



esoc

European Space Operations Centre
Robert-Bosch-Strasse 5
D-64293 Darmstadt
Germany
T +49 (0)6151 900
F +49 (0)6151 90495
www.esa.int

DOCUMENT

Envisat Mission Extension Spacecraft Operations Timeline

Prepared by Andrew Moore
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1 SCOPE

The Envisat mission extension beyond 2010 implies the satellite altitude to be decreased through a series of in-plane manoeuvres. This document has been issued following the Orbit Change Operational Plan Work Package **WP.E2.1.FOS.1100** and describes the Envisat instrument, PEB and SM activities that shall be carried out before, during and after the altitude reduction.

2 INTRODUCTION

In the context of the Envisat mission second extension, the satellite semi-major axis shall be reduced by 17.4 km in a series of 3 manoeuvre pairs:

- On 22nd October, two in-plane OCMs
- On 26th October, two in-plane OCMs
- On 2nd November, two FCMs.

For the whole duration of the orbit change, the PDS does not intend to process the instrument scientific data. Consequently each instrument is expected to be kept in a safe, manoeuvre-compliant operational mode (e.g. protection of optical instruments against accidental solar illumination, instrument thermally stable, manoeuvre shock/acceleration preservation, etc.).

The following sections provide a detailed list of the activities that need to be performed and at which time. Both automated activities (eg via MPS planning) and manual activities (to be performed by Engineer or Analyst) are included. Additionally, there are some further maintenance activities which are also included in the timeline which will be carried out to make use of the planned PLM downtime.

3 REFERENCE AND SUPPORT DOCUMENTS

	Title	Reference
[RD1]	E2010+Orbit Change Operations Plan	
[RD2]	ENVISAT mission extension beyond 2010, PLSO, ESRIN – May 2010	
[RD3]	Instrument Switching Plan	ENVI-MIS-RS-1001-OPS-OEV



4 SPACECRAFT OPERATIONS TIMELINE

The following pages list all activities that shall be performed during the Envisat orbit lowering phase, including the following activities:

- Verification of preparation activities
- OCM / FCM times
- Availability / Unavailability times for MPS activities
- MPS planned operations
- Manual activities to be performed by Engineer / Analyst
- Maintenance activities to be performed by Engineer
- Selected Ground Station Pass times for nominal Kiruna/Svalbard passes and additional stations on demand

Note that Mission Planning will be active throughout the orbit lowering phase, and will be planning routine SSR1 TR playback dumps via XBS2 on all Kiruna passes. A number of Instruments remain in measurement modes to ensure that sufficient data will be played back on each pass, so that recorded HKTM data is downlinked promptly. After the second OCM pair, SSR1 and SSR2 playbacks will be planned as normal on XBS and KBS links.

All AOS & LOS times for ground station coverage are based on predicted times provided by FDS on 16/07/2010, which assumes that all manoeuvres are performed as planned.



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
Fri	15/10/2010	288						
			12:00:00	SCIA	SOE	Verify CTI files delivery		
			12:00:00	SCIA	SOE	CTI Procedure Update	FCP_SCI_IECM	Offline activity
Tue	19/10/2010	292						
			16:10:37			KIRUNA AOS		Includes SSR1 PB to XBS2
			16:12:00	AATSR	SOE	Commence Outgassing	FCP_ATR_1411	
			16:23:27			KIRUNA LOS		
Wed	20/10/2010	293						
						Nominal Activities		
Thu	21/10/2010	294						
			12:00:00	SM	FDS	Manoeuvre File Delivery		
			18:50:00	ASAR	SOE	Unavailability Start		
			18:55:45			KIRUNA AOS		Includes SSR1 PB to XBS2
			19:00:00	DORIS	SOE	Update Kalman Filter Param.		SSALTO to provide TT TCS
			19:00:00	DORIS	SOE	Uplink Frequency Bias		SSALTO to provide TT TCS
			19:10:48			KIRUNA LOS		
			20:35:59			KIRUNA AOS		Includes SSR1 PB to XBS2
			20:50:28			KIRUNA LOS		



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
			23:59:00	PLM	MPS	Instruments to Modes for OCM:		
			23:59:00	AATSR	MPS	Measurement / Cooler Off		
			23:59:00	ASAR	MPS	Pre-Op		
			23:59:00	GOMOS	MPS	Heater / MDE On		
			23:59:00	MERIS	MPS	Heater		
			23:59:00	MIPAS	MPS	Heater		
			23:59:00	MWR	MPS	Nominal		
			23:59:00	DORIS	MPS	Measurement		
			23:59:00	RA2	MPS	Measurement		
			23:59:00	SCIA	MPS	Measurement - Idle		
			23:59:00	KBS1	MPS	Transmit HSM MRC		
			23:59:00	APC/KBS	MPS	Artemis link suspended		
Fri	22/10/2010	295						
			00:05:54			KIRUNA AOS		Includes SSR1 PB to XBS2
			00:07:00	PLM	SPACON	Verify Instrument Modes		
			00:08:42			KIRUNA LOS		
			01:45:01			SVALBARD AOS		
			01:55:35			SVALBARD LOS		
			04:14:24			TROLL AOS		
			04:20:00	SM	FDS	YSM to YSM Transition		
			04:22:00	SM	FDS	YSM to FPM Transition		
			04:28:40			TROLL LOS		



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
			05:08:43			SVALBARD AOS		
			05:19:43			SVALBARD LOS		
			06:25:00	MERIS	SOE	MERIS to STANDBY	FCP_MER_1037	Timetagged
			06:35:56	SM	FDS	OCM Burn 1 Start		
			06:53:37			KIRUNA AOS		Includes SSR1 PB to XBS2
			07:04:04	SM	FDS	OCM Burn 1 End		
			07:04:34			KIRUNA LOS		
			08:33:04			KIRUNA AOS		Includes SSR1 PB to XBS2
			08:47:10			KIRUNA LOS		
			09:06:08	SM	FDS	OCM Burn 2 Start		
			09:11:22			TROLL AOS		
			09:26:17			TROLL LOS		
			09:35:20	SM	FDS	OCM Burn 2 End		
			10:12:36			KIRUNA AOS		Includes SSR1 PB to XBS2
			10:14:00	MERIS	SOE	Cold Reset + Patch Uplink		Load Patch MER24.P04
			10:26:52			KIRUNA LOS		
			10:24:56			MASPALOMAS AOS		
			10:38:44			MASPALOMAS LOS		
			10:52:30			TROLL AOS		
			11:06:01			TROLL LOS		



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
			11:32:41			KATSUURA AOS		
			11:47:01			KATSUURA LOS		
			11:51:46			KIRUNA AOS		Includes SSR1 PB to XBS2
			11:53:00	MERIS	SOE	Recovery to Heater Mode		
			11:54:33	SM	FDS	FPM to YSM Transition		
			10:12:00	SM	FDS	Thruster Torque Update		(10:12 - 12:05)
			12:05:15			KIRUNA LOS		
			12:00:00	PLM	SOE	PEB / Instrument Operations:		
			12:00:00	ASAR	MPS	Wave / Pre-Op		
			13:30:29			KIRUNA AOS		Includes SSR1 PB to XBS2
			13:33:00	SSR1	SOE	Powercycle to fix latchup		Ref.: AR ENV_SC5028
			13:42:31			KIRUNA LOS		
			14:00:00	ASAR	SOE	Verify CTI files delivery		
			15:08:19			KIRUNA AOS		Includes SSR1 PB to XBS2
			15:15:00	ASAR	SOE	CTI / Parameter Uplink		Manual Uplink
			15:20:09			KIRUNA LOS		
			16:45:53			KIRUNA AOS		Includes SSR1 PB to XBS2
			16:58:59			KIRUNA LOS		
Sat	23/10/2010	296				Nominal Activities		



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
Sun	24/10/2010	297				Nominal Activities		
Mon	25/10/2010	298	12:00:00	SM	FDS	Manoeuvre File Delivery		
Tue	26/10/2010	299						
			08:59:00	PLM	MPS	Instruments to Modes for OCM.		NB Most instruments and PEB subsystems remain in same configuration. Only specific activity is to terminate ASAR Wave and remain in Pre-Op.
			08:59:00	AATSR	MPS	Measurement / Cooler Off		
			08:59:00	ASAR	MPS	Pre-Op		
			08:59:00	GOMOS	MPS	Heater / MDE On		
			08:59:00	MERIS	MPS	Heater		
			08:59:00	MIPAS	MPS	Heater		
			08:59:00	MWR	MPS	Nominal		
			08:59:00	DORIS	MPS	Measurement		
			08:59:00	RA2	MPS	Measurement		
			08:59:00	SCIA	MPS	Measurement Idle		
			09:35:35			KIRUNA AOS		
			09:40:00	PLM	SPACON	Verify Instrument Modes		
			09:40:00	DORIS	SOE	Update Kalman Filter Param.		
			09:40:00	DORIS	SOE	Uplink Frequency Bias		
			09:40:00	SM	SOE	Latch Valve Reconfiguration		
			09:49:54			KIRUNA LOS		
			11:14:54			KIRUNA AOS		
			11:28:43			KIRUNA LOS		
								Includes SSR1 PB to XBS2
								SSALTO to provide IT TCs
								SSALTO to provide IT TCs
								Includes SSR1 PB to XBS2



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
			11:56:52			TROLL AOS		
			12:07:18	SM	FDS	YSM to FPM Transition		
			12:08:42			TROLL LOS		
			12:34:42			KATSUURA AOS		
			12:49:19			KATSUURA LOS		
			12:53:45			KIRUNA AOS		Includes SSR1 PB to XBS2
			13:06:19			KIRUNA LOS		
			13:13:53			KOUROU AOS		
			13:28:38			KOUROU LOS		
			13:38:00	MERIS	SOE	MERIS to STANDBY	FCP_MER_1037	Timetagged Activity
			13:48:40	SM	FDS	OCM Burn 3 Start		
			13:56:55			PERTH AOS		
			14:11:27			PERTH LOS		
			14:11:16	SM	FDS	OCM Burn 3 End		
			14:15:06			MASUDA AOS		
			14:26:16			MASUDA LOS		
			14:32:16			KIRUNA AOS		Includes SSR1 PB to XBS2
			14:43:38			KIRUNA LOS		



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
			14:55:20			KOUROU AOS		
			15:04:38			KOUROU LOS		
			15:36:27			PERTH AOS		
			15:49:27			PERTH LOS		
			16:09:34			KIRUNA AOS		Includes SSR1 PB to XBS2
			16:18:44	SM	FDS	OCM Burn 4 Start		
			16:22:12			KIRUNA LOS		
			16:42:03	SM	FDS	OCM Burn 4 End		
			17:47:04			KIRUNA AOS		Includes SSR1 PB to XBS2
			17:50:00	SM	FDS	Thruster Torque Update		(17:46 - 19:40)
			17:50:00	SM	SOE	Latch Valve Reconfiguration		
			17:55:00	PLM	SOE	MERIS to HEATER	FCP_MER_1038	Immediate Commanding
			18:00:50			KIRUNA LOS		
			18:47:20			TROLL AOS		
			18:48:36	SM	FDS	FPM to YSM Transition		
			18:57:32			TROLL LOS		
			19:25:22			KIRUNA AOS		Includes SSR1 PB to XBS2
			19:40:02			KIRUNA LOS		



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
			20:00:00	PLM	MPS	PEB / Instruments Available:		
			20:00:00	ASAR	MPS	IM/WV/WS/GM/API/Pre-Op		
			20:00:00	MERIS	MPS	Dir&Avg / Heater		
			20:00:00	MIPAS	MPS	Measurement		
			20:54:00	APC/KBS	MPS	Resume Artemis Operations		
			23:00:00	SCIA	SOE	APSM Healthcheck	FCP_SCI_44A3	Routine monthly activity
			23:30:00	SCIA	SOE	ADC Calibration	FCP_SCI_44A4	Routine monthly activity
			23:45:00	SCIA	SOE	Engineering Parameter Uplink	FCP_SCI_2301	New Procedure
Wed	27/10/2010	300						
			00:00:00	SCIA	MPS	CTI / Timelines Uplink		
			00:00:00	SCIA	MPS	Measurement - Timeline		
			07:38:00	AATSR	SOE	Terminate Outgassing		
Thu	28/10/2010	301						
						Nominal Activities		
Fri	29/10/2010	302						
						Nominal Activities		
Sat	30/10/2010	303						
						Nominal Activities		
Sun	31/10/2010	304						
						Nominal Activities		



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
Mon	01/11/2010	305				Nominal Activities		
Tue	02/11/2010	306						
			08:40:25			KIRUNA AOS		Includes SSR1 PB to XBS2
			08:45:00	SM	FDS	Star Programming in YSM		
			08:54:24			KIRUNA LOS		
			10:19:41			KIRUNA AOS		Includes SSR1 PB to XBS2
			10:25:02	SM	FDS	YSM to SYSM Transition		
			10:33:50			KIRUNA LOS		
Wed	03/11/2010	307						
			12:00:00	SM	FDS	Manoeuvre File Delivery		
Thu	04/11/2010	308						
			17:18:29			KIRUNA AOS		Includes SSR1 PB to XBS2
			17:31:43			KIRUNA LOS		
			18:56:13			KIRUNA AOS		Includes SSR1 PB to XBS2
			19:10:48			KIRUNA LOS		
			20:36:04			KIRUNA AOS		Includes SSR1 PB to XBS2
			20:40:27	SM	FDS	FCM Burn 5 Start		
			20:41:00	SM	FDS	FCM Burn 5 End		
			20:50:06			KIRUNA LOS		



Day	Date	DOY	Time	S/S	Responsibility	Activity	Procedure	Comment
			21:30:32	SM	FDS	FCM Burn 6 Start		
			21:31:05	SM	FDS	FCM Burn 6 End		
			22:18:04			KIRUNA AOS		Includes SSR1 PB to XBS2
			22:29:22			KIRUNA LOS		
			tbc	GOMOS	SOE	Heater to Pause Transition		Manual activity
			tbc	GOMOS	MPS	Occultation		Back to ops time still tbc
TBD	TBD	TBD				Outstanding Activities:		
				SM	SOE	Update STD Earth Diameter constant	FCP_OCCU_0011	Wait 2 orbits before re-enabling STD Deviations surveillance
				SCIA	ANALYST	Propagate CTI Seq. to FOCC	FCP_SCI_IECM	Offline activity

