SOST: Handoff Package for Rev 61
3rd Targeted Enceladus Flyby

Segment Boundary 2008-072T02:36:00 – 2008-073T09:51:00

January 15, 2004

Amanda Hendrix, Bonnie Buratti, Rosaly Lopes

SOST Rev 61

- Science to be accomplished during this flyby:
  - Radar scatterometry of both hemispheres of Enceladus to determine surface and near-surface roughness at cm scales and radiometry to determine the energy balance of Enceladus;
  - compositional mapping of Enceladus at sub-km spatial resolution to determine the identity and extent of ices and their relationship to geological features;
  - meter-scale resolution imaging to determine geological structures and the satellite's history;
  - MAPS examination of the particle environment at ~100 km from the surface to determine the nature of material coming off the surface and the relationship between the satellite and the E-ring;
  - CIRS measurements of the warm-up of Enceladus exiting solar eclipse to determine surface heat capacity and textural properties.

Attitude Strategy

Request	Riders	Start(SCET)	Start(Epoch)	Duration	End(SCET)	Primary Pointing	Secondary Pointing	Comments
Sequence S038, length = 36 ...		2008-047T11:51:00	E059_SEQUENCE_038+000T00:00:00	035T13:59:00	2008-083T01:50:00			
SOST rev 61 Segment		2008-072T02:36:00		001T07:15:00	2008-073T09:51:00			
SP_061RA_WAYPTTURN072_PRIME	C, M	2008-072T02:36:00		000T00:34:00	2008-072T03:10:00	ISS_NAC to 103.38/-4.11	NEG_X to Sun	19.9 min turn from -Z to EA, -X to NEP; safe WP
NEW WAYPOINT		**2008-072T03:10:00**		**001T06:41:00**	**2008-073T09:51:00**	**ISS_NAC to 103.38/-4.11**	**NEG_X to Sun**	
SP_061NA_DEADTIME072_PRIME	**M**	**2008-072T03:10:00**		**000T00:15:00**	**2008-072T03:25:00**	**ISS_NAC to 103.38/-4.11**	**NEG_X to Sun**	
Begin Custom		**2008-072T03:25:00**						
RADAR_061OT_WARMUP4EN002_PRIME	M	2008-072T03:25:32	GMB_E061_Enceladus-000T15:40:00	000T00:15:00	2008-072T03:40:32	ISS_NAC to 103.38/-4.11	NEG_X to Sun	Pick up at ISS_NAC to 103.38/-4.11, NEG_X to Sun; Hand off at ISS_NAC to 103.38/-4.11, NEG_X to Sun. No pointing for RADAR; just taking 15 minutes of data in SNER_5A. No constraints on primary nor secondary axis.
VIMS_061EN_ENCELADUS001_PRIME	C, I, M, R, U	2008-072T03:40:32	GMB_E061_Enceladus-000T15:25:00	000T08:45:00	2008-072T12:25:32	ISS_NAC to Enceladus	POS_Z to Sun	Pick up at unknown, unknown; Hand off at unknown, unknown. Pickup at ISS_NAC to 103.38/-4.11, Drop off at ISS_NAC to Enceladus, POS_Z
ISS_061EN_PHOTPOL001_PRIME	C, R, U, V	2008-072T12:25:32	GMB_E061_Enceladus-000T06:40:00	000T02:10:00	2008-072T14:35:32	ISS_NAC to Enceladus	POS_Z to Sun	Pick up at ISS_NAC to Enceladus, POS_Z to Sun; Hand off at ISS_NAC to Enceladus, POS_Z to Sun. Pick-up at ISS_NAC to Enceladus, POS_Z to Sun.Offset ISS_NAC to center of crescent for UVIS rider.
RADAR_061EN_SCATTRAD001_PRIME	C	2008-072T14:35:32	GMB_E061_Enceladus-000T04:30:00	000T02:00:00	2008-072T16:35:32	NEG_Z to Enceladus	NEG_X to North_Pole_Dir	Pick up at ISS_NAC to Enceladus, POS_Z to Sun; Hand off at NEG_Z to Enceladus, NEG_X to North_Pole_Dir. Pick up from ISS (NAC to EN, +Z Sun). Handoff to CIRS at RADAR att. (CIRS picks up) at -Z EN, -X pole_dir. RADAR must control primary and secondary a..
CIRS_061EN_FP34MAP001_PRIME	I, M, U, V	2008-072T16:35:32	GMB_E061_Enceladus-000T02:30:00	000T00:40:00	2008-072T17:15:32	ISS_NAC to Enceladus	POS_Z to Sun	Pick up at NEG_Z to Enceladus, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, POS_Z to Sun.
VIMS_061EN_ENCELADUS002_PRIME	C, I, M, U	2008-072T17:15:32	GMB_E061_Enceladus-000T01:50:00	000T00:30:00	2008-072T17:45:32	ISS_NAC to Enceladus	POS_Z to Sun	Pick up at unknown, unknown; Hand off at unknown, unknown. Pick up at ISS_NAC to Enceladus, Handoff at POS_Z ISS_NAC to Enceladus, POS_Z
UVIS_061EN_ICYMAP012_PRIME	C, I, M, V	2008-072T17:45:32	GMB_E061_Enceladus-000T01:20:00	000T00:30:00	2008-072T18:15:32	ISS_NAC to Enceladus	POS_Z to Sun	Pick up at ISS_NAC to Enceladus, POS_Z to Sun; Hand off at ISS_NAC to Enceladus, POS_Z to Sun.
CIRS_061EN_FP1INMAP001_PRIME	M, U, V	2008-072T18:15:32	GMB_E061_Enceladus-000T00:50:00	000T00:18:00	2008-072T18:33:32	ISS_NAC to Enceladus	POS_Z to Sun	Pick up at ISS_NAC to Enceladus, POS_Z to Sun; Hand off at ISS_NAC to Enceladus, POS_Z to Sun.
ISS_061EN_REGMAP002_PRIME	C, M, U, V	2008-072T18:33:32	GMB_E061_Enceladus-000T00:32:00	000T00:13:00	2008-072T18:46:32	ISS_NAC to Enceladus	NEG_X to SC_RAM	Pick up at ISS_NAC to Enceladus, POS_Z to Sun; Hand off at ISS_NAC to Enceladus, NEG_X to SC_RAM. Pick-up at ISS_NAC to Enceladus, POS_Z to Sun; hand off at ISS_NAC to Enceladus, -X to Enceladus SC Ram
CAPS_061EN_ENCLDSPTG001_PRIME	C, I, M, U, V	2008-072T18:46:32	GMB_E061_Enceladus-000T00:19:00	000T00:24:00	2008-072T19:10:32	NEG_X to SC_RAM	POS_Y to COROT	Pick up at ISS_NAC to Enceladus, NEG_X to SC_RAM; Hand off at NEG_X to SC_RAM, POS_Y to COROT. S/C ram is with respect to Enceladus, corotation is with respect to Saturn. Corotation is defined in the PDT sense.
CIRS_061EN_FP1MAPSOU001_PRIME	I, M, U, V	2008-072T19:10:32	GMB_E061_Enceladus+000T00:05:00	000T00:50:00	2008-072T20:00:32	ISS_NAC to Enceladus	POS_Z to Sun	Pick up at NEG_X to SC_RAM, POS_Y to COROT; Hand off at ISS_NAC to Enceladus, POS_Z to Sun.
RADAR_061EN_SCATTRAD002_PRIME	C, M	2008-072T20:00:32	GMB_E061_Enceladus+000T00:55:00	000T00:50:00	2008-072T20:50:32	NEG_Z to Enceladus	NEG_X to North_Pole_Dir	Pick up at ISS_NAC to Enceladus, POS_Z to Sun; Hand off at NEG_Z to Enceladus, NEG_X to North_Pole_Dir. Pick up from CIRS NAC to EN, +Z Sun. Handoff at RADAR att. (CIRS picks up) at -Z EN, -X Pole_dir. RADAR must control primary and secondary axes to o..
CIRS_061EN_FP1SECLX001_PRIME	I, M, U, V	2008-072T20:50:32	GMB_E061_Enceladus+000T01:45:00	000T01:10:00	2008-072T22:00:32	ISS_NAC to Enceladus	POS_Z to Sun	Pick up at NEG_Z to Enceladus, NEG_X to NSP; Hand off at ISS_NAC to Enceladus, POS_Z to Sun.
UVIS_061EN_ICYLON046_PRIME	C, I, M, V	2008-072T22:00:32	GMB_E061_Enceladus+000T02:55:00	000T02:04:28	2008-073T00:05:00	ISS_NAC to Enceladus	POS_Z to Sun	Pick up at ISS_NAC to Enceladus, POS_Z to Sun; Hand off at ISS_NAC to 103.38/-4.11, NEG_X to Sun.
End Custom		**2008-073T00:05:00**						
SP_061NA_DEADTIME073_PRIME	**M**	**2008-073T00:05:00**		**000T00:15:00**	**2008-073T00:20:00**	**ISS_NAC to 103.38/-4.11**	**NEG_X to Sun**	
SP_061EA_DLTURN073_PRIME	M	2008-073T00:20:00		000T00:31:00	2008-073T00:51:00	XBAND to Earth	POS_X to NEP	
SP_061EA_G70METOPN073_PRIME	C, M, U	2008-073T00:51:00		000T09:00:00	2008-073T09:51:00	XBAND to Earth		

Telemetry Modes

TELEMETRY MODE REPORT

SCET	TELEMETRY MODE	REQUEST
2008-072T02:36:00.000	"S_N_ER_3"	SP_061NA_G70OBSOPN073_NA
2008-072T03:25:32.000	"S_N_ER_5A"	SP_061NA_G70OBSOPN073_NA
2008-072T03:40:32.000	"S_N_ER_3"	SP_061NA_G70OBSOPN073_NA
2008-072T14:35:32.000	"S_N_ER_8"	SP_061NA_G70OBSOPN073_NA
2008-072T16:35:32.000	"S_N_ER_3"	SP_061NA_G70OBSOPN073_NA
2008-072T18:46:32.000	"S_N_ER_2"	SP_061NA_G70OBSOPN073_NA
2008-072T20:00:32.000	"S_N_ER_8"	SP_061NA_G70OBSOPN073_NA
2008-072T20:50:32.000	"S_N_ER_3"	SP_061NA_G70OBSOPN073_NA
2008-073T00:51:00.000	"RTE_N_SPB_124425"	SP_061EA_G70METOPN073_PRIME
2008-073T01:21:00.000	"RTE_N_SPB_142200"	SP_061EA_G70METOPN073_PRIME
2008-073T02:21:00.000	"RTE_N_SPB_165900"	SP_061EA_G70METOPN073_PRIME
2008-073T08:51:00.000	"RTE_N_SPB_142200"	SP_061EA_G70METOPN073_PRIME

Op Modes

ENGR_061SC_RADWU072_PPS	2008-072T03:25:32	GMB_E061_Enceladus-000T15:40:00	000T00:00:07
ENGR_061SC_RADRWA072_PPS	2008-072T14:35:32	GMB_E061_Enceladus-000T04:30:00	000T00:00:44
ENGR_061SC_RADWU372_PPS	2008-072T16:35:32	GMB_E061_Enceladus-000T02:30:00	000T00:00:29
ENGR_061SC_RADRWA372_PPS	2008-072T20:00:32	GMB_E061_Enceladus+000T00:55:00	000T00:00:44
ENGR_061SC_DFPW372_PPS	2008-072T20:49:55	GMB_E061_Enceladus+000T01:44:23	000T00:00:37
ENGR_061EA_MECVROPN001_THERM	2008-073T01:01:00		000T00:06:10

Data Volume

DATA VOLUME SUMMARY

			OBSERVATION_PERIOD								DOWNLINK_PASS							
			P4							P5	RECORDED		PLAYBACK					
DOWNLINK PASS NAME	Start doy hh:mm	End doy hh:mm	START (Mb)	SCI (Mb)	HK+E (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGIN (Mb)	(%)	OPNAV (Mb)	SCI (Mb)	ENGR (Mb)	TOTAL (Mb)	CPACTY (Mb)	MARGIN (Mb)	(%)	CAROVR (Mb)	
SP_061EA_G70METOPN073_PRIME	073 00:51	073 09:51	0	3210	77	3288	3562	274	8%	0	317	53	3658	4349	691	16%	0	

DATA VOLUME REPORT

Event	Start doy hh:mm	End doy hh:mm	CAPS (Mb)	CDA (Mb)	CIRS (Mb)	INMS (Mb)	ISS (Mb)	MAG (Mb)	MIMI (Mb)	RADAR (Mb)	RPWS (Mb)	UVIS (Mb)	VIMS (Mb)	PROBE (Mb)	ENGR (Mb)	TOTAL (Mb)
OBSERVATION_NOR	072 02:36	073 00:51	134.1	15.9	261.2	14.4	398.8	88.7	80.8	459.6	1310.9	255.0	191.1	0.0	0.0	3210.4
SP_061EA_G70METOPN073_PRIME	073 00:51	073 09:51	32.4	6.1	43.2	1.6	0.0	28.0	32.2	0.0	171.0	2.5	0.0	0.0	0.0	317.0
DAILY TOTAL SCIENCE	072 02:36	073 09:51	166.5	22.0	304.4	16.1	398.8	116.7	112.9	459.6	1481.9	257.5	191.1	0.0		

AVERAGE DATA RATE REPORT (calculated over observation periods and downlink passes)

Event	Start doy hh:mm	End doy hh:mm	CAPS (bps)	CDA (bps)	INMS (bps)	MAG (bps)	MIMI (bps)	RPWS (bps)	UVIS (bps)
SP_061NA_G70OBSOPN073_NA	072 02:36	073 00:51	1674.2	198.1	180.2	1107.1	1008.3	16365.2	3184.0
SP_061EA_G70METOPN073_PRIME	073 00:51	073 09:51	1000.0	188.0	50.0	865.0	992.6	5278.9	76.0

DSN Requests

DOWNLINK PASS					DSN PASS					
NAME	START_TO_END SCET	START_TO_END ERT	DUR hh:mm	DATA_RATES kbps	ID	START_TO_END SCET	START_TO_END ERT	DUR hh:mm	CALS min	RADIO__CONFIG R UD D UD MAR
G70METOPN073	073T00:51-09:51	073T02:00-11:00	09:00	124,142,165,142	14	073T00:51-09:51	073T02:00-11:00	09:00	15/15	R XX - -- --0

Open Issues

- SPASS
  - Custom handoff fields must be fixed
    - VIMS
    - CIRS
    - ISS
    - RADAR
- Custom period turn checks have been performed by
  - RADAR (2) -- OK
  - CIRS (3) -- OK
  - ISS (1) -- TBD
    - PDT problems that may be bogus; PDT guru will be working it.
    - May need to hand off at 5-10°; if so, CAPS will do the extra tiny turn.
- Flyby attitude
  - Will be 100 km per agreement with NAV
  - New trajectory kernel will be released later in tour

TWT/OST Integration Constraint and Guideline Checklist

Below are Target Working Team (TWT) and Orbiter Science Team (OST) constraints that must be followed during segment implementation. Any exceptions to constraint numbers 3, 4, 6, or 7 must be approved by the Science Planning Manager.

Constraint	C=Comply V=Violate N/A=Not Applicable	Comments	Disposition
1. A. SP has checked all waypoints turns to and from waypoints.	C		
B. All initial downlink attitudes have been checked as waypoints.	C		
2. All turns to and from waypoints checked for violations and margins. ☐CAPS ☐CDA ☐CIRS ☐INMS ☐ISS ☐MIMI ☐MAG ☐NAV ☐RADAR ☐RPWS ☐RSS ☐UVIS ☐VIMS Each Prime Instrument agrees to accept a reduction in observation time during implementation if problems arise.	C		
3. Custom handoffs limited to:			
A. ±3 hours from targeted Icy Satellite flyby	V		
B. ±3 hours from targeted Titan Flyby	N/A		
C. OpNavs preceding/following a downlink	N/A		
4. Minimum 30 min SPASS Prime request duration outside ±5 hours from targeted satellite flyby (5 min. integer duration if >30 min.)	C		
5. Live and Ground Movable Blocks include appropriate time margins.	C	K. Klaasen's margin for flyby 061EN is 15 min. according to memo dated .	
6. Waypoints changes are ≤3 per day	C		
A. All turns that accomplish the waypoint strategy are requested by SP or OpNav.	C		
7. Live Movable Blocks limited to the following orbits: 7, 8, 9, 10, 12, 28, 51, 56, 57, 60, 63, 64	N/A		

Guideline	Yes / No	Comments
1. Were repeatable/reusable templates used where possible?	Yes	
2. During Pre-Integration: Was 30 min. used for 90° RWA turns and/or 10 min. for RCS turns?	Yes	

(DOUBLE-CLICK TO MAKE CHANGES)