CASSINI SOST SEGMENT

Rev 131 Handoff Package

Segment Boundary 2010-137T13:31:00 – 2010-139T07:15:00

9 Nov 2009

Nora K. Alonge & Amanda Hendrix

SMT report and SPASS

Science Highlights

Notes & Liens

Integration Checklist

SMT report

https://cassini.jpl.nasa.gov/sp/icy/131EN/SOST_131EN_091109.rpt

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DATA VOLUME SUMMARY --- TRANSFER FRAME OVERHEAD INCLUDED (80 BITS PER 8800-BIT FRAME)
-----------------------------------------------------------------------------------------------------------------------
                                          |           OBSERVATION_PERIOD            |            DOWNLINK_PASS             |
                                          |----------------------------------------|-------------------------------------|
                                          |              P4              |    P5    | RECORDED |         PLAYBACK         |
                                          |------------------------------|----------|----------|-------------------------|
                            Start     End | START  SCI  HK+E  TOTAL CPACTY MRGN| OPNAV|  SCI  ENGR| TOTAL CPACTY MARGN  NET_MARGN  CAROVR|
   DOWNLINK PASS NAME     doy hh:mm doy hh:mm| (Mb)  (Mb) (Mb)  (Mb)  (Mb)  (Mb)| (Mb) | (Mb)  (Mb)| (Mb)  (Mb)  (Mb)  (Mb)  (%)  (Mb)|

SP_131EA_M70METNON138_PRIME 138 15:00 139 00:00    0  3200  125  3325  3548   223     0    412   53  3791  3688  -104    2   0%   103|
SP_131EA_G34BWGNON138_PRIME 139 00:00 139 07:15  103     0    0   103  3548  3445     0    537   43   683   685     2    2   0%     0|
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SSR PARTITION SIZE SUMMARY - SELECTED SSR CONFIGURATION: DOUBLE
---------------------------------------------------------------------
                                  SSR A/B
                         ----------------------------------
   OBSERVATION PERIOD     P4 Size    P5 Size    P6 Size
                          (Frames)   (Frames)   (Frames)
---------------------------------------------------------------------
SP_131NA_G70OBSNON138_NA   201784       446      25596
---------------------------------------------------------------------
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DATA VOLUME REPORT --- TRANSFER FRAME OVERHEAD NOT INCLUDED
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                            Start     End    CAPS   CDA   CIRS  INMS   ISS   MAG  MIMI  RADAR  RPWS  UVIS  VIMS  PROBE  ENGR  TOTAL
   Event                  doy hh:mm doy hh:mm (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)
-----------------------------------------------------------------------------------------------------------------------------------------------
OBSERVATION_NOR            137 13:31 138 15:00 421.0 363.7  87.5  43.1 588.0 119.0 112.2   0.0 542.4 521.9 370.0   0.0 124.2 3293.1
OBSERVATION_SI             137 13:31 138 15:00   0.0   0.0   2.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    2.0
SP_131EA_M70METNON138_PRIME 138 15:00 139 00:00 129.6 135.8   8.1   3.2   0.0  61.4  38.9   0.0  30.8   1.0   0.0   0.0   0.0  408.7
SP_131EA_G34BWGNON138_PRIME 139 00:00 139 07:15 104.4 109.4  78.3   2.6   0.0  51.6  31.3   0.0  24.8   4.0   0.0   0.0 125.4  531.8
DAILY TOTAL SCIENCE        137 13:31 139 07:15 655.0 608.9 175.9  48.9 588.0 232.0 182.4   0.0 598.0 526.9 370.0   0.0 249.6
```

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                                             CAPS   CDA   CIRS  INMS   ISS   MAG  MIMI  RADAR  RPWS  UVIS  VIMS  PROBE
                                             (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)  (Mb)
                                             -------------------------------------------------------------------------
TOTAL RECORDED (OPNAV data not included)     655.0 608.9 175.9  48.9 588.0 232.0 182.4   0.0 598.0 526.9 370.0   0.0
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SPASS

SOST rev 131

https://cassini.jpl.nasa.gov/sp/icy/131EN/SPASS_131EN_091109.pdf
https://cassini.jpl.nasa.gov/sp/icy/131EN/SPASS_131EN_091109.xls

Request	Riders	Start (SCET)	Start (Epoch)	Duration	End (SCET)	Primary	Secondary	Comments
Sequence S60, length = 34 days		2010-137T13:31:00		039T07:39:00	2010-176T21:10:00			
E10 Flyby Segment		2010-137T13:31:00		001T17:44:00	2010-139T07:15:00			
SP_131EA_S60IVP137_PRIME	M	2010-137T13:31:00		000T00:06:00	2010-137T13:37:00	XBAND to Earth	POS_X to NEP	S60 IVP Gap
UVIS_131EN_ICYATM001_PRIME	M	2010-137T13:37:00		000T04:43:00	2010-137T18:20:00	UVIS_FUV to Enceladus	POS_X to NSP	Offset, such that phase angle is reduced to allowable value. See observation description for general design goals. Duration of 4 hours allows for 30 min slew to and from Enceladus, and 3 integration sites.
SP_131EN_WAYPTTURN137_PRIME	M	2010-137T18:20:00		000T00:45:00	2010-137T19:05:00	ISS_NAC to Enceladus	NEG_X to NSP	
NEW WAYPOINT		2010-137T19:05:00		000T19:55:00	2010-138T15:00:00	ISS_NAC to Enceladus	NEG_X to NSP	
ISS_131EN_PLMHRHP001_PRIME	M, U, V	2010-137T19:05:00		000T04:03:00	2010-137T23:08:00	ISS_NAC to Enceladus	POS_X to NSP	
UVIS_131SA_USUNOCC001_PRIME	M, V	2010-137T23:08:00		000T03:08:00	2010-138T02:16:00	UVIS_SOL_OFF to Sun	POS_X to 10.5/-6.0	
SP_131NA_DEADTIME139_PRIME	M	2010-138T02:16:00		000T00:05:39	2010-138T02:21:39	ISS_NAC to Enceladus	NEG_X to NSP	
Begin Custom		2010-138T02:21:39	GMB_E131_Enceladus-000T03:43:00	000T00:00:01	2010-138T02:21:40	ISS_NAC to Enceladus	NEG_X to NSP	
CIRS_131DI_FP3SECLN001_PRIME	C, I, M, U	2010-138T02:21:39	GMB_E131_Enceladus-000T03:43:00	000T01:34:00	2010-138T03:55:39	CIRS_FP1 to Dione	NEG_X to NSP	Pick up at ISS_NAC to Enceladus, NEG_X to NSP; Hand off at CIRS_FP3 to Enceladus, NEG_X to NSP.
CIRS_131EN_FP1DRKMAP001_PRIME	I, M, U, V	2010-138T03:55:39	GMB_E131_Enceladus-000T02:09:00	000T00:29:00	2010-138T04:24:39	CIRS_FP3 to Enceladus	NEG_X to NSP	Pick up at CIRS_FP3 to Enceladus, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, NEG_X to NSP.
UVIS_131EN_ICYLIMB001_PRIME	M, V	2010-138T04:24:39	GMB_E131_Enceladus-000T01:40:00	000T00:56:00	2010-138T05:20:39	UVIS_FUV to Enceladus	NEG_X to NSP	Pick up at ISS_NAC to Enceladus, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, NEG_X to NSP. Turn off limb as far as possible given duration of observation. Pick lat/lon that will put slit tangent to limb given s/c orientation. Scan slowly (<10 micr...
ISS_131EN_PLMHR001_PRIME	M, U, V	2010-138T05:20:39	GMB_E131_Enceladus-000T00:44:00	000T00:12:00	2010-138T05:32:39	ISS_NAC to Enceladus	NEG_X to NSP	Pick up at ISS_NAC to Enceladus, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, NEG_X to NSP.
UVIS_131SU_ICYSUNOCC001_PRIME	M, V	2010-138T05:32:39	GMB_E131_Enceladus-000T00:32:00	000T00:48:00	2010-138T06:20:39	UVIS_SOL_OFF to Sun	NEG_X to 30.0/50.0	Pick up at ISS_NAC to Enceladus, NEG_X to NSP; Hand off at UVIS_SOL_OFF to Sun, NEG_X to NSP.
Begin Dual Playback Science...		2010-138T05:55:34	GMB_E131_Enceladus-000T00:09:05	000T00:00:01	2010-138T05:55:35			
131EN (t) E10 ENCELADUS In...		2010-138T06:04:39		000T00:00:01	2010-138T06:04:40			
End Dual Playback Science f...		2010-138T06:10:34	GMB_E131_Enceladus+000T00:05:55	000T00:00:01	2010-138T06:10:35			
ISS_131EN_ENCEL001_PRIME	C, M, U, V	2010-138T06:20:39	GMB_E131_Enceladus+000T00:16:00	000T00:44:00	2010-138T07:04:39	ISS_NAC to Enceladus	NEG_X to NSP	Pick up at UVIS_SOL_OFF to Sun, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, NEG_X to NSP. ISS_NAC to Enceladus
VIMS_131EN_ENCEL001_PRIME	C, I, M, U	2010-138T07:04:39	GMB_E131_Enceladus+000T01:00:00	000T00:31:00	2010-138T07:35:39	ISS_NAC to Enceladus	NEG_X to NSP	Pick up at ISS_NAC to Enceladus, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, NEG_X to NSP.
ISS_131EN_ENCEL002_PRIME	C, M, U	2010-138T07:35:39	GMB_E131_Enceladus+000T01:31:00	000T00:20:00	2010-138T07:55:39	ISS_NAC to Enceladus	NEG_X to NSP	Pick up at ISS_NAC to Enceladus, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, NEG_X to NSP. ISS_NAC to Enceladus
VIMS_131EN_ENCEL002_PRIME	C, I, M, U	2010-138T07:55:39	GMB_E131_Enceladus+000T01:51:00	000T01:09:00	2010-138T09:04:39	ISS_NAC to Enceladus	NEG_X to NSP	Pick up at ISS_NAC to Enceladus, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, NEG_X to NSP.
Periapse R = 3.518 Rs, lat ...		2010-138T08:31:30		000T00:00:01	2010-138T08:31:31			
CIRS_131EN_FP3DAYMAP001_PRIME	I, M, U, V	2010-138T09:04:39	GMB_E131_Enceladus+000T03:00:00	000T02:00:00	2010-138T11:04:39	ISS_NAC to Enceladus	NEG_X to NSP	Pick up at ISS_NAC to Enceladus, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, NEG_X to NSP.
End Custom		2010-138T11:04:39	GMB_E131_Enceladus+000T05:00:00	000T00:00:01	2010-138T11:04:40	ISS_NAC to Enceladus	NEG_X to NSP	
SP_131NA_DEADTIME138_PRIME	M	2010-138T11:04:39	GMB_E131_Enceladus+000T05:00:00	000T00:05:21	2010-138T11:10:00	ISS_NAC to Enceladus	NEG_X to NSP	
UVIS_131EN_ICYATM002_PRIME	M	2010-138T11:10:00		000T03:13:00	2010-138T14:23:00	UVIS_FUV to Enceladus	NEG_X to NSP	See observation description. Duration of 4 hours allows for 30 min slew to and from Enceladus, and 3 integration sites.
SP_131EA_DLTURN138_PRIME	M	2010-138T14:23:00		000T00:37:00	2010-138T15:00:00	XBAND to Earth	NEG_X to NSP	
NEW WAYPOINT		2010-138T15:00:00		000T16:15:00	2010-139T07:15:00	XBAND to Earth	NEG_X to NSP	
SP_131EA_M70METNON138_PRIME	C, E, M, R	2010-138T15:00:00		000T09:00:00	2010-139T00:00:00	XBAND to Earth	Rolling/SRU	
Pointer Reset in preparatio...		2010-139T00:00:00		000T00:00:01	2010-139T00:00:01			
SP_131EA_G34BWGNON138_PRIME	C, M, R	2010-139T00:00:00		000T07:15:00	2010-139T07:15:00	XBAND to Earth	Rolling	

Science Highlights

May 17 - 19, 2010 (DOY 137-139)

These ~ 42 hours encompass the targeted E10 (rev 131) Enceladus flyby at a closest-approach altitude of 438 km.

DOY 137: UVIS starts the segment with a nearly 5-hour Icy Atmosphere observation to map volatiles in the system in the immediate neighborhood of Enceladus. Observations will test the connection of volatile changes to plume eruptions. ISS will then do a high resolution plume observation at high phase before UVIS observes the egress of a solar occultation of Saturn.

DOY 138: Flyby day! This is an ORS-centric flyby. Before the Enceladus activities begin, CIRS starts off a custom hand-off period with a long Dione observation. CIRS then observes Enceladus with a full disk raster scan. UVIS takes over prime pointing to observe volatiles off the limb of Enceladus before another high-resolution ISS plume image. At closest approach to Enceladus, UVIS has prime control of the spacecraft for an ingress/egress solar occultation of Enceladus' plume. The EUV solar occultation port will be centered on the sun. VIMS will be a rider during the solar occultation to make the first ever near-infrared transmission measurements of Enceladus' plumes. These measurements will allow very sensitive tests for other compounds, including carbon monoxide, various organics, water gas versus water ice, hydrogen sulfide and other compounds. The slow orbital velocity will enable a detailed profile of compounds to be constructed, perhaps showing compositional differences between the various plume source regions.

After C/A, ISS and VIMs (with ORS and MAPS riders) will each do some post-flyby imaging of Enceladus before CIRS takes over for an FP3 global scan of the satellite. The segments ends with an additional UVIS Icy Atmosphere volatile observation before turning to Earth to downlink all the data.

DOY 139: Cassini continues to downlink the Enceladus flyby data, finishing a 9-hour 70-meter Madrid downlink and starting the dual playback of high-value data (15 min. at C/A) utilizing a DSN beam-wave-guide antenna at the Goldstone complex in California.

Y bias data volume

SOST has discussed the possible need for data volume cuts if the post-flyby DL (70m) is chosen for a Y-bias. Standard across-the-board cuts is not the preferred option. SOST Leads will call an emergency data cut discussion to finalize agreements if/when a Y-bias is implemented on the main DL. Note that there is also a 7 hr 15 min BWG immediately following the main 9-hr DL that could be used and/or upgraded to lessen DV impact if necessary.

Cassini**XM**
EXTENDED MISSION

Notes and Liens

- Pointing:

    - Main flyby WP (-Y to EN, -X to NSP) goes bad (CIRS, VIMS radiator FR violations and ORS to Sun) for ~5 min. at C/A. We are in a custom period here, so all should be fine.
    - Y-bias window is over the DL on a 70m (see p.5)
    - RBOT friendliness: Majority of segment uses the WP attitude or nearly, but since it is a flyby, this may/may not cause RBOT issues. (always unknown)
    - Prime/rider coordination for all ORS observations during flyby custom period (10 total):

        1st: CIRS_131DI_FP3SECLN001_PRIME @ 2010-138T02:21:39 (GMB_E131_Enceladus-000T03:43:00)

        Last: CIRS_131DI_FP3DAYMAP001_PRIME @ 2010-138T09:04:39 (GMB_E131_Enceladus+000T03:00:00)

        (and all primes in between)

- Data Volume:

    - No negative SSR margin. No carryover. Dual PB for 15 min. around C/A (125 Mb).

- DSN:

    - No stations requested in maintenance.

- Opmodes:

    - No unique opmodes or agreements.

- Special Activities:

    - None

Sequence Liens:

- None besides data cuts if Y-bias is placed on the post-flyby DL.

Segment Checklist p1

Item	Disposition notes, or X if complete
1. Disposition all requests in CIMS - approve all pending requests, no outstanding revisions/new requests	x
2. Version the SPASS in CIMS, use label INTEG_FIN, in description put date and your name	x
3. Examine SPASS, ensure SP turns correctly designated PRIME or NEW WAYPOINT. Review Ybias presentation. Prime RSS observations require the Xband to Earth attitude be a waypoint, use DLTURN with spass type New Waypoint	x
4. Waypoints and downlinks are violation free (per CTV). NOTE ON ISSUES PAGE if periods of no valid waypoint	x - see p.6
5. SP turns have been checked and are violation free. All large turns >60 degrees use the slower XM slew rates and include turn margin as specified in the Extended Mission slew margin policy. Exceptions to this rule are specified in FR07D145	x
6. YBIAS windows have been included as required, guidelines for integration met per MP forum package	x
7. There are no more than 3 waypoint changes in a 24 hour period (DLTURN waypoints for YBIAS do not count)	x
8. The minimum prime instrument request duration outside ±5 hours from a targeted satellite flyby is 30 minutes	x
9. Custom handoffs are limited to ±3 hours around a targeted Titan or Icy Satellite flyby	C/A - 3:43 to + 5 hrs
10. Custom periods 1) designated properly with SPASS notes 2) requests have "pick up at" and "hand off at" information filled in correctly 3) turn times and handoff attitudes have been verified – early PDT work recommended!	x - #1 & #2 #3: Instrument reps say so…
11. Prime/rider coordination: secondaries have all been reviewed and agreed to, co-designed observations are so designated, pre-designed in PDT	X - collaborative riders listed. Rest say they've reviewed 2ries
12. Use rolling_sru if required per CTV checks	x
13. The secondary axis for downlinks that contain prime and backup OTMs is the same, and inertially fixed	N/A
14. Downlinks that contain OTPs only roll for the first 4 hours of the downlink pass max. OTB: 6_hr rolling OK, unless SRU issues, then 4_Hr_Rolling max	N/A
15. There is one downlink pass block per OTM prime or backup window (one wedding cake for a split pass). Exception - if first split downlink pass is ≤4 hours can use 2 cakes, put playback_gap in 2nd pass, put OTP/OTB in name of BOTH passes (for CDA)	N/A
16. Downlinks (attitude/rolling) match XMDLWG plan. Negotiated changes should be reported back to the WG	x

Segment Checklist p2

Item	Disposition notes, or X if complete
17. Multi-revolution turns about the X-axis have an offset greater than or equal to 30 degrees about Z	N/A
18. Live moveable blocks (LMBs) include the appropriate time margin specified as a DEADTIME request in CIMS at the beginning and end of the moveable block. TLM modes in separate OBSMOV request (n/a for RSS)	N/A
19. Live moveable blocks use an LMB epoch and use the appropriate epoch naming conventions. Live Update Blocks use a LUB epoch (RSS only)	N/A
20. All stellar occultation observations include an additional +/-20 minutes of time (40 minutes total) when they occur within -1 day to +2 days of Saturn periapse	x
21. All Ground and Live Moveable blocks associated with non-targeted geometric events (e.g., solar and earth occultations) include an additional +/-20 minutes of time margin (40 minutes total) to account for reference trajectory changes.	Included >5 min. deadtime - updated epoch for 091005 ref traj (though this is a targeted flyby)
22. Check your GMB, LMB, LUB, Occ times against current reference trajectory	x
23. Dual playback of high value science data is performed via multiple playbacks within this segment. CIMS entries are correct. Dual playback does not affect downstream segments	x
24. Run the resource checker in CIMS and fix errors found. Paste remaining notes here with disposition	x
25. Run SMT, if SSR not empty at end of segment include in notes, and instances of <-90 SSR margin	(see notes page)
26. Examine SMT warnings report, include dispositions here of any items (negative SSR margin should already be on notes page)	x - no warnings

Segment Checklist p3

Item	Disposition notes, or X if complete
27. Examine "ap_downlink report check" output, include dispositions here of any items (see next two items).	x
28. List any DSN stations requested during maintenance periods, AND JUSTIFICATION. **AVOID!!!!!**	none
29. List your percent 70M stations requested - avoid >35%	1 of 2: 50%
30. Examine "ap_downlink report nav" output, MP should ensure NAV OK with gaps in 2way	x - no gaps
31. In CIMS check for "start before", "end before", "start after", "end after" requests - fix if any problems found	x
32. Verify OPNAVs are in SNER5 and are support_image class, sanity check rest of tlm modes (Tilmann often wants SNER5, RADAR 15 min in 5A/activity in 5A or 8, etc)	x
33. If sequence boundary at START of your segment, ensure IVPGAP info correct, NO "start before" MAPS requests	x - yes: start of S60, all ok
34. If sequence boundary at END of your segment (ie in the next segment), ensure 6 "SEQ" upload DSN passes - will probably ripple into preceding segment(s), make sure to notify them. Last pass has Ybias window in front, no bonus science. NO "end after" MAPS requests	N/A
35. Verify opmodes correct (RSS and RADAR especially), teams going to sleep have agreed? Use table at https://cassini.jpl.nasa.gov/wiki/bin/view/Cassini/XMOpModes	x
36. Compare RSS requests to DSN requests, make sure they jive (ORT, occ, etc), ORTs are integrated.	x
37. If conjunction is in your segment, see Conjunction page on SP Wiki	N/A
38. RAMAVOID: new waypoint, NOT in custom period	N/A
39. If on thrusters, confirm deadbands	N/A
40. Segment products & this package linked to XM deliveries page	x