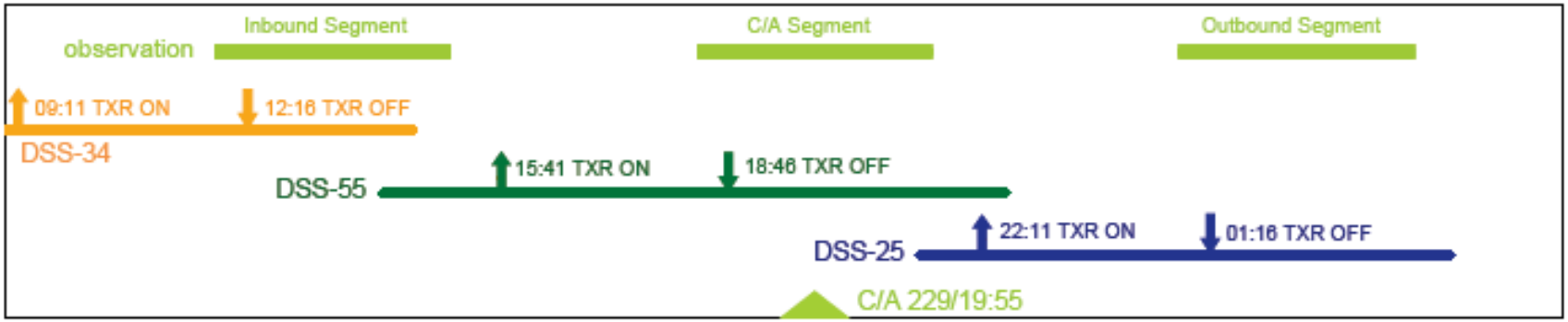
Tethys:
CIRS nighttime temperature mapping, at better than 20 km/pixel, of the thermally anomalous region's western boundary. These data will help to better characterize the spatial extent of Tethys' thermal anomaly. The ISS observations will concentrate on Odysseus, the largest impact basin of this moon. The spatial resolution of the NAC will be about 270 m/pxl.

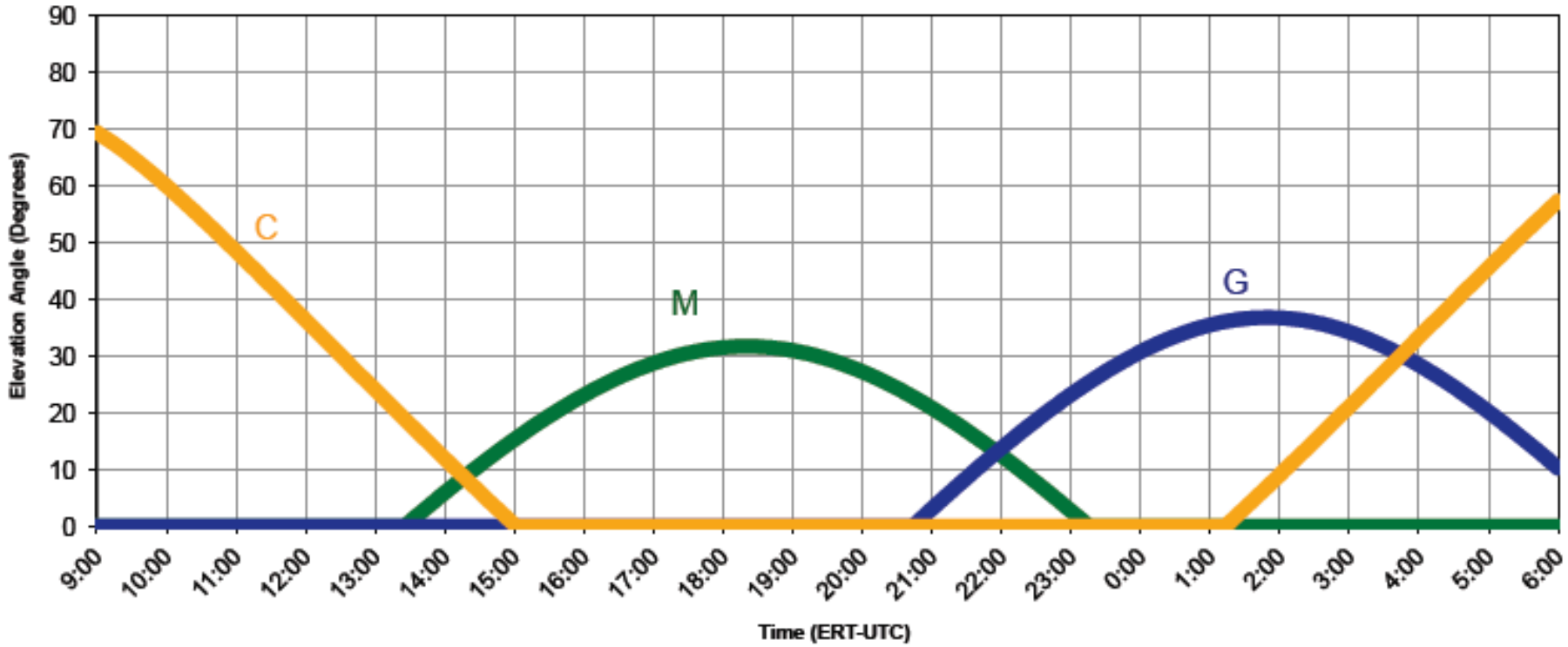
Enceladus remote-sensing observations will begin at 230T03:04 UTC. At a phase angle of approx. 90 deg, the visible parts of the surface will be located on the anti-Saturn side, the spatial resolution of the NAC images will be approx. 360 m/pxl. Later, between 07:00 and 09:00 UTC, the plumes of Enceladus will be observed.

Among the outer or irregular moons of Saturn, satellite Bestla will be observed twice near the end of the segment over a total time span of about 6 hrs to sample a lightcurve. The range to Bestla will be 12 million km, and this small, distant moon will appear only as a light dot in the Cassini images. These data are expected to be useful to determine the pole-axis orientation and a shape model of Bestla.

OWLT ~1:22
RTLT ~2:44

S90 Rev 220 RSS Dione D5 Gravity
2015 229-230 / August 17-18, 2015





AAnabtawi

Y bias and RSS

No Biases during (overlapping) the RSS science observations: Occultation experiments (rings, Saturn atmospheric, Titan, Satellite), Bistatic observations and prime gravity observations.

For gravity observations, the requirement is no biases (thruster firing) in arcs devoted to gravity observations. A gravity arc is defined as the time between the start of the first tracking pass and the end of the last pass, so if there's a gap in between the tracking passes, there should be no biases there as well. Any firing in this arc would destroy the coherence of the trajectory and would lead to an unpredictable result.

The thruster firing/bias keep-out zone is from beginning of inbound GSE until the end of the outbound GSE, with the most critical period being the prime gravity observation (beginning of 1st segment until the end of the third segment). See note below about the outbound GSE

For D5:
2015-228T20:08:00 to 2015-231T04:53:00
Critical period:
2015-229T08:53:26 to 2015-230T02:33:26

NOTE: there is a YBIAS window scheduled at 230T18:23 before the outbound GSE pass (our last downlink in this segment). I can't move the downlink earlier to place the YBIAS after the downlink because the station's viewperiod is exactly 9 hours long and we need all of it for data volume. At a sequence level and with VCUT you may be able to shorten this station to put a ybias at the back end. I've placed a SPLAT item on the ENGR_YBIAS request asking AACS to try to avoid using this particular window.

Notes

- Pointing:
  - This is an RSS gravity flyby. There are 3 parts to the gravity requests, with science in between each part. Parts 1 and 3 ride on downlinks. Part 2 (closest approach) also rides on a downlink, but there is a 10 minute gap in the downlink for ORS observations of Dione. (ISS is prime and knows not to do any turning. They have no pickup rate during downlink telemetry modes).The secondary for each downlink is different, mostly for turn time/health&safety reasons. The NEG_Y to 85.5/-69.7 secondary accomplishes the Dione ORS observation
  - The Earth waypoint/-Y RA/DEC has SRU FOV issues from 229-22:05 to 22:19: this is in a custom period, and the actual prime pointing is OK
  - Several requests have collaborative riders. Also, the secondary during the ISS_EN_PLM was chosen by CDA
- Data Volume: no issues
- DSN:
  - station requested during maintenance: DSS55 on doy 229, for the RSS gravity experiment. This station has an extended downtime following this observation so waiving weekly maintenance should be OK
  - Level 3 requests. In ERT: 2015-229T05:45:00 to 2015-230T04:30:00
    DSN Stations: 34, 55, 25
- Resource checker: Please mark as “ignore” at the sequence level

Disposition	Time	Request	Lien or Action
May go away in sequence merge. Opmode strategy validated.	2015-229T06:48:00	ENGR_220SC_RSSKRWAF229_PPS	Multiple OpMode requests where found prior to ENGR_220SC_RSSKRWAF229_PPS
Ignore, checker is comparing wrong requests!	2015-230T03:04:00	UVIS_220EN_ICYLON001_ISS	Rider request UVIS_220EN_ICYLON001_ISS start/end 2015-230T03:04:00/2015-230T03:34:00 <> Prime request UVIS_220EN_ICYLON001_CIRS start/end 2015-230T05:04:00/2015-230T06:04:00
Ignore, checker is comparing wrong requests!	2015-230T03:04:00	UVIS_220EN_ICYLON001_ISS	Rider request UVIS_220EN_ICYLON001_ISS start/end 2015-230T03:04:00/2015-230T03:34:00 <> Prime request UVIS_220EN_ICYLON001_PRIME start/end 2015-230T03:34:00/2015-230T05:04:00
OK, strategy validated	2015-229T11:54:00	CIRS_220DI_FP3SCAN001_PRIME	Turn away from downlink does not have the name WAYPTTURN
Yes it can!	2015-229T23:13:00	SP_220EA_DLTURN429_PRIME	Waypoint change cannot occur during a Custom Period

- Opmodes: RSS opmode RSSKRWAF does NOT require anything special, per Laura Burke
- Hydrazine: N/A
- Special Activities: None
- Liens: RSS thruster keep out zone: SPLAT item opened on ENGR_YBIAS request, please try to avoid placing a bias here