VIRTIS
Lutetia Fly-By
Observations Report

August 30th 2010

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1 Scope

This document describes the functional performances of VIRTIS during the Lutetia Fly-by observations executed on the 09th and on the 10th of July 2010.

2 Reference Documents

RD01	RO-SGS-PL-0010_4_-_Rosetta_MSP_Lutetia_2010Jan26	Lutetia Fly by RSOC Master Science Plan
RD02	RO-SGS-TN-0027_4_a_Rosetta_Timeline_Details_Lutetia_2010Jan25	Lutetia Fly by timeline details
RD03	RO-SGS-LI-0027_4_a_Rosetta_CSPL_Lutetia_2010Jan26	Lutetia Fly RSOC CSPL
RD04	VIR-IAS-TN-017_Issue_1_Lutetia_Dynamic_Rehearsal	Lutetia rehearsal Virtis Team report
RD05	ORHR_FDLRMA_DA_____00096.ROS	Heliocentric orbit of Rosetta, available on the DDS
RD06	ATNR_FDLRMA_DAP040302093352_00097.ROS	Spacecraft attitude, available on the DDS
RD07	SANR_FDLRMA_DAP090831235854_00097.ROS	Solar aspect angle file, available on the DDS

3 Activity Summary

The VIRTIS activity during the Lutetia Fly-by has been divided in four subsequent steps consisting of two light curves, an internal scan and an observation in pushbroom mode at CA. The sequences used are listed below in the order they were performed:

3.1 VR01A Lutetia First Light Curve

It consisted of an 8 hours observation of Lutetia in order to obtain the light curve of the asteroid.
Starting at 19:00 of 9th July 2010, S/C performed an 8 hours scan to determine Lutetia light curve, starting at about 1050000 km from the target and ending at about 650000 km from the target.
During this observation S/C stared at target 16 mrad (positive Y axis) off Nadir.
Only Virtis-M operated.

3.2 VR01B Lutetia Second Light Curve

It consisted of an 8 hours and 33 minutes observation of Lutetia in order to obtain the light curve of the asteroid.
Starting at 06:14 of 10th July 2010, S/C performed an 8 hours and 33 minutes scan to determine Lutetia light curve.
Virtis-M operated for the entire light curve observation, while Virtis-H began its observation at 12:24 of 10th July 2010.
At 11:24 of 10th July 2010 S/C slewed from Alice narrow slit boresight to cooperative boresight.
At 11:34 until 12:14 of 10th July 2010 S/C performed attitude flip.

3.3 VR03 Lutetia Internal Scan

It consisted of a 43 minutes internal scan observation of Lutetia.
Starting at 14:49 of 10th July 2010 (1 hour and 5 minutes before CA) , S/C performed a 43 minutes scan at a distance between 55000 and 21000 km from the target.
Both Virtis-M and Virtis-H operated.

3.4 VR02 Lutetia Closest Approach Phase

It consisted of a 30 minutes of observation of Lutetia in pushbroom mode around CA.
Starting at 15:44 of 10th July 2010 (10 minutes before CA) , S/C performed a 30 minutes observation in pushbroom mode around CA.
Both Virtis-M and Virtis-H operated.

4 Activity Description and Cubes Generated

In the following pages it is presented a description of each observation performed by VIRTIS during the Lutetia Fly-by, along with the cubes generated and, for each of them, the distance of the instrument from the target at the beginning and at the end of the observation.

The observations are listed below in the order they were performed.

4.1 VR01A Lutetia First Light Curve

The Goal of this observation was the acquisition of spectra from Lutetia during a period of eight hours that corresponds to about the synodical rotational period of Lutetia (8.17 ± 0.01 hours) in order to determine Lutetia light curve.
During this observation S/C stared at target 16 mrad (positive Y axis) off Nadir in order to use only the part of the CCD in perfect condition.
The observation was successful; the instrument operated as expected.
Data will be analyzed to determine whether light variations can be due to bright and dark areas or to the shape of the asteroid.

Cube	PDS	EGSE	Distance at Start (km)	Distance at End (km)
M Calibration	V1_00237319854_QUB	PVA79I09 _QUB	1165000	1147000
M Calibration	I1_00237319854_QUB	PIA79I09_QUB	1165000	1147000
M1	V1_00237322862_QUB	PVA79J00_QUB	1120000	1066000
M2	I1_00237322858_QUB	PIA79J00_QUB	1120000	1066000
M3	V1_00237326331_QUB	PVA79J58_QUB	1066000	1012000
M4	I1_00237326327_QUB	PIA79J58_QUB	1066000	1012000
M5	V1_00237329946_QUB	PVA79K59_QUB	1012000	958000
M6	I1_00237329942_QUB	PIA79K59_QUB	1012000	958000
M7	V1_00237333618_QUB	PVA79L59_QUB	958000	904000
M8	I1_00237333614_QUB	PIA79L59_QUB	958000	904000
M9	V1_00237337218_QUB	PVA79M59_QUB	904000	850000
M10	I1_00237337214_QUB	PIA79M59_QUB	904000	850000
M11	V1_00237340747_QUB	PVA79N58_QUB	850000	796000
M12	I1_00237340743_QUB	PIA79N58_QUB	850000	796000
M13	V1_00237344418_QUB	PVA7A059_QUB	796000	742000
M14	I1_00237344414_QUB	PIA7A059_QUB	796000	742000
M15	V1_00237347947_QUB	PVA7A159_QUB	742000	688000
M16	I1_00237347943_QUB	PIA7A159_QUB	742000	688000

Table 1 M Cubes for VR01A Lutetia First Light Curve

4.2 VR01B Second Light Curve

The Goal of this observation was the acquisition of spectra from Lutetia during a period of eight hours and 33 minutes that corresponds to about the synodical rotational period of Lutetia (8.17 ± 0.01 hours) in order to determine Lutetia light curve.
The observation was successful; the instrument operated as expected.
Data will be analyzed to determine whether light variations can be due to bright and dark areas or to the shape of the asteroid.

Cube	PDS	EGSE	Distance at Start (km)	Distance at End (km)
M1	V1_00237363294_QUB	PVA7A614_QUB	518000	472000
M2	I1_00237363292_QUB	PIA7A614_QUB	518000	472000
M3	V1_00237366858_QUB	PVA7A714_QUB	472000	418000
M4	I1_00237366856_QUB	PIA7A714_QUB	472000	418000
M5	V1_00237370509_QUB	PVA7A814_QUB	418000	364000
M6	I1_00237370507_QUB	PIA7A814_QUB	418000	364000
M7	V1_00237374109_QUB	PVA7A914_QUB	364000	310000
M8	I1_00237374107_QUB	PIA7A914_QUB	364000	310000
M9	V1_00237377709_QUB	PVA7AA14_QUB	310000	256000
M10	I1_00237377707_QUB	PIA7AA14_QUB	310000	256000
M11	V1_00237381954_QUB	PVA7AB25_QUB	256000	202000
M12	I1_00237381952_QUB	PIA7AB25_QUB	256000	202000
M13	V1_00237384909_QUB	PVA7AC14_QUB	202000	148000
M14	I1_00237384907_QUB	PIA7AC14_QUB	202000	148000
M15	V1_00237388509_QUB	PVA7AD14_QUB	148000	70000
M16	I1_00237388507_QUB	PIA7AD14_QUB	148000	70000

Table 2.1 M Cubes for VR01B Lutetia Second Light Curve

Cube	PDS	EGSE	Distance at Start (km)	Distance at End (km)
H Calibration	H1_00237389112_QUB	PHA7AD24_QUB	125000	123000
H Calibration	T1_00237389090_QUB	PTA7AD24_QUB	125000	116000
H1	H1_00237390320_QUB	PHA7AD44_QUB	107000	103000
H2	T1_00237390289_QUB	PTA7AD44_QUB	107000	103000
H3	H1_00237390650_QUB	PHA7AD50_QUB	102500	54500
H4	T1_00237390992_QUB	PTA7AD50_QUB	97000	54500

Table 2.2 H Cubes for VR01B Lutetia Second Light Curve

4.3 VR03 Internal Scan

The Goal of this observation was the acquisition of spectral images, obtained by means of the internal mirror, from Lutetia during a period of 43 minutes starting 1 hour and 5 minutes before CA.
The observation was successful; the instrument operated as expected.
Hyperspectral images as well as high resolution spectra of Lutetia were collected.
Data will be analyzed to study Lutetia composition.

Cube	PDS	EGSE	Distance at Start (km)	Distance at End (km)
M1	V1_00237394253_QUB	PVA7AE50_QUB	48000	25000
M2	I1_00237394252_QUB	PIA7AE50_QUB	48000	25000
M3	V1_00237395858_QUB	PVA7AF17_QUB	24000	22000
M4	I1_00237395857_QUB	PIA7AF17_QUB	24000	22000
M5	V1_00237396113_QUB	PVA7AF21_QUB	20300	14200
M6	I1_00237396112_QUB	PIA7AF21_QUB	20300	14200

Table 3.1 M Cubes for VR03 Lutetia Internal Scan

Cube	PDS	EGSE	Distance at Start (km)	Distance at End (km)
H1	T1_00237394189_QUB	PTA7AE49_QUB	49000	45000
H2	H1_00237394220_QUB	PHA7AE49_QUB	49000	45000
H3	H1_00237394550_QUB	PHA7AE55_QUB	43500	11000
H4	T1_00237394904_QUB	PTA7AE55_QUB	38000	13000

Table 3.2 H Cubes for VR03 Lutetia Internal Scan

4.4 VR02 Lutetia Closest Approach Phase

The Goal of this observation was the acquisition of spectra from Lutetia in pushbroom mode, using the S/C motion to build the spectral images, during a period of 30 minutes around CA
The observation was successful; the instrument operated as expected.
Hyperspectral images as well as high resolution spectra of Lutetia were collected.
Data will be analyzed to study Lutetia composition.

Cube	PDS	EGSE	Distance at Start (km)	Distance at End (km)
M1	V1_00237396953_QUB	PVA7AF35_QUB	8000	7000
M2	I1_00237396952_QUB	PIA7AF35_QUB	8000	7000
M3	V1_00237397943_QUB	PVA7AF51_QUB	8000	17500
M4	I1_00237397942_QUB	PIA7AF51_QUB	8000	17500

Table 4.1 M Cubes for VR03 Lutetia Closest Approach Phase

Cube	PDS	EGSE	Distance at Start (km)	Distance at End (km)
H1	T1_00237396889_QUB	PTA7AF34_QUB	9000	5400
H2	H1_00237396920_QUB	PHA7AF34_QUB	9000	5400
H3	H1_00237397250_QUB	PHA7AF40_QUB	4300	18500
H4	T1_00237397602_QUB	PTA7AF40_QUB	3800	15300

Table 4.2 H Cubes for VR03 Lutetia Closest Approach Phase

5 Virtis Lutetia Fly-by Observation Sequence

VIRTIS Lutetia Fly-by Observation Sequence Command History

OIOR	TC	Mnemonic	Execution Time	Sequense	
VR ON					
	ZDMX0047	Define Nom/Red branch for VIRTIS	2010.190.17.00.00.000	AVRF001A	
	ZSKA8121	START VIRTIS Power On OBCP	2010.190.17.00.10.000	AVRF001A	
VR-M ON					
	ZVR00125	M Cooler ON in Closed Loop	2010.190.17.10.00.000	AVRS001A	
	ZVR00120	M PEM Switch ON	2010.190.17.10.10.000	AVRS001A	
	ZVR00061	MTC_DefaultConf	2010.190.18.10.00.000	AVRF005A	M Calibration
	ZVR00143	M Set Calibration DP in RAM	2010.190.18.10.01.000	AVRF005A	
	ZVR00016	MTC_ChangeOpe_R	2010.190.18.10.02.000	AVRF005A	
	ZVR00018	MTC_ChangeCal_R	2010.190.18.10.03.000	AVRF005A	
	ZVR00104	Enable M Science on SSMM	2010.190.18.10.04.000	AVRF005A	
	ZVR00106	Disable M Science on SSMM	2010.190.18.30.04.000	AVRF005A	
VR01A					
		First Light Curve			
		Center on Virtis-M Boresight			
	ZVR00123	M Cover Open	2010.190.19.00.00.000	AVRF021A	
	ZVR00061	MTC_DefaultConf	2010.190.19.01.00.000	AVRF010A	M Cube M1
	ZVR00142	M Set Science DP in RAM	2010.190.19.01.01.000	AVRF010A	
	ZVR00016	MTC_ChangeOpe_R	2010.190.19.01.02.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.190.19.01.03.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.190.19.01.04.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.190.19.01.05.000	AVRF010A	
	ZVR00106	Disable M Science on SSMM	2010.190.20.00.00.000	AVRF009A	
	ZVR00061	MTC_DefaultConf	2010.190.20.00.15.000	AVRF010A	
	ZVR00142	M Set Science DP in RAM	2010.190.20.00.16.000	AVRF010A	M Cube M2
	ZVR00016	MTC_ChangeOpe_R	2010.190.20.00.17.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.190.20.00.18.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.190.20.00.19.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.190.20.00.20.000	AVRF010A	
	ZVR00106	Disable M Science on SSMM	2010.190.21.00.00.000	AVRF009A	
	ZVR00061	MTC_DefaultConf	2010.190.21.00.15.000	AVRF010A	
	ZVR00142	M Set Science DP in RAM	2010.190.21.00.16.000	AVRF010A	M Cube M3
	ZVR00016	MTC_ChangeOpe_R	2010.190.21.00.17.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.190.21.00.18.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.190.21.00.19.000	AVRF010A	

ZVR00104	Enable M Science on SSMM	2010.190.21.00.20.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.190.22.00.00.000	AVRF009A	
ZVR00061	MTC_DefaultConf	2010.190.22.00.15.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.190.22.00.16.000	AVRF010A	**M Cube M4**
ZVR00016	MTC_ChangeOpe_R	2010.190.22.00.17.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.190.22.00.18.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.190.22.00.19.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.190.22.00.20.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.190.23.00.00.000	AVRF009A	
ZVR00061	MTC_DefaultConf	2010.190.23.00.15.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.190.23.00.16.000	AVRF010A	**M Cube M5**
ZVR00016	MTC_ChangeOpe_R	2010.190.23.00.17.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.190.23.00.18.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.190.23.00.19.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.190.23.00.20.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.191.00.00.00.000	AVRF009A	
ZVR00061	MTC_DefaultConf	2010.191.00.00.15.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.191.00.00.16.000	AVRF010A	**M Cube M6**
ZVR00016	MTC_ChangeOpe_R	2010.191.00.00.17.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.191.00.00.18.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.191.00.00.19.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.191.00.00.20.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.191.01.00.00.000	AVRF009A	
ZVR00061	MTC_DefaultConf	2010.191.01.00.15.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.191.01.00.16.000	AVRF010A	**M Cube M7**
ZVR00016	MTC_ChangeOpe_R	2010.191.01.00.17.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.191.01.00.18.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.191.01.00.19.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.191.01.00.20.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.191.02.00.00.000	AVRF009A	
ZVR00061	MTC_DefaultConf	2010.191.02.00.15.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.191.02.00.16.000	AVRF010A	**M Cube M8**
ZVR00016	MTC_ChangeOpe_R	2010.191.02.00.17.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.191.02.00.18.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.191.02.00.19.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.191.02.00.20.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.191.03.00.00.000	AVRF009A	

VR01B

Second Light Curve

		Center on Alice narrow slit Boresight		
ZVR00061	MTC_DefaultConf	2010.191.06.14.55.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.191.06.14.56.000	AVRF010A	**M Cube M1**
ZVR00016	MTC_ChangeOpe_R	2010.191.06.14.57.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.191.06.14.58.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.191.06.14.59.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.191.06.15.00.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.191.07.14.55.000	AVRF009A	
ZVR00061	MTC_DefaultConf	2010.191.07.15.10.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.191.07.15.11.000	AVRF010A	**M Cube M2**
ZVR00016	MTC_ChangeOpe_R	2010.191.07.15.12.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.191.07.15.13.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.191.07.15.14.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.191.07.15.15.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.191.08.14.55.000	AVRF009A	
ZVR00061	MTC_DefaultConf	2010.191.08.15.10.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.191.08.15.11.000	AVRF010A	**M Cube M3**
ZVR00016	MTC_ChangeOpe_R	2010.191.08.15.12.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.191.08.15.13.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.191.08.15.14.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.191.08.15.15.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.191.09.14.55.000	AVRF009A	
ZVR00061	MTC_DefaultConf	2010.191.09.15.10.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.191.09.15.11.000	AVRF010A	**M Cube M4**
ZVR00016	MTC_ChangeOpe_R	2010.191.09.15.12.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.191.09.15.13.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.191.09.15.14.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.191.09.15.15.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.191.10.14.55.000	AVRF009A	
ZVR00061	MTC_DefaultConf	2010.191.10.15.10.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.191.10.15.11.000	AVRF010A	**M Cube M5**
ZVR00016	MTC_ChangeOpe_R	2010.191.10.15.12.000	AVRF010A	
ZVR00014	MTC_ChangeFun_R	2010.191.10.15.13.000	AVRF010A	
ZVR00020	MTC_ChangeAlt_R	2010.191.10.15.14.000	AVRF010A	
ZVR00104	Enable M Science on SSMM	2010.191.10.15.15.000	AVRF010A	
ZVR00106	Disable M Science on SSMM	2010.191.11.14.55.000	AVRF009A	
		Center slewes to Cooperative Boresight		
ZVR00061	MTC_DefaultConf	2010.191.11.25.55.000	AVRF010A	
ZVR00142	M Set Science DP in RAM	2010.191.11.25.56.000	AVRF010A	**M Cube M6**
ZVR00016	MTC_ChangeOpe_R	2010.191.11.25.57.000	AVRF010A	

	ZVR00014	MTC_ChangeFun_R	2010.191.11.25.58.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.191.11.25.59.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.191.11.26.00.000	AVRF010A	
Start Flip			2010.191.11.34.00.000		
End Flip			2010.191.12.14.00.000		
	ZVR00106	Disable M Science on SSMM	2010.191.12.14.55.000	AVRF009A	
	ZVR00061	MTC_DefaultConf	2010.191.12.15.10.000	AVRF010A	
	ZVR00142	M Set Science DP in RAM	2010.191.12.15.11.000	AVRF010A	**M Cube M7**
	ZVR00016	MTC_ChangeOpe_R	2010.191.12.15.12.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.191.12.15.13.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.191.12.15.14.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.191.12.15.15.000	AVRF010A	
VR-H ON					
	ZVR00136	H Cooler ON in Closed Loop	2010.191.12.24.55.000	AVRS002A	
	ZVR00131	H PEM Switch ON	2010.191.12.25.05.000	AVRS002A	
	ZVR00106	Disable M Science on SSMM	2010.191.13.14.55.000	AVRF009A	
	ZVR00061	MTC_DefaultConf	2010.191.13.15.10.000	AVRF010A	
	ZVR00142	M Set Science DP in RAM	2010.191.13.15.11.000	AVRF010A	**M Cube M8**
	ZVR00016	MTC_ChangeOpe_R	2010.191.13.15.12.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.191.13.15.13.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.191.13.15.14.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.191.13.15.15.000	AVRF010A	
	ZVR00135	H Cover Close	2010.191.13.24.55.000	AVRS004A	**H Calibration**
	ZVR00042	HTC_DefaultConf	2010.191.13.25.25.000	AVRS004A	
	ZVR00149	H Set Calibration DP in RAM	2010.191.13.25.26.000	AVRS004A	
	ZVR00047	HTC_ChangeOpe_R	2010.191.13.25.27.000	AVRS004A	
	ZVR00045	HTC_ChangeFun_R	2010.191.13.25.28.000	AVRS004A	
	ZVR00053	HTC_ChangePix_R	2010.191.13.25.29.000	AVRS004A	
	ZVR00105	Enable H Science on SSMM	2010.191.13.25.30.000	AVRS004A	
	ZVR00107	Disable H Science on SSMM	2010.191.13.35.30.000	AVRS004A	
	ZVR00042	HTC_DefaultConf	2010.191.13.44.55.000	AVRF020A	**H Cube H1**
	ZVR00134	H Cover Open	2010.191.13.44.56.000	AVRF020A	
	ZVR00152	H Set Science Backup DP in RAM	2010.191.13.45.26.000	AVRF020A	
	ZVR00045	HTC_ChangeFun_R	2010.191.13.45.27.000	AVRF020A	
	ZVR00047	HTC_ChangeOpe_R	2010.191.13.45.28.000	AVRF020A	
	ZVR00105	Enable H Science on SSMM	2010.191.13.45.29.000	AVRF020A	
	ZVR00107	Disable H Science on SSMM	2010.191.13.49.55.000	AVRF009B	
	ZVR00042	HTC_DefaultConf	2010.191.13.50.55.000	AVRS005A	**H Cube H2**
	ZVR00134	H Cover Open	2010.191.13.50.56.000	AVRS005A	

	ZVR00148	H Set Nom Observation DP in RAM	2010.191.13.51.26.000	AVRS005A	
	ZVR00045	HTC_ChangeFun_R	2010.191.13.51.27.000	AVRS005A	
	ZVR00047	HTC_ChangeOpe_R	2010.191.13.51.28.000	AVRS005A	
	ZVR00053	HTC_ChangePix_R	2010.191.13.51.29.000	AVRS005A	
	ZVR00105	Enable H Science on SSMM	2010.191.13.51.30.000	AVRS005A	
	ZVR00107	Disable H Science on SSMM	2010.191.14.44.55.000	AVRF009B	
	ZVR00106	Disable M Science on SSMM	2010.191.14.47.55.000	AVRF009A	
VR03					
			Lutetia Internal Scan		
	ZVR00042	HTC_DefaultConf	2010.191.14.49.55.000	AVRF020A	H Cube H1
	ZVR00134	H Cover Open	2010.191.14.49.56.000	AVRF020A	
	ZVR00152	H Set Science Backup DP in RAM	2010.191.14.50.26.000	AVRF020A	
	ZVR00045	HTC_ChangeFun_R	2010.191.14.50.27.000	AVRF020A	
	ZVR00047	HTC_ChangeOpe_R	2010.191.14.50.28.000	AVRF020A	
	ZVR00105	Enable H Science on SSMM	2010.191.14.50.29.000	AVRF020A	
	ZVR00061	MTC_DefaultConf	2010.191.14.50.55.000	AVRF010A	
	ZVR00142	M Set Science DP in RAM	2010.191.14.50.56.000	AVRF010A	M Cube M1
	ZVR00016	MTC_ChangeOpe_R	2010.191.14.50.57.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.191.14.50.58.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.191.14.50.59.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.191.14.51.00.000	AVRF010A	
	ZVR00107	Disable H Science on SSMM	2010.191.14.54.55.000	AVRF009B	
	ZVR00042	HTC_DefaultConf	2010.191.14.55.55.000	AVRS005A	H Cube H2
	ZVR00134	H Cover Open	2010.191.14.55.56.000	AVRS005A	
	ZVR00148	H Set Nom Observation DP in RAM	2010.191.14.56.26.000	AVRS005A	
	ZVR00045	HTC_ChangeFun_R	2010.191.14.56.27.000	AVRS005A	
	ZVR00047	HTC_ChangeOpe_R	2010.191.14.56.28.000	AVRS005A	
	ZVR00053	HTC_ChangePix_R	2010.191.14.56.29.000	AVRS005A	
	ZVR00105	Enable H Science on SSMM	2010.191.14.56.30.000	AVRS005A	
	ZVR00106	Disable M Science on SSMM	2010.191.15.17.23.000	AVRF009A	
	ZVR00061	MTC_DefaultConf	2010.191.15.17.40.000	AVRF010A	
	ZVR00142	M Set Science DP in RAM	2010.191.15.17.41.000	AVRF010A	M Cube M2
	ZVR00016	MTC_ChangeOpe_R	2010.191.15.17.42.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.191.15.17.43.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.191.15.17.44.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.191.15.17.45.000	AVRF010A	
	ZVR00106	Disable M Science on SSMM	2010.191.15.20.20.000	AVRF009A	
	ZVR00061	MTC_DefaultConf	2010.191.15.21.55.000	AVRF010A	
	ZVR00142	M Set Science DP in RAM	2010.191.15.21.56.000	AVRF010A	M Cube M3
	ZVR00016	MTC_ChangeOpe_R	2010.191.15.21.57.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.191.15.21.58.000	AVRF010A	

	ZVR00020	MTC_ChangeAlt_R	2010.191.15.21.59.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.191.15.22.00.000	AVRF010A	
	ZVR00106	Disable M Science on SSMM	2010.191.15.29.40.000	AVRF009A	
	ZVR00107	Disable H Science on SSMM	2010.191.15.32.55.000	AVRF009B	
VR02					
		Lutetia Closest Approach Phase			
	ZVR00042	HTC_DefaultConf	2010.191.15.34.55.000	AVRF020A	**H Cube H1**
	ZVR00134	H Cover Open	2010.191.15.34.56.000	AVRF020A	
	ZVR00152	H Set Science Backup DP in RAM	2010.191.15.35.26.000	AVRF020A	
	ZVR00045	HTC_ChangeFun_R	2010.191.15.35.27.000	AVRF020A	
	ZVR00047	HTC_ChangeOpe_R	2010.191.15.35.28.000	AVRF020A	
	ZVR00105	Enable H Science on SSMM	2010.191.15.35.29.000	AVRF020A	
	ZVR00061	MTC_DefaultConf	2010.191.15.35.55.000	AVRF010A	
	ZVR00142	M Set Science DP in RAM	2010.191.15.35.56.000	AVRF010A	**M Cube M1**
	ZVR00016	MTC_ChangeOpe_R	2010.191.15.35.57.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.191.15.35.58.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.191.15.35.59.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.191.15.36.00.000	AVRF010A	
	ZVR00107	Disable H Science on SSMM	2010.191.15.39.55.000	AVRF009B	
	ZVR00042	HTC_DefaultConf	2010.191.15.40.55.000	AVRS005A	**H Cube H2**
	ZVR00134	H Cover Open	2010.191.15.40.56.000	AVRS005A	
	ZVR00148	H Set Nom Observation DP in RAM	2010.191.15.41.26.000	AVRS005A	
	ZVR00045	HTC_ChangeFun_R	2010.191.15.41.27.000	AVRS005A	
	ZVR00047	HTC_ChangeOpe_R	2010.191.15.41.28.000	AVRS005A	
	ZVR00053	HTC_ChangePix_R	2010.191.15.41.29.000	AVRS005A	
	ZVR00105	Enable H Science on SSMM	2010.191.15.41.30.000	AVRS005A	
	ZVR00106	Disable M Science on SSMM	2010.191.15.51.55.000	AVRF009A	
	ZVR00061	MTC_DefaultConf	2010.191.15.52.25.000	AVRF010A	
	ZVR00142	M Set Science DP in RAM	2010.191.15.52.26.000	AVRF010A	**M Cube M2**
	ZVR00016	MTC_ChangeOpe_R	2010.191.15.52.27.000	AVRF010A	
	ZVR00014	MTC_ChangeFun_R	2010.191.15.52.28.000	AVRF010A	
	ZVR00020	MTC_ChangeAlt_R	2010.191.15.52.29.000	AVRF010A	
	ZVR00104	Enable M Science on SSMM	2010.191.15.52.30.000	AVRF010A	
CA			2010.191.15.54.00.000		
	ZVR00106	Disable M Science on SSMM	2010.191.16.03.55.000	AVRF009A	
	ZVR00107	Disable H Science on SSMM	2010.191.16.04.55.000	AVRF009B	
VR OFF					
	ZDM10144	SSMM-Stop Write Operation from User	2010.191.16.44.55.000	AVRF016A	
	ZVR00124	M Cover Close	2010.191.16.46.55.000	AVRF023C	

ZVR00135	H Cover Close	2010.191.16.48.55.000	AVRF023C
ZVR00111	Switch PEMs OFF	2010.191.16.50.55.000	AVRF023C
ZVR00115	Coolers OFF	2010.191.16.56.55.000	AVRF022C
ZDMX0224	Stop Time Update to VIRTIS 51	2010.191.16.58.25.000	AVRF004D
ZVR00037	VTC_EnterSafe	2010.191.16.58.35.000	AVRF004D
ZDMX0213	Send Time to VIRTIS 51	2010.191.16.59.05.000	AVRF004D
ZSKA8122	START VIRTIS Power Off OBCP	2010.191.17.00.53.000	AVRF006A

6 Sequence Observations Parameter List

6.1 VR01A Parameter List

	VR01A M First Lutetia Light Curve				
Parameter List		**M1**		**M2**	
M_ERT	Repetition Time	1	20 sec	1	20 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	20	2 sec	20	2 sec
M_CCD_EXPO	CCD Exposure	60	6 sec	60	6 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	1	Scan	1	Scan
M_Alpha_first	Start Angle	30887	15 lines around	30887	15 lines around
M_Alpha_last	Stop Angle	34412	M boresight	34412	M boresight
M_D_BCK_RATE	Dark Rate	15		15	
Expected duration (sec)			3540		3585
Expected Number of Science Lines			165		167
Expected Number of Dark			12		12
Expected Data Volume (kbit)			82500		82500

Table 12.1 M Cube Parameters for VR01A First Lutetia Light Curve (cubes M1 and M2)

	VR01A M First Lutetia Light Curve				
Parameter List		**M3**		**M4**	
M_ERT	Repetition Time	1	20 sec	1	20 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	20	2 sec	20	2 sec
M_CCD_EXPO	CCD Exposure	60	6 sec	60	6 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	1	Scan	1	Scan
M_Alpha_first	Start Angle	30887	15 lines around	30887	15 lines around
M_Alpha_last	Stop Angle	34412	M boresight	34412	M boresight
M_D_BCK_RATE	Dark Rate	15		15	
Expected duration (sec)			3585		3585
Expected Number of Science Lines			167		167
Expected Number of Dark			12		12
Expected Data Volume (kbit)			82500		82500

Table 12.2 M Cube Parameters for VR01A First Lutetia Light Curve (cubes M3 and M4)

	VR01A M First Lutetia Light Curve				
Parameter List		**M5**		**M6**	
M_ERT	Repetition Time	1	20 sec	1	20 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	20	2 sec	20	2 sec
M_CCD_EXPO	CCD Exposure	60	6 sec	60	6 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	1	Scan	1	Scan
M_Alpha_first	Start Angle	30887	15 lines around	30887	15 lines around
M_Alpha_last	Stop Angle	34412	M boresight	34412	M boresight
M_D_BCK_RATE	Dark Rate	15		15	
Expected duration (sec)			3585		3585
Expected Number of Science Lines			167		167
Expected Number of Dark			12		12
Expected Data Volume (kbit)			82500		82500

Table 12.3 M Cube Parameters for VR01A First Lutetia Light Curve (cubes M5 and M6)

	VR01A M First Lutetia Light Curve				
Parameter List		**M7**		**M8**	
M_ERT	Repetition Time	1	20 sec	1	20 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	20	2 sec	20	2 sec
M_CCD_EXPO	CCD Exposure	60	6 sec	60	6 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	1	Scan	1	Scan
M_Alpha_first	Start Angle	30887	15 lines around	30887	15 lines around
M_Alpha_last	Stop Angle	34412	M boresight	34412	M boresight
M_D_BCK_RATE	Dark Rate	15		15	
Expected duration (sec)			3585		3585
Expected Number of Science Lines			167		167
Expected Number of Dark			12		12
Expected Data Volume (kbit)			82500		82500

Table 12.4 M Cube Parameters for VR01A First Lutetia Light Curve (cubes M7 and M8)

6.2 VR01B Parameter List

	VR01B M Second Lutetia Light Curve				
Parameter List		**M1**		**M2**	
M_ERT	Repetition Time	1	20 sec	1	20 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	7	0,7 sec	7	0,7 sec
M_CCD_EXPO	CCD Exposure	20	2 sec	20	6 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	1	Scan	1	Scan
M_Alpha_first	Start Angle	28772	15 lines around	28772	15 lines around
M_Alpha_last	Stop Angle	32297	Al narrow slit boresight	32297	Al narrow slit boresight
M_D_BCK_RATE	Dark Rate	15		15	
Expected duration (sec)			3600		3585
Expected Number of Science Lines			168		167
Expected Number of Dark			12		12
Expected Data Volume (kbit)			82500		82500

Table 13.1 M Cube Parameters for VR01B Second Lutetia Light Curve(cubes M1 and M2)

	VR01B M Second Lutetia Light Curve				
Parameter List		**M3**		**M4**	
M_ERT	Repetition Time	1	20 sec	1	20 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	7	0,7 sec	7	0,7 sec
M_CCD_EXPO	CCD Exposure	20	2 sec	20	6 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	1	Scan	1	Scan
M_Alpha_first	Start Angle	28772	15 lines around	28772	15 lines around
M_Alpha_last	Stop Angle	32297	Al narrow slit boresight	32297	Al narrow slit boresight
M_D_BCK_RATE	Dark Rate	15		15	
Expected duration (sec)			3585		3585
Expected Number of Science Lines			167		167
Expected Number of Dark			12		12
Expected Data Volume (kbit)			82500		82500

Table 13.2 M Cube Parameters for VR01B Second Lutetia Light Curve(cubes M3 and M4)

	VR01B M Second Lutetia Light Curve				
Parameter List		**M5**		**M6**	
M_ERT	Repetition Time	1	20 sec	1	20 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	7	0,7 sec	7	0,7 sec
M_CCD_EXPO	CCD Exposure	20	2 sec	20	6 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	1	Scan	1	Scan
M_Alpha_first	Start Angle	28772	15 lines around	28772	15 lines around
M_Alpha_last	Stop Angle	32297	Al narrow slit boresight	32297	Al narrow slit boresight
M_D_BCK_RATE	Dark Rate	15		15	
Expected duration (sec)			3585		3585
Expected Number of Science Lines			167		167
Expected Number of Dark			12		12
Expected Data Volume (kbit)			82500		82500

Table 13.3 M Cube Parameters for VR01B Second Lutetia Light Curve(cubes M5 and M6)

	VR01B M Second Lutetia Light Curve				
Parameter List		**M7**		**M8**	
M_ERT	Repetition Time	1	20 sec	1	20 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	7	0,7 sec	7	0,7 sec
M_CCD_EXPO	CCD Exposure	20	2 sec	20	6 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	1	Scan	1	Scan
M_Alpha_first	Start Angle	28772	15 lines around	28772	15 lines around
M_Alpha_last	Stop Angle	32297	Al narrow slit boresight	32297	Al narrow slit boresight
M_D_BCK_RATE	Dark Rate	15		15	
Expected duration (sec)			3585		5565
Expected Number of Science Lines			167		259
Expected Number of Dark			12		19
Expected Data Volume (kbit)			82500		123500

Table 13.4 M Cube Parameters for VR01B Second Lutetia Light Curve(cubes M7 and M8)

	VR01B H Second Lutetia Light Curve				
Parameter List		**H1**		**H2**	
H_DPT	Data Production Mode	8	Backup	0	Nominal
H_int_Science	Integration Time	53	1,6 sec	53	1,6 sec
H_Sum	Frame Summing	0	NO	0	NO
H_NR_Frame	Number of Frames	2		2	
H_DARK_RATE	Dark Rate	8		8	
H_Comp	Compression	1	Lossless	1	Lossless
Expected duration (sec)			300		3240
Expected Number of Image Slices			52		0
Expected Number of Spectral Slices			0		11
Expected Number of Dark			5		91
Expected Data Volume (kbit)			59500		22500

Table 13.5 H Cube Parameters for VR01B Second Lutetia Light Curve(cubes H1 and H2)

6.3 VR03 Parameter List

	VR01B M Lutetia Internal Scan				
Parameter List		**M1**		**M2**	
M_ERT	Repetition Time	0	5 sec	0	5 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	7	0,7 sec	7	0,7 sec
M_CCD_EXPO	CCD Exposure	10	1 sec	10	1 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	1	Scan	1	Scan
M_Alpha_first	Start Angle	30587	20 lines around	29412	30 lines around
M_Alpha_last	Stop Angle	35287	cooperative boresight	36462	cooperative boresight
M_D_BCK_RATE	Dark Rate	20		20	
Expected duration (sec)			1590		160
Expected Number of Science Lines			302		30
Expected Number of Dark			16		2
Expected Data Volume (kbit)			145000		14500

Table 14.1 M Cube Parameters for VR03 Lutetia Internal Scan(cubes M1 and M2)

	VR01B M Lutetia Internal Scan		
Parameter List		**M3**	
M_ERT	Repetition Time	0	5 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1
M_IR_EXPO	IR Exposure	7	0,7 sec
M_CCD_EXPO	CCD Exposure	10	1 sec
M_IR_WIN_Y1	Start Spatial Pixel	7	
M_IR_WIN_Y2	Stop Spatial Pixel	262	
M_CCD_WIN_Y1	Start Spatial Pixel	0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255	
M_SU_MODE	Mirror Mode	1	Scan
M_Alpha_first	Start Angle	31762	10 lines around
M_Alpha_last	Stop Angle	34112	cooperative boresight
M_D_BCK_RATE	Dark Rate	20	
Expected duration (sec)			465
Expected Number of Science Lines			89
Expected Number of Dark			4
Expected Data Volume (kbit)			42500

Table 14.2 M Cube Parameters for VR03 Lutetia Internal Scan(cube M3)

	VR03 H Lutetia Internal Scan				
Parameter List		**H1**		**H2**	
H_DPT	Data Production Mode	8	Backup	0	Nominal
H_int_Science	Integration Time	53	1,6 sec	53	1,6 sec
H_Sum	Frame Summing	0	NO	0	NO
H_NR_Frame	Number of Frames	2		2	
H_DARK_RATE	Dark Rate	8		8	
H_Comp	Compression	1	Lossless	1	Lossless
Expected duration (sec)			300		2220
Expected Number of Image Slices			52		0
Expected Number of Spectral Slices			0		7
Expected Number of Dark			5		62
Expected Data Volume (kbit)			59500		14500

Table 14.3 H Cube Parameters for VR03 Lutetia Internal Scan(cubes H1 and H2)

6.4 VR02 Parameter List

	VR02 M Lutetia Closest Approach Phase				
Parameter List		**M1**		**M2**	
M_ERT	Repetition Time	0	5 sec	0	5 sec
M_ACQ_MODE	Acquisition Mode	5	All pix full window	5	All pix full window
M_COMP_MODE	Compression	2	Wavelet F1	2	Wavelet F1
M_IR_EXPO	IR Exposure	7	0,7 sec	7	0,7 sec
M_CCD_EXPO	CCD Exposure	10	1 sec	10	1 sec
M_IR_WIN_Y1	Start Spatial Pixel	7		7	
M_IR_WIN_Y2	Stop Spatial Pixel	262		262	
M_CCD_WIN_Y1	Start Spatial Pixel	0		0	
M_CCD_WIN_Y2	Stop Spatial Pixel	255		255	
M_SU_MODE	Mirror Mode	0	Pushbroom	0	Pushbroom
M_Alpha_first	Start Angle	30587	20 lines around	29412	30 lines around
M_Alpha_last	Stop Angle	35287	cooperative boresight	36462	cooperative boresight
M_D_BCK_RATE	Dark Rate	20		20	
Expected duration (sec)			1590		160
Expected Number of Science Lines			302		30
Expected Number of Dark			16		2
Expected Data Volume (kbit)			145000		14500

Table 15.1 M Cube Parameters for VR02 Lutetia Closest Approach Phase(cubes M1 and M2)

	VR02 H Lutetia Closest Approach Phase				
Parameter List		**H1**		**H2**	
H_DPT	Data Production Mode	8	Backup	0	Nominal
H_int_Science	Integration Time	53	1,6 sec	53	1,6 sec
H_Sum	Frame Summing	0	NO	0	NO
H_NR_Frame	Number of Frames	2		2	
H_DARK_RATE	Dark Rate	8		8	
H_Comp	Compression	1	Lossless	1	Lossless
Expected duration (sec)			300		2220
Expected Number of Image Slices			52		0
Expected Number of Spectral Slices			0		7
Expected Number of Dark			5		62
Expected Data Volume (kbit)			59500		14500

Table 15.2 H Cube Parameters for VR02 Lutetia Closest Approach Phase(cubes H1 and H2)

7 Lutetia Fly-by and Lutetia Rehearsal Temperature Values Comparison

7.1 Trajectory & Attitude

The trajectory and attitude of Rosetta are provided in RD05 and RD06. The attitude of Rosetta during the Lutetia rehearsal is chosen so that the position of the sun as seen from Rosetta is the same as during the Lutetia flyby. The angular offset of the sun from the Rosetta spacecraft coordinate axis is given in RD07.
The geometrical parameters during the Rehearsal are given below. For reference, the parameters for the actual flyby are also provided:

Rosetta-Sun distance: 1.74 AU (Lutetia flyby: 2.71 AU)

Rosetta-Earth distance: 0.84 AU (Lutetia flyby: 3.03 AU)

Sun-Spacecraft-Earth Angle: 19.4 deg (Lutetia flyby: 19.3 deg)

Date of simulated closest approach: 15 March 2010, 0 UT

7.2 Telemetry Analysis during Lutetia rehearsal and Rosetta-Sun distance influence

During the Lutetia rehearsal Rosetta Attitude Angle respect to the Sun is almost the same than in Lutetia flyby.
The temperature of the Sun (5700 K) is so high respect to Virtis components temperatures to take complete control in the radiance equation.
The only parameter useful to compare the effects on Virtis components temperatures during the Lutetia rehearsal versus the Lutetia flyby is the Rosetta-Sun distance.
Assuming that the radiance power is inversely proportional to the square of the distance, the radiance power ratio at the two times is 0,41.
It has been assumed that the temperature trend is similar in both cases.
For the purpose of preparing the Lutetia Flyby have been taken into account the temperatures at the beginning of the flip, at the maximum temperature of the radiator (3 hours and 43 minutes after the beginning of the flip), at the CA and at 30 minutes after CA (end of Lutetia observations).
The temperatures measured during Lutetia dynamic rehearsal are shown in Fig. 1 and Fig.2.
The temperatures expected during Lutetia flyby are shown In Table 16.

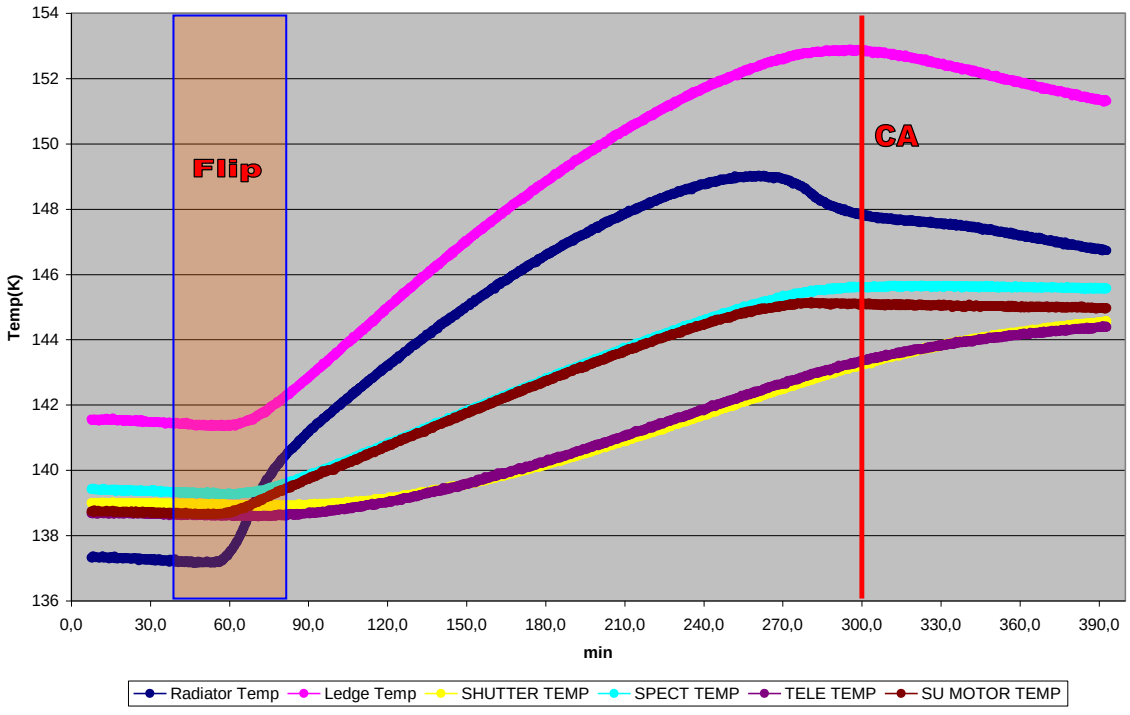

Fig. 1 (Temperatures measured during Lutetia Rehearsal – Virtis M)

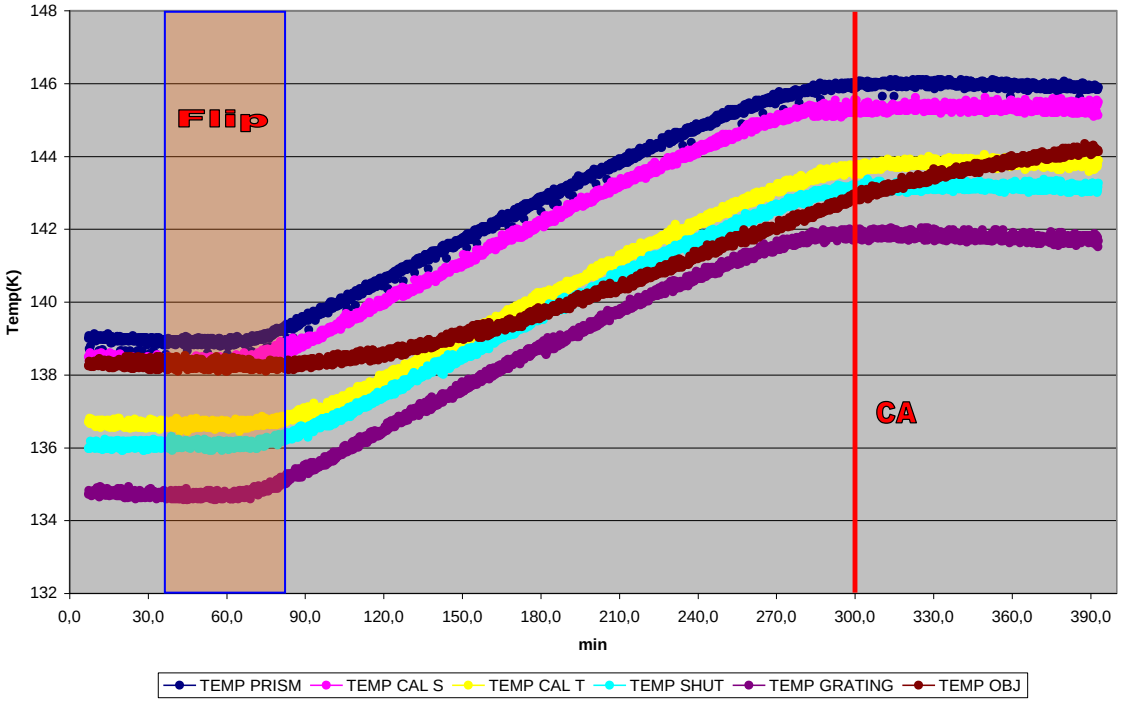

Fig.2 (Temperatures measured during Lutetia Rehearsal – Virtis H)

	Lutetia Dynamic Rehearsal				Lutetia Flyby			
	Flip	Max(263')	CA	CA +30'	Flip	Max (263')	CA	CA +30'
Radiator Temp (M)	137,2	149,2	147,9	147,7	137,2	142,1	141,6	141,6
Ledge Temp (M)	141,7	152,4	152,8	152,4	141,7	146,1	146,3	146,1
Shutter Temp (M)	139,0	142,2	143,2	143,9	139,0	140,3	140,7	141,0
Spect Temp (M)	139,4	145,2	145,7	145,7	139,4	141,8	142,0	142,0
Tele Temp (M)	138,7	142,4	143,3	143,9	138,7	140,2	140,6	140,8
SU Motor Temp (M)	138,7	145,0	145,2	145,2	138,7	141,3	141,4	141,4
Temp Prism (H)	138,8	145,6	146,0	146,0	139,2	141,6	141,8	141,8
Temp Cal S (H)	138,4	144,8	145,3	145,3	138,5	141,0	141,2	141,2
Temp Cal T (H)	136,8	142,8	143,7	143,9	136,8	139,3	139,6	139,7
Temp Shut (H)	136,0	142,3	143,2	143,2	136,0	138,6	139,0	139,0
Temp Grating (H)	134,7	141,3	141,9	141,9	133,7	137,4	137,7	137,7
Temp Obj (H)	138,3	141,9	143,0	143,5	138,3	139,8	140,2	140,4

Table 16 (Temperatures measured during Lutetia Rehearsal and expected during Lutetia Flyby)

7.3 Telemetry Analysis during Lutetia Fly-By

During the actual Lutetia Fly-By the temperature trends were similar to those obtained after Lutetia rehearsal.
The temperatures measured during the Lutetia Fly-By were a little lower than those expected after having extrapolated the data of the Lutetia rehearsal.
The differences of about 1 °C are within the limits expected due to the simplifying assumptions made on that occasion.
The increase of temperature did not heavily affect the observations.
The temperatures measured during Lutetia Fly-By are shown in Fig. 3 and Fig.4.

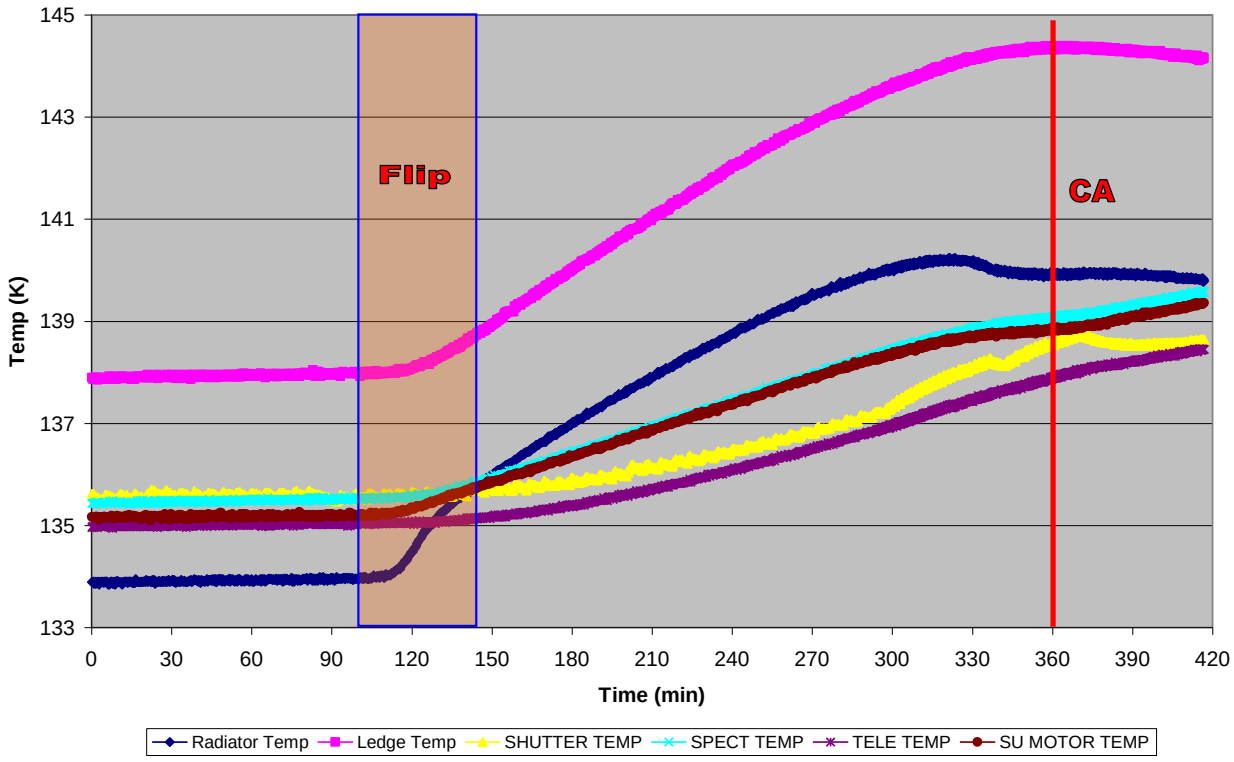

Fig. 3 (Temperatures measured during Lutetia Fly-By – Virtis M)

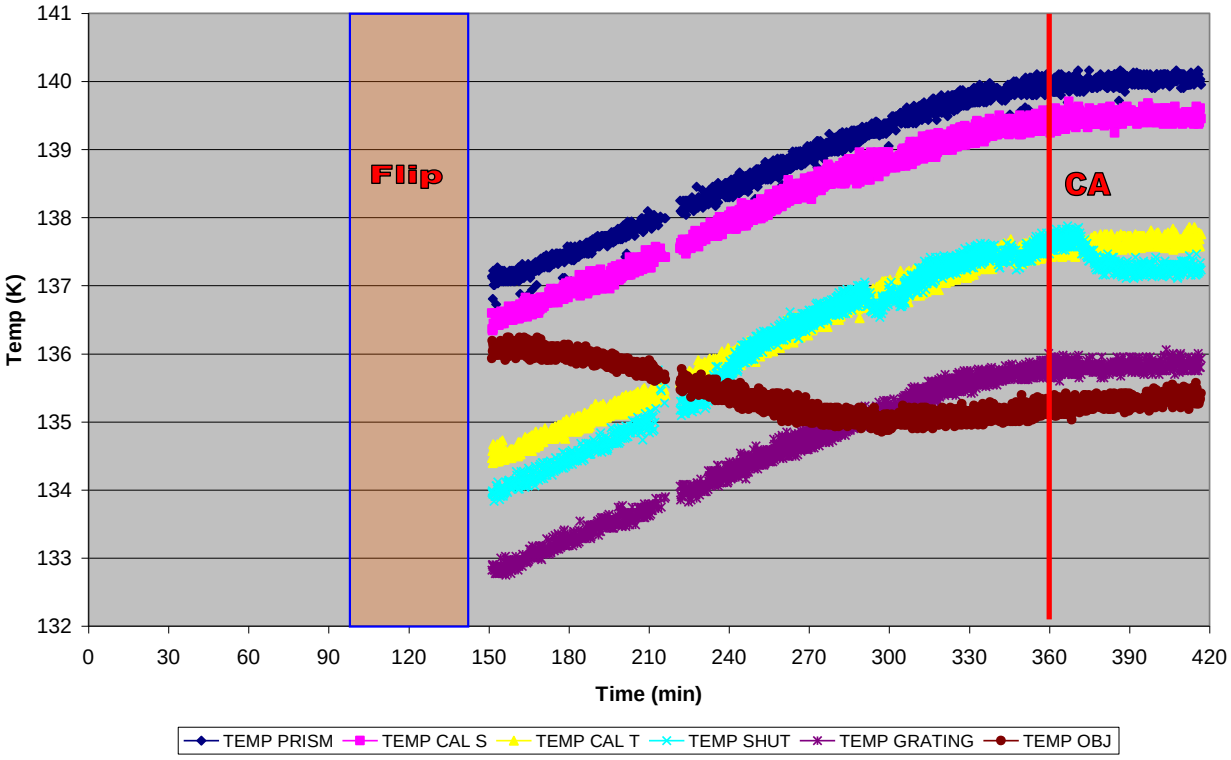

Fig. 4 (Temperatures measured during Lutetia Fly-By – Virtis H)

8 EGSE LOG FILE

During all sessions there was no error event.

9 Conclusions

From VIRTIS point of view the Lutetia Fly-By has been a complete success, inasmuch as we achieved all the objectives that were planned. All the data were downloaded successfully and are being analysed.

10 VIRTIS OIOR

In the following pages are reported the command files (OIOR) relative to the observations fulfilled in Lutetia Fly-by.

10.1 VIRTIS OIOR VR01A

```
# $Log: OIOR_PIIRSO_D_0018_VR_01A___VVVVV.ITL,v $
#

#
#=============================================================================#
# Filename:     OIOR_PIIRSO_D_0018_VR_01A___VVVVV.ITL
# Type:         Input Timeline file
#
# Description:  VIRTIS Lutetia-Flyby-VR01
#
#               name:   RSOC - Michael Kuppers
#               email:  rsoc@rssd.esa.int
#
#               name: Virtis team - Fabrizio Capaccioni - Stefano Giuppi
#               email:  fabrizio.capaccioni@iasf-roma.inaf.it
#               email:  stefano.giuppi@ifsi-roma.inaf.it
#
# Date:         05 May 2010
#
#
```

```
#=============================================================================================#

Version: 00002
Init_mode: VIRTIS IDLE


Ref_date:  09-July-2008

Start_time:  000_00:00:00
End_time:    000_08:00:00

#=============================================================================================#
Description: "VR01A First Lutetia Light Curve"
#=============================================================================================#

#
# Two Light Curves are acquired
#

#
# First Light curve 000_19:00 to 001_03:00 8 hours
# Light curve in All pixels full window mode; 8 cubes acquired, every cube in high res mode
#

# New sequence open the M cover
000_00:00:00   VIRTIS          IDLE    AVRF021A              # Open VIRTIS-M Cover

000_00:01:00   VIRTIS          IDLE    AVRF010A( \           # VIRTIS Start-M Nominal Science
                                                 VVRG0051 = 1 \     # M_ERT    (repetition time 20s)
                                                 VVRG0053 = 5 \     # M_ACQ_MODE    (All pix full window)
                                                 VVRG0054 = 2 \     # Wavelet compression (=8)
                                                 VVRG0029 = 20 \   # M_IR_EXPO        (2s integration time)
                                                 VVRG0035 = 60 \   # M_CCD_EXPO     (6s integration time)
                                                 VVRG0037 = 30887 \  # M_ALPHA_FIRST (15 slices around M-Boresight)
                                                 VVRG0038 = 34412 \    # M_ALPHA_LAST
                                                 VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)
```

```
000_01:00:00   VIRTIS        SCIENCE   AVRF009A          # VIRTIS-M Stop acquisition SSMM
000_01:00:15   VIRTIS        IDLE      AVRF010A( \       # VIRTIS Start-M Nominal Science
                                                  VVRG0051 = 1 \      # M_ERT            (repetition time 20s)
                                                  VVRG0053 = 5 \      # M_ACQ_MODE  (All pix full window)
                                                  VVRG0054 = 2 \      # Wavelet compression (=8)
                                                   VVRG0029 = 20 \       # M_IR_EXPO  (2s integration time)
                                                   VVRG0035 = 60 \     # M_CCD_EXPO (6s integration time)
                                                   VVRG0037 = 30887 \ # M_ALPHA_FIRST (15 slices around M-Boresight)
                                                   VVRG0038 = 34412 \    # M_ALPHA_LAST
                                                   VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_02:00:00   VIRTIS        SCIENCE   AVRF009A          # VIRTIS-M Stop acquisition SSMM
000_02:00:15   VIRTIS        IDLE      AVRF010A( \       # VIRTIS Start-M Nominal Science
                                                   VVRG0051 = 1 \         # M_ERT                (repetition time 20s)
                                                   VVRG0053 = 5 \         # M_ACQ_MODE        (All pix full window)
                                                   VVRG0054 = 2 \         # Wavelet compression (=8)
                                                   VVRG0029 = 20 \       # M_IR_EXPO  (2s integration time)
                                                   VVRG0035 = 60 \     # M_CCD_EXPO (6s integration time)
                                                   VVRG0037 = 30887 \ # M_ALPHA_FIRST (15 slices around M-Boresight)
                                                   VVRG0038 = 34412 \    # M_ALPHA_LAST
                                                   VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_03:00:00   VIRTIS        SCIENCE   AVRF009A          # VIRTIS-M Stop acquisition SSMM
000_03:00:15   VIRTIS        IDLE      AVRF010A( \       # VIRTIS Start-M Nominal Science
                                                   VVRG0051 = 1 \         # M_ERT                (repetition time 20s)
                                                   VVRG0053 = 5 \         # M_ACQ_MODE        (All pix full window)
                                                   VVRG0054 = 2 \         # Wavelet compression (=8)
                                                   VVRG0029 = 20 \       # M_IR_EXPO  (2s integration time)
                                                   VVRG0035 = 60 \     # M_CCD_EXPO (6s integration time)
                                                   VVRG0037 = 30887 \ # M_ALPHA_FIRST (15 slices around M-Boresight)
                                                   VVRG0038 = 34412 \    # M_ALPHA_LAST
                                                   VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_04:00:00   VIRTIS        SCIENCE   AVRF009A          # VIRTIS-M Stop acquisition SSMM
000_04:00:15   VIRTIS        IDLE      AVRF010A( \       # VIRTIS Start-M Nominal Science
                                                   VVRG0051 = 1 \         # M_ERT                (repetition time 20s)
                                                   VVRG0053 = 5 \         # M_ACQ_MODE        (All pix full window)
```

```
                                                VVRG0054 = 2 \          # Wavelet compression (=8)
                                                VVRG0029 = 20 \         # M_IR_EXPO  (2s integration time)
                                                VVRG0035 = 60 \      # M_CCD_EXPO (6s integration time)
                                                VVRG0037 = 30887 \  # M_ALPHA_FIRST (15 slices around M-Boresight)
                                                VVRG0038 = 34412 \    # M_ALPHA_LAST
                                                VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_05:00:00   VIRTIS          SCIENCE   AVRF009A                    # VIRTIS-M Stop acquisition SSMM
000_05:00:15   VIRTIS          IDLE      AVRF010A( \             # VIRTIS Start-M Nominal Science
                                                VVRG0051 = 1 \          # M_ERT                 (repetition time 20s)
                                                VVRG0053 = 5 \          # M_ACQ_MODE        (All pix full window)
                                                VVRG0054 = 2 \          # Wavelet compression (=8)
                                                VVRG0029 = 20 \         # M_IR_EXPO  (2s integration time)
                                                VVRG0035 = 60 \      # M_CCD_EXPO (6s integration time)
                                                VVRG0037 = 30887 \ # M_ALPHA_FIRST (15 slices around M-Boresight)
                                                VVRG0038 = 34412 \    # M_ALPHA_LAST
                                                VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_06:00:00   VIRTIS          SCIENCE   AVRF009A                    # VIRTIS-M Stop acquisition SSMM
000_06:00:15   VIRTIS          IDLE      AVRF010A( \             # VIRTIS Start-M Nominal Science
                                                VVRG0051 = 1 \          # M_ERT                 (repetition time 20s)
                                                VVRG0053 = 5 \          # M_ACQ_MODE        (All pix full window)
                                                VVRG0054 = 2 \          # Wavelet compression (=8)
                                                VVRG0029 = 20 \         # M_IR_EXPO  (2s integration time)
                                                VVRG0035 = 60 \      # M_CCD_EXPO (6s integration time)
                                                VVRG0037 = 30887 \ # M_ALPHA_FIRST (15 slices around M-Boresight)
                                                VVRG0038 = 34412 \    # M_ALPHA_LAST
                                                VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_07:00:00   VIRTIS          SCIENCE   AVRF009A                    # VIRTIS-M Stop acquisition SSMM
000_07:00:15   VIRTIS          IDLE      AVRF010A( \             # VIRTIS Start-M Nominal Science
                                                VVRG0051 = 1 \          # M_ERT                 (repetition time 20s)
                                                VVRG0053 = 5 \          # M_ACQ_MODE        (All pix full window)
                                                VVRG0054 = 2 \          # Wavelet compression (=8)
                                                VVRG0029 = 20 \         # M_IR_EXPO  (2s integration time)
                                                VVRG0035 = 60 \      # M_CCD_EXPO (6s integration time)
                                                VVRG0037 = 30887 \ # M_ALPHA_FIRST (15 slices around M-Boresight)
```

```
                                        VVRG0038 = 34412 \    # M_ALPHA_LAST
                                        VVRG0041 = 15)        # Dark Rate (one dark every 15 spectra)

000_08:00:00   VIRTIS          SCIENCE        AVRF009A              # VIRTIS-M Stop acquisition SSMM


#
# Data Volume = 660 Mibit = 85 MBytes
#
```

10.2 VIRTIS OIOR VR01B

```
# $Log: OIOR_PIIRSO_D_0018_VR_01B___VVVVV.ITL,v $
#

#
#=============================================================================#
# Filename:      OIOR_PIIRSO_D_0018_VR_01B___VVVVV.ITL
# Type:          Input Timeline file
#
# Description:   VIRTIS Lutetia-Flyby-VR01
#
#                name:   RSOC - Michael Kuppers
#                email:  rsoc@rssd.esa.int
#
#                name: Virtis team - Fabrizio Capaccioni - Stefano Giuppi
#                email:  fabrizio.capaccioni@iasf-roma.inaf.it
#                email:  stefano.giuppi@ifsi-roma.inaf.it
#
# Date:          05 May 2010
#
#
#=============================================================================#
```

```
Version: 00002
Init_mode: VIRTIS IDLE


Ref_date:  10-July-2008

Start_time:  000_00:00:00
End_time:    000_08:33:00

#=============================================================================================#
Description: "VR01B Second Lutetia Light Curve"
#=============================================================================================#



#
# Second Light curve 000_06:14 to 000_14:47  8 hours and 33 minutes
# Light curve in All pixels full window mode; 8 cubes acquired, every cube in high res mode
#

000_00:00:00    VIRTIS          IDLE    AVRF010A( \             # VIRTIS Start-M Nominal Science
                                        VVRG0051 = 1 \   # M_ERT      (repetition time 20s)
                                        VVRG0053 = 5 \          # M_ACQ_MODE        (All pix full window)
                                        VVRG0054 = 2 \          # Wavelet compression (=8)
                                        VVRG0029 = 7 \          # M_IR_EXPO  (0.7s integration time)
                                        VVRG0035 = 20 \      # M_CCD_EXPO (2.0s integration time)
                                        VVRG0037 = 28772 \ # M_ALPHA_FIRST (15 slices around Al narrow slit b/sight)
                                       VVRG0038 = 32297 \    # M_ALPHA_LAST
                                        VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_01:00:00    VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM
000_01:00:15    VIRTIS          IDLE    AVRF010A( \             # VIRTIS Start-M Nominal Science
                                        VVRG0051 = 1 \          # M_ERT                   (repetition time 20s)
                                        VVRG0053 = 5 \          # M_ACQ_MODE        (All pix full window)
                                        VVRG0054 = 2 \          # Wavelet compression (=8)
                                        VVRG0029 = 7 \          # M_IR_EXPO  (0.7s integration time)
```

```
                                VVRG0035 = 20 \      # M_CCD_EXPO (2.0s integration time)
                                VVRG0037 = 28772 \  # M_ALPHA_FIRST (15 slices around Al narrow slit b/sight)
                                VVRG0038 = 32297 \    # M_ALPHA_LAST
                                VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_02:00:00   VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM
000_02:00:15   VIRTIS          IDLE     AVRF010A( \              # VIRTIS Start-M Nominal Science
                                 VVRG0051 = 1 \         # M_ERT                 (repetition time 20s)
                                VVRG0053 = 5 \         # M_ACQ_MODE        (All pix full window)
                                VVRG0054 = 2 \         # Wavelet compression (=8)
                                VVRG0029 = 7 \         # M_IR_EXPO  (0.7s integration time)
                                VVRG0035 = 20 \      # M_CCD_EXPO (2.0s integration time)
                                VVRG0037 = 28772 \  # M_ALPHA_FIRST (15 slices around Al narrow slit b/sight)
                                VVRG0038 = 32297 \             # M_ALPHA_LAST
                                VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_03:00:00   VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM
000_03:00:15   VIRTIS          IDLE     AVRF010A( \              # VIRTIS Start-M Nominal Science
                                VVRG0051 = 1 \         # M_ERT                 (repetition time 20s)
                                VVRG0053 = 5 \         # M_ACQ_MODE        (All pix full window)
                                VVRG0054 = 2 \         # Wavelet compression (=8)
                                VVRG0029 = 7 \         # M_IR_EXPO  (0.7s integration time)
                                VVRG0035 = 20 \      # M_CCD_EXPO (2.0s integration time)
                                VVRG0037 = 28772 \   # M_ALPHA_FIRST (15 slices around Al narrow slit b/sight)
                                VVRG0038 = 32297 \             # M_ALPHA_LAST
                                VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_04:00:00   VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM
000_04:00:15   VIRTIS          IDLE     AVRF010A( \              # VIRTIS Start-M Nominal Science
                                VVRG0051 = 1 \         # M_ERT                 (repetition time 20s)
                                VVRG0053 = 5 \         # M_ACQ_MODE        (All pix full window)
                                VVRG0054 = 2 \         # Wavelet compression (=8)
                                VVRG0029 = 7 \         # M_IR_EXPO  (0.7s integration time)
                                VVRG0035 = 20 \      # M_CCD_EXPO (2.0s integration time)
                                VVRG0037 = 28772 \   # M_ALPHA_FIRST (15 slices around Al narrow slit b/sight)
                                VVRG0038 = 32297 \             # M_ALPHA_LAST
                                VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)
```

```
000_05:00:00   VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM


# at 11:24 S/C slew from Alice Narrow slit boresight to Cooperative Boresight
#
# at 11:25 until 12:03 S/C performs attitude flip

000_05:11:00   VIRTIS          IDLE    AVRF010A( \             # VIRTIS Start-M Nominal Science
                                        VVRG0051 = 1 \          # M_ERT                 (repetition time 20s)
                                        VVRG0053 = 5 \          # M_ACQ_MODE            (All pix full window)
                                        VVRG0054 = 2 \          # Wavelet compression (=8)
                                        VVRG0029 = 7 \          # M_IR_EXPO  (0.7s integration time)
                                        VVRG0035 = 20 \       # M_CCD_EXPO (2.0s integration time)
                                        VVRG0037 = 31057 \    # M_ALPHA_FIRST (15 slices around Cooperative B/sight)
                                        VVRG0038 = 34582 \              # M_ALPHA_LAST
                                        VVRG0041 = 15)        # Dark Rate (one dark every 15 spectra)

000_06:00:00   VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM
000_06:00:15   VIRTIS          IDLE    AVRF010A( \             # VIRTIS Start-M Nominal Science
                                        VVRG0051 = 1 \          # M_ERT                 (repetition time 20s)
                                        VVRG0053 = 5 \          # M_ACQ_MODE            (All pix full window)
                                        VVRG0054 = 2 \          # Wavelet compression (=8)
                                        VVRG0029 = 7 \          # M_IR_EXPO  (0.7s integration time)
                                        VVRG0035 = 20 \       # M_CCD_EXPO (2.0s integration time)
                                        VVRG0037 = 31057 \    # M_ALPHA_FIRST (15 slices around Cooperative B/sight)
                                        VVRG0038 = 34582 \              # M_ALPHA_LAST
                                        VVRG0041 = 15)        # Dark Rate (one dark every 15 spectra)


000_06:10:00   VIRTIS          IDLE    AVRS002A              # VIRTIS-H Initialisation

000_07:00:00   VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM
000_07:00:15   VIRTIS          IDLE    AVRF010A( \             # VIRTIS Start-M Nominal Science
                                        VVRG0051 = 1 \          # M_ERT                 (repetition time 20s)
                                        VVRG0053 = 5 \          # M_ACQ_MODE            (All pix full window)
                                        VVRG0054 = 2 \          # Wavelet compression (=8)
```

```
                                VVRG0029 = 7 \          # M_IR_EXPO  (0.7s integration time)
                                VVRG0035 = 20 \      # M_CCD_EXPO (2.0s integration time)
                                VVRG0037 = 31057 \   # M_ALPHA_FIRST (15 slices around Cooperative B/sight)
                                VVRG0038 = 34582 \             # M_ALPHA_LAST
                                VVRG0041 = 15)       # Dark Rate (one dark every 15 spectra)

000_07:10:00   VIRTIS          IDLE    AVRS004A( \           # VIRTIS-H Calibration
                                                    VVRG0093 = 929 \     # Telescope Cal Int. time=1s
                                                    VVRG0094 = 1   \     #
                                                    VVRG0097 = 929 \     # Radiometric Cal Int. time=1s
                                                    VVRG0098 = 1   \
                                                    VVRG0179 = 0x421E87E2     \        # H_Pix_Map_C11
                                                    VVRG0180 = 0x3E00FA15     \        # H_Pix_Map_C12
                                                    VVRG0181 = 0x38BC3DCC     \        # H_Pix_Map_C13
                                                    VVRG0182 = 0x42B9C019     \        # H_Pix_Map_C21
                                                    VVRG0183 = 0x3DC985C7     \        # H_Pix_Map_C22
                                                    VVRG0184 = 0x387DD8E4     \        # H_Pix_Map_C23
                                                    VVRG0185 = 0x43010418     \        # H_Pix_Map_C31
                                                    VVRG0186 = 0x3D9EA323     \        # H_Pix_Map_C32
                                                    VVRG0187 = 0x38290589     \        # H_Pix_Map_C33
                                                    VVRG0188 = 0x43194CCC     \        # H_Pix_Map_C41
                                                    VVRG0189 = 0x3D9329F8     \        # H_Pix_Map_C42
                                                    VVRG0190 = 0x3773EE3E     \        # H_Pix_Map_C43
                                                    VVRG0191 = 0x432BE624     \        # H_Pix_Map_C51
                                                    VVRG0192 = 0x3D73B695     \        # H_Pix_Map_C52
                                                    VVRG0193 = 0x3716EDFF     \        # H_Pix_Map_C53
                                                    VVRG0194 = 0x4339DA1C     \        # H_Pix_Map_C61
                                                    VVRG0195 = 0x3D49E251     \        # H_Pix_Map_C62
                                                    VVRG0196 = 0x371AA135     \        # H_Pix_Map_C63
                                                    VVRG0197 = 0x43459EB7     \        # H_Pix_Map_C71
                                                    VVRG0198 = 0x3D104A64     \        # H_Pix_Map_C72
                                                    VVRG0199 = 0x37AD1197     \        # H_Pix_Map_C73
                                                    VVRG0200 = 0x434DEF9D     \        # H_Pix_Map_C81
                                                    VVRG0201 = 0x3CF4F9DC     \        # H_Pix_Map_C82
                                                    VVRG0202 = 0x37B67469     )        # H_Pix_Map_C83

000_07:30:00   VIRTIS          IDLE    AVRF020A (\ #   VIRTIS Start-H Backup acquisition Science
```

```
                                                VVRG0117 = 53 \       # Integration time = 1.6s
                                                VVRG0118 = 3 \        # H_INT_SCIENCE_NUM2
                                                VVRG0120 = 0 \        # H_SUM
                                                VVRG0121 = 2\         # Repetition Rate = 2
                                                VVRG0123 = 8 \        # H_DARK_RATE
                                                VVRG0124 = 1 )\       # lossless compression

000_07:35:00   VIRTIS        SCIENCE      AVRF009B            # VIRTIS-H Stop acquisition SSMM

000_07:36:00   VIRTIS        IDLE    AVRS005A(\            # VIRTIS Start-H Nominal acquisition Science
                                                VVRG0117 = 53 \       # Integration time = 1,6s
                                                VVRG0118 = 3  \     # H_INT_SCIENCE_NUM2
                                                VVRG0120 = 0 \        # H_SUM
                                                VVRG0121 = 2\         # H_NR_Frame = 2
                                                VVRG0123 = 8 \        # H_DARK_RATE
                                                VVRG0124 = 1\         # lossless compression
                                                VVRG0179 = 0x421E87E2     \         # H_Pix_Map_C11
                                                VVRG0180 = 0x3E00FA15     \         # H_Pix_Map_C12
                                                VVRG0181 = 0x38BC3DCC     \         # H_Pix_Map_C13
                                                VVRG0182 = 0x42B9C019     \         # H_Pix_Map_C21
                                                VVRG0183 = 0x3DC985C7     \         # H_Pix_Map_C22
                                                VVRG0184 = 0x387DD8E4     \         # H_Pix_Map_C23
                                                VVRG0185 = 0x43010418     \         # H_Pix_Map_C31
                                                VVRG0186 = 0x3D9EA323     \         # H_Pix_Map_C32
                                                VVRG0187 = 0x38290589     \         # H_Pix_Map_C33
                                                VVRG0188 = 0x43194CCC     \         # H_Pix_Map_C41
                                                VVRG0189 = 0x3D9329F8     \         # H_Pix_Map_C42
                                                VVRG0190 = 0x3773EE3E     \         # H_Pix_Map_C43
                                                VVRG0191 = 0x432BE624     \         # H_Pix_Map_C51
                                                VVRG0192 = 0x3D73B695     \         # H_Pix_Map_C52
                                                VVRG0193 = 0x3716EDFF     \         # H_Pix_Map_C53
                                                VVRG0194 = 0x4339DA1C     \         # H_Pix_Map_C61
                                                VVRG0195 = 0x3D49E251     \         # H_Pix_Map_C62
                                                VVRG0196 = 0x371AA135     \         # H_Pix_Map_C63
                                                VVRG0197 = 0x43459EB7     \         # H_Pix_Map_C71
                                                VVRG0198 = 0x3D104A64     \         # H_Pix_Map_C72
                                                VVRG0199 = 0x37AD1197     \         # H_Pix_Map_C73
```

```
                                                    VVRG0200 = 0x434DEF9D    \        # H_Pix_Map_C81
                                                    VVRG0201 = 0x3CF4F9DC    \        # H_Pix_Map_C82
                                                    VVRG0202 = 0x37B67469    )        # H_Pix_Map_C83

000_08:30:00   VIRTIS          SCIENCE       AVRF009B          # VIRTIS-H Stop acquisition SSMM

000_08:33:00   VIRTIS          SCIENCE       AVRF009A          # VIRTIS-M Stop acquisition SSMM
#
# Data Volume = Second Light Curve 700Mibit + H 90Mibit = 790 Mibit = 100 MBytes
#
```

10.3 VIRTIS OIOR VR03

```
 # $Log: OIOR_PIIRSO_D_0018_VR_03____VVVVV.ITL,v $
#
#
#=============================================================================================#
# Filename:      OIOR_PIIRSO_D_0018_VR_03____VVVVV.ITL
# Type:          Input Timeline file
#
# Description:   VIRTIS Lutetia-Flyby-VR03
#
#                name:   RSOC - Michael Kuppers
#                email:  rsoc@rssd.esa.int
#
#                name: Virtis team - Fabrizio Capaccioni - Stefano Giuppi
#                email:  fabrizio.capaccioni@iasf-roma.inaf.it
#                email:  stefano.giuppi@ifsi-roma.inaf.it
#
# Date:          05 May 2010
#
#
```

```
#=============================================================================#

Version: 00002
Init_mode: VIRTIS IDLE


Ref_date:  10-July-2010

Start_time:  000_00:00:00
End_time:   000_00:43:00

#=============================================================================#
Description: "VR03 Lutetia Internal Scan"
#=============================================================================#

# Time 00:00 corresponds to t=-50min before CA;
# Start_time:  000_14:49:00
# End_time:   000_15:32:00

000_00:00:00   VIRTIS          IDLE    AVRF020A (\             #   VIRTIS Start-H Backup acquisition Science
                                        VVRG0117 = 53 \       # Integration time = 1.6s
                                        VVRG0118 = 3 \        # H_INT_SCIENCE_NUM2
                                        VVRG0120 = 0 \        # H_SUM
                                        VVRG0121 = 2\         # Repetition Rate = 2
                                        VVRG0123 = 8 \        # H_DARK_RATE
                                        VVRG0124 = 1 )        # lossless compression


#
# Lutetia Internal Scan First Phase
#

000_00:01:00   VIRTIS          IDLE    AVRF010A( \           # VIRTIS Start-M Nominal Science
                                        VVRG0051 = 0 \        # M_ERT         (repetition time 5s)
                                        VVRG0053 = 5 \        # M_ACQ_MODE        (All pixel Full slit)
                                        VVRG0054 = 2 \        # Wavelet compression (=8)
                                        VVRG0029 = 7 \       # M_IR_EXPO     (0.7s integration time)
```

```
VVRG0035 = 10 \ # M_CCD_EXPO (1.0s integration time)
VVRG0037 = 30587 \    # M_ALPHA_FIRST (20 slices around Cooperative b/sight)
VVRG0038 = 35287 \    # M_ALPHA_LAST
VVRG0041 = 20 )      # Dark Rate (one dark every 20 spectra)

000_00:05:00   VIRTIS          SCIENCE   AVRF009B                  # VIRTIS-H Stop acquisition SSMM

000_00:06:00   VIRTIS          IDLE     AVRS005A(\              # VIRTIS Start-H Nominal acquisition Science
                                                    VVRG0117 = 53 \       # Integration time = 1,6s
                                                    VVRG0118 = 3  \     # H_INT_SCIENCE_NUM2
                                                    VVRG0120 = 0 \        # H_SUM
                                                    VVRG0121 = 2\         # H_NR_Frame = 2
                                                    VVRG0123 = 8 \        # H_DARK_RATE
                                                    VVRG0124 = 1\         # lossless compression
                                                    VVRG0179 = 0x421E87E2     \         # H_Pix_Map_C11
                                                    VVRG0180 = 0x3E00FA15     \         # H_Pix_Map_C12
                                                    VVRG0181 = 0x38BC3DCC     \         # H_Pix_Map_C13
                                                    VVRG0182 = 0x42B9C019     \         # H_Pix_Map_C21
                                                    VVRG0183 = 0x3DC985C7     \         # H_Pix_Map_C22
                                                    VVRG0184 = 0x387DD8E4     \         # H_Pix_Map_C23
                                                    VVRG0185 = 0x43010418     \         # H_Pix_Map_C31
                                                    VVRG0186 = 0x3D9EA323     \         # H_Pix_Map_C32
                                                    VVRG0187 = 0x38290589     \         # H_Pix_Map_C33
                                                    VVRG0188 = 0x43194CCC     \         # H_Pix_Map_C41
                                                    VVRG0189 = 0x3D9329F8     \         # H_Pix_Map_C42
                                                    VVRG0190 = 0x3773EE3E     \         # H_Pix_Map_C43
                                                    VVRG0191 = 0x432BE624     \         # H_Pix_Map_C51
                                                    VVRG0192 = 0x3D73B695     \         # H_Pix_Map_C52
                                                    VVRG0193 = 0x3716EDFF     \         # H_Pix_Map_C53
                                                    VVRG0194 = 0x4339DA1C     \         # H_Pix_Map_C61
                                                    VVRG0195 = 0x3D49E251     \         # H_Pix_Map_C62
                                                    VVRG0196 = 0x371AA135     \         # H_Pix_Map_C63
                                                    VVRG0197 = 0x43459EB7     \         # H_Pix_Map_C71
                                                    VVRG0198 = 0x3D104A64     \         # H_Pix_Map_C72
                                                    VVRG0199 = 0x37AD1197     \         # H_Pix_Map_C73
                                                    VVRG0200 = 0x434DEF9D     \         # H_Pix_Map_C81
```

```
                                                VVRG0201 = 0x3CF4F9DC     \         # H_Pix_Map_C82
                                                VVRG0202 = 0x37B67469     )         # H_Pix_Map_C83

000_00:27:30    VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM

000_00:27:45    VIRTIS          IDLE    AVRF010A( \             # VIRTIS Start-M Nominal Science
                                        VVRG0051 = 0 \          # M_ERT                 (repetition time 5s)
                                        VVRG0053 = 5 \          # M_ACQ_MODE        (All pixel Full slit)
                                        VVRG0054 = 2 \          # Wavelet compression (=8)
                                        VVRG0029 = 7 \          # M_IR_EXPO  (0.7s integration time)
                                        VVRG0035 = 10 \     # M_CCD_EXPO   (1.0s integration time)
                                        VVRG0037 = 29412 \    # M_ALPHA_FIRST (30 slices around Cooperative b/sight)
                                        VVRG0038 = 36462 \    # M_ALPHA_LAST
                                        VVRG0041 = 20 )       # Dark Rate (one dark every 20 spectra)

000_00:30:25    VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM

#
# Lutetia Internal Scan Second Phase
#

000_00:32:00    VIRTIS          IDLE    AVRF010A( \             # VIRTIS Start-M Nominal Science
                                        VVRG0051 = 0 \          # M_ERT                 (repetition time 5s)
                                        VVRG0053 = 5 \          # M_ACQ_MODE        (All pixel Full slit)
                                        VVRG0054 = 2 \          # Wavelet compression (=8)
                                        VVRG0029 = 7 \          # M_IR_EXPO  (0.7s integration time)
                                        VVRG0035 = 10 \       # M_CCD_EXPO (1.0s integration time)
                                        VVRG0037 = 31762 \    # M_ALPHA_FIRST (10 slices around Cooperative b/sight)
                                        VVRG0038 = 34112 \              # M_ALPHA_LAST
                                        VVRG0041 = 20 )       # Dark Rate (one dark every 20 spectra)



000_00:39:45    VIRTIS          SCIENCE   AVRF009A                  # VIRTIS-M Stop acquisition SSMM

000_00:43:00    VIRTIS          SCIENCE   AVRF009B                  # VIRTIS-H Stop acquisition SSMM
```

```
#
# Data Volume = First Scan (70+16) + Second scan  (45) H 75 Mibit = 206 Mibit = 26 MBytes
#
```

10.4 VIRTIS OIOR VR02

```
# $Log: OIOR_PIIRSO_D_0018_VR_02____VVVVV.ITL,v $
#
#
#============================================================================================#
# Filename:      OIOR_PIIRSO_D_0018_VR_02____VVVVV.ITL
# Type:          Input Timeline file
#
# Description:   VIRTIS Lutetia-Flyby-VR02
#
#                name:   RSOC - Michael Kuppers
#                email:  rsoc@rssd.esa.int
#
#                name: Virtis team - Fabrizio Capaccioni - Stefano Giuppi
#                email:  fabrizio.capaccioni@iasf-roma.inaf.it
#                email:  stefano.giuppi@ifsi-roma.inaf.it
#
# Date:          05 May 2010
#
#
#============================================================================================#

Version: 00002
Init_mode: VIRTIS IDLE
```

```
Ref_date:  10-July-2010

Start_time:   000_00:00:00
End_time:    000_00:30:00

#=============================================================================#
Description: "VR02 Lutetia Closest Approach Phase"
#=============================================================================#

# Time 00:00 corresponds to t = -10min  before CA;
# Start_time:   000_15:44:00
# End_time:    000_16:14:00

000_00:00:00   VIRTIS          IDLE    AVRF020A (\                    # VIRTIS Start-H Backup acquisition Science
                                              VVRG0117 = 53 \        # Integration time = 1.6s
                                              VVRG0118 = 3 \       # H_INT_SCIENCE_NUM2
                                              VVRG0120 = 0 \         # H_SUM
                                              VVRG0121 = 2\          # Repetition Rate = 2
                                              VVRG0123 = 8 \         # H_DARK_RATE
                                              VVRG0124 = 1 )\        # lossless compression

000_00:01:00   VIRTIS          IDLE    AVRF010A ( \                   # VIRTIS Start-M Nominal Science
                                              VVRG0051 = 0 \         # M_ERT                 (repetition time 5s)
                                              VVRG0053 = 5 \         # M_ACQ_MODE        (All pixel Full slit)
                                              VVRG0054 = 1 \         # Lossless Compression
                                              VVRG0029 = 7 \         # M_IR_EXPO  (0.7s integration time)
                                              VVRG0035 = 10 \    # M_CCD_EXPO   (1.s integration time)
                                              VVRG0036 = 0 \         # M_SU point mode
                                              VVRG0037 = 32937\    # M_ALPHA_FIRST (Al-MR Cooperative Boresight)
                                              VVRG0041 = 20 )    # Dark Rate (one dark every 20 spectra)



000_00:05:00   VIRTIS          SCIENCE   AVRF009B                          # VIRTIS-H Stop acquisition SSMM

000_00:06:00   VIRTIS          IDLE    AVRS005A( \                    # VIRTIS Start-H Nominal acquisition Science
                                                VVRG0117 = 53 \        # Integration time = 1,6s
```

```
VVRG0118 = 3  \      # H_INT_SCIENCE_NUM2
VVRG0120 = 0 \         # H_SUM
VVRG0121 = 2 \         # H_NR_Frame = 2
VVRG0123 = 8 \         # H_DARK_RATE
VVRG0124 = 1 \         # lossless compression
VVRG0179 = 0x421E87E2      \          # H_Pix_Map_C11
VVRG0180 = 0x3E00FA15      \          # H_Pix_Map_C12
VVRG0181 = 0x38BC3DCC      \          # H_Pix_Map_C13
VVRG0182 = 0x42B9C019      \          # H_Pix_Map_C21
VVRG0183 = 0x3DC985C7      \          # H_Pix_Map_C22
VVRG0184 = 0x387DD8E4      \          # H_Pix_Map_C23
VVRG0185 = 0x43010418      \          # H_Pix_Map_C31
VVRG0186 = 0x3D9EA323      \          # H_Pix_Map_C32
VVRG0187 = 0x38290589      \          # H_Pix_Map_C33
VVRG0188 = 0x43194CCC      \          # H_Pix_Map_C41
VVRG0189 = 0x3D9329F8      \          # H_Pix_Map_C42
VVRG0190 = 0x3773EE3E      \          # H_Pix_Map_C43
VVRG0191 = 0x432BE624      \          # H_Pix_Map_C51
VVRG0192 = 0x3D73B695      \          # H_Pix_Map_C52
VVRG0193 = 0x3716EDFF      \          # H_Pix_Map_C53
VVRG0194 = 0x4339DA1C      \          # H_Pix_Map_C61
VVRG0195 = 0x3D49E251      \          # H_Pix_Map_C62
VVRG0196 = 0x371AA135      \          # H_Pix_Map_C63
VVRG0197 = 0x43459EB7      \          # H_Pix_Map_C71
VVRG0198 = 0x3D104A64      \          # H_Pix_Map_C72
VVRG0199 = 0x37AD1197      \          # H_Pix_Map_C73
VVRG0200 = 0x434DEF9D      \          # H_Pix_Map_C81
VVRG0201 = 0x3CF4F9DC      \          # H_Pix_Map_C82
VVRG0202 = 0x37B67469      )          # H_Pix_Map_C83
```

```
000_00:17:00    VIRTIS          SCIENCE         AVRF009A                # VIRTIS-M Stop acquisition SSMM

#
# Lutetia Internal Scan Post Encounter Phase
#
```

```
000_00:17:30    VIRTIS          IDLE    AVRF010A( \                     # VIRTIS Start-M Nominal Science
                                            VVRG0051 = 0 \      # M_ERT                 (repetition time 5s)
                                            VVRG0053 = 5 \      # M_ACQ_MODE        (All pixel Full slit)
                                            VVRG0054 = 2 \      # Wavelet compression (=8)
                                            VVRG0029 = 7 \      # M_IR_EXPO  (0.7s integration time)
                                            VVRG0035 = 10 \             # M_CCD_EXPO          (1,0s integration time)
                                            VVRG0037 = 31762 \# M_ALPHA_FIRST (10 slices around Al-MR Cooperative b/sight)
                                            VVRG0038 = 34112 \          # M_ALPHA_LAST
                                            VVRG0041 = 20 )     # Dark Rate (one dark every 20 spectra)

000_00:29:00    VIRTIS          SCIENCE   AVRF009A                          # VIRTIS-M Stop acquisition SSMM

000_00:30:00    VIRTIS          SCIENCE   AVRF009B                          # VIRTIS-H Stop acquisition SSMM

#
# Data Volume = H 175 Mibit M 395Mibit  = 570 Mibit = 70 MBytes
#
```