



13438 - Probing the atmosphere of a transiting ocean world

Cycle: 21, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) EUROPA-TRANSIT	STIS/FUV-MAMA	1	03-Jan-2014 21:14:57.0	yes
02	(2) EUROPA2	STIS/FUV-MAMA	1	03-Jan-2014 21:15:06.0	yes
03	(3) EUROPA3	STIS/FUV-MAMA	1	03-Jan-2014 21:15:13.0	yes
04	(4) EUROPA-TRANSIT-WFC3	WFC3/UVIS	1	03-Jan-2014 21:15:22.0	yes

4 Total Orbits Used

ABSTRACT

We propose to image the atmosphere of Europa against the smooth FUV and NUV background of Jupiter to reveal or constrain its structure, scale height and composition. Molecules are liberated from the surface by a combination of sputtering and erosion associated with impacting magnetospheric ions, micrometeoroids, sublimation from sunlight and, potentially, cryogenic volcanism. In detail, the relationships between the atmosphere, exosphere and surface are not understood. The clumpy FUV OI emission implies a patchy, irregular exosphere, suggestive of localized

Proposal 13438 (STScI Edit Number: 8, Created: Friday, January 3, 2014 9:15:31 PM EST) - Overview

sources and strong atmospheric density variations. If the internal heat sources and surface cracking are sufficient to release outgassing plumes, as for Enceladus, we have an excellent chance of detecting them. By using the STIS FUV MAMA TIME-TAG imaging: Jupiter is smooth, detector features are removed, and we can crisply image, post-facto, any and all targets in the field individually, including Europa, its shadow and features on Jupiter. The spatial resolution is highest in the FUV and cross-sections of relevant molecules are high. An intriguing archival image demonstrates the power of this approach. An additional observation in the NUV using conventional CCD imaging will provide sensitive limits on dusty particulates above the surface, potentially entrained by outflowing gas.

OBSERVING DESCRIPTION

We will obtain three observations of Europa transiting the face of Jupiter. Two use TIME-TAG STIS FUV imaging and one uses blue WFC3 imaging. We avoid three days near opposition where the shadow of Europa would interfere with the transit, and desire a sun-target-observer angle $<4.5^\circ$ if possible. We also desire the transit to be across the center of the planet.

Proposal 13438 - Visit 01 - Probing the atmosphere of a transiting ocean world

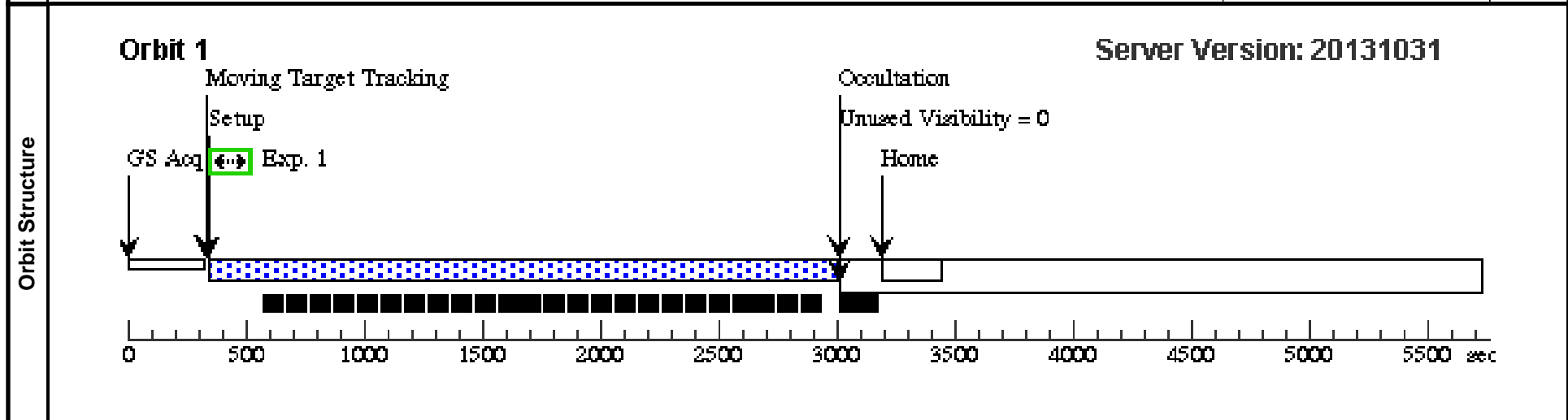
Sat Jan 04 02:15:32 GMT 2014

Visit
Proposal 13438, Visit 01, implementation
Diagnostic Status: Warning
 Scientific Instruments: STIS/FUV-MAMA
 Special Requirements: SCHED 100%; BETWEEN 19-JAN-2014:14:00:00 AND 19-JAN-2014:19:00:00
Comments: Time constraints are so that Sun-Target-Observer angle is in range 4.5 deg to 0.6 deg (latter to avoid shadow behind target)
Additional time constraint to select single visit matched to EPOCH in level 3 target specification.
Execute two of visits 1, 2, 3

Diagnostics
 (Exposure 1 (Visit 01)) Warning (Form): Sensitive exposures should have an ETC run number provided.

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(1)	EUROPA-TRANSIT	STD=JUPITER	STD=EUROPA	TYPE=POS_ANGLE,RAD=6.0,ANG=180.0,REF=NORTH,R_RAD=-8.5,R_ANG=0,EPOCH=19-JAN-2014:16:30:26,EpochTimeScale=UTC	TRANSIT OF EUROPA ACROSS JUPITER FROM EARTH, SEP OF EUROPA JUPITER FROM EARTH LT -10" MOSS Show Windows: true	EARTH

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) EUROPA-TRAN SIT	STIS/FUV-MAMA, TIME-TAG, F25SRF2	MIRROR	BUFFER-TIME=99			2700 Secs (2507 Secs) [=>2507.0 Secs]	[1]



Proposal 13438 - Visit 02 - Probing the atmosphere of a transiting ocean world

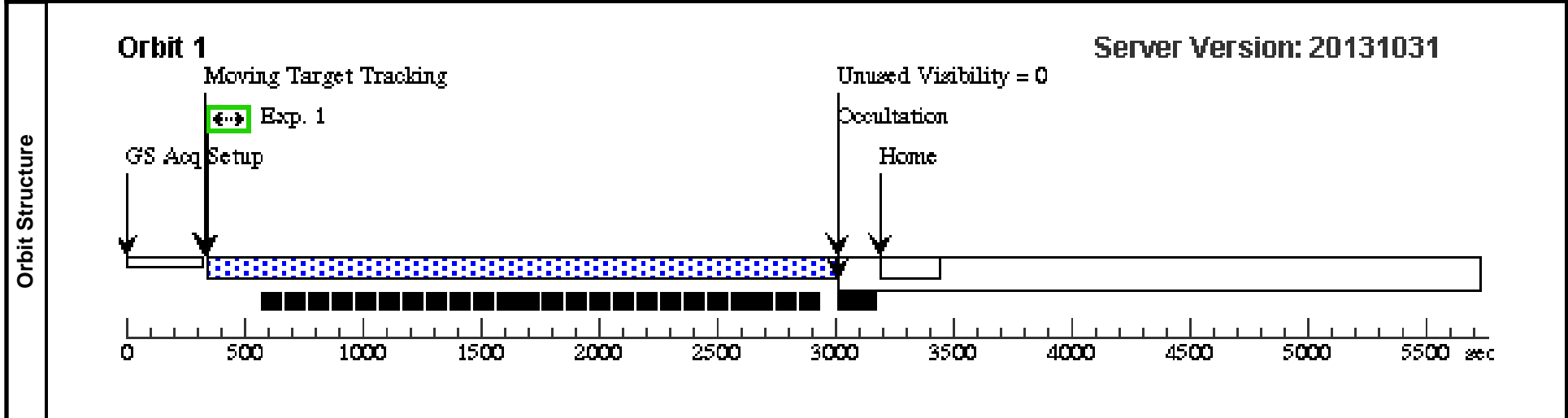
Sat Jan 04 02:15:34 GMT 2014

Visit
Proposal 13438, Visit 02, implementation
Diagnostic Status: Warning
 Scientific Instruments: STIS/FUV-MAMA
 Special Requirements: SCHED 100%; BETWEEN 26-JAN-2014:16:00:00 AND 26-JAN-2014:21:00:00
*Comments: Time constraints are so that Sun-Target-Observer angle is in range 4.5 deg to 0.6 deg (latter to avoid shadow behind target)
 Further constrained to match EPOCH in Level 3 target specification.
 Execute two of visits 1, 2, 3*

Diagnostics
 (Exposure 1 (Visit 02)) Warning (Form): Sensitive exposures should have an ETC run number provided.

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(2)	EUROPA2	STD=JUPITER	STD=EUROPA	TYPE=POS_ANGLE,RAD=6.0,ANG=180,REF=NORTH,R_RAD=-8.5,R_ANG=0,EPOCH=26-JAN-2014:18:12:18,EpochTimeScale=UTC	TRANSIT OF EUROPA ACROSS JUPITER FROM EARTH, SEP OF EUROPA JUPITER FROM EARTH LT -10" MOSS Show Windows: true	EARTH

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) EUROPA2	STIS/FUV-MAMA, TIME-TAG, F25SRF2	MIRROR	BUFFER-TIME=99			2700 Secs (2507 Secs) [=>2507.0 Secs]	[1]



Proposal 13438 - Visit 03 - Probing the atmosphere of a transiting ocean world

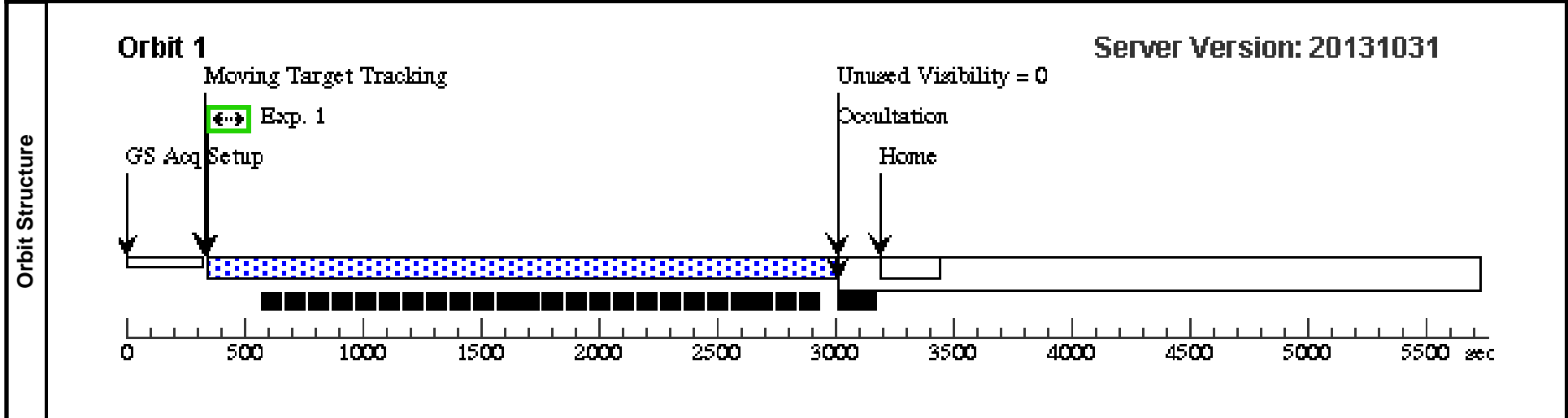
Sat Jan 04 02:15:35 GMT 2014

Visit
Proposal 13438, Visit 03, completed
Diagnostic Status: Warning
 Scientific Instruments: STIS/FUV-MAMA
 Special Requirements: SCHED 100%; BETWEEN 22-DEC-2013:04:00:00 AND 22-DEC-2013:10:00:00
*Comments: Time constraints are so that Sun-Target-Observer angle is in range 4.5 deg to 0.6 deg (latter to avoid shadow behind target)
 Further constrained to match Level 3 target specification EPOCH
 Execute two of visits 1, 2, 3*

Diagnostics
 (Exposure 1 (Visit 03)) Warning (Form): Sensitive exposures should have an ETC run number provided.

#	Name	Level 1	Level 2	Level 3	Window	Ephem Center
(3)	EUROPA3	STD=JUPITER	STD=EUROPA	TYPE=POS_ANGLE,RAD=0,ANG=90,REF=NORTH,R_RAD=-138,R_ANG=0,EPOCH=22-DEC-2013:07:07:30,EpochTimeScale=UTC	TRANSIT OF EUROPA ACROSS JUPITER FROM EARTH, SEP OF EUROPA JUPITER FROM EARTH LT -10" MOSS Show Windows: true	EARTH

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) EUROPA3	STIS/FUV-MAMA, TIME-TAG, F25SRF2	MIRROR	BUFFER-TIME=99			2700 Secs (2507 Secs) [=>2507.0 Secs]	[1]



Proposal 13438 - Visit 04 - Probing the atmosphere of a transiting ocean world

Visit	Proposal 13438, Visit 04, completed Sat Jan 04 02:15:36 GMT 2014 Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: SCHED 80%; BETWEEN 15-DEC-2013:14:30:00 AND 03-JAN-2014:14:30:00; BETWEEN 08-JAN-2014:16:30:00 AND 27-JAN-2014:05:00:00 <i>Comments: Time constraints are so that Sun-Target-Observer angle is in range 4.5 deg to 0.6 deg (latter to avoid shadow behind target)</i>									
	Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center		
(4)		EUROPA-TRANSIT-WFC3	STD=JUPITER	STD=EUROPA		TRANSIT OF EUROPA ACROSS JUPITER FROM EARTH, SEP OF EUROPA JUPITER FROM EARTH LT -10" MOSS Show Windows: true	EARTH			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(4) EUROPA-TRAN SIT-WFC3	(4) EUROPA-TRAN SIT-WFC3	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F225W		POS TARG 0.5,0.5		150 Secs X 2 (300 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]
	2	(4) EUROPA-TRAN SIT-WFC3	(4) EUROPA-TRAN SIT-WFC3	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F225W				150 Secs X 2 (300 Secs) [==>(Copy 1)] [==>(Copy 2)]	[1]
	3	(4) EUROPA-TRAN SIT-WFC3	(4) EUROPA-TRAN SIT-WFC3	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F275W				29.4 Secs X 3 (88.2 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]
	4	(4) EUROPA-TRAN SIT-WFC3	(4) EUROPA-TRAN SIT-WFC3	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F275W		POS TARG -0.5,-0.5		29.4 Secs X 3 (88.2 Secs) [==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)]	[1]

