



14884 - Characterising the dust ejection process in the first known active binary asteroid system 288P/300163.

Cycle: 24, Proposal Category: GO

(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) 288P	WFC3/UVIS	1	29-Nov-2016 21:16:14.0	yes
02	(1) 288P	WFC3/UVIS	1	29-Nov-2016 21:16:15.0	yes
03	(1) 288P	WFC3/UVIS	1	29-Nov-2016 21:16:16.0	yes
04	(1) 288P	WFC3/UVIS	1	29-Nov-2016 21:16:17.0	yes

4 Total Orbits Used

ABSTRACT

We request four orbits of MC time to monitor the dust ejected from the recently discovered, first known active binary asteroid system 288P/300163, using WFC3. The key aim is to trace the influence of the binary nature and/or potential rapid rotation on the sublimation-driven activity, in order to understand if the activity was triggered by the same process that led to the formation of the binary, or if the two processes were independent. Both dust release and binary formation can be a consequence of rapid rotation, and 288P is the first object showing both these phenomena, which may emphasise the importance of the YORP-effect in re-shaping the asteroid belt. The proposed observations will exploit the change in projection related to the Earth's crossing the orbital plane of 288P in 2016 December to reconstruct the three-dimensional distribution of the dust ejected from the 288P system. As this coincides with the expected maximum of activity (perihelion is on November 08) and a close approach to Earth (perigee was on September-10 at 1.45 AU), we will follow the dust ejection process at supreme temporal and spatial resolution. The activity of 288P is expected to cease around 2017 February, which triggers our request for mid-cycle time.

OBSERVING DESCRIPTION

The purpose of the program is to observe active asteroid 288P during December 2016 through February 2017. One orbit should be scheduled as close as possible to December 14 in order to measure the vertical extent of the dust trail while the Earth crosses the orbital plane of 288P. The remaining 3 orbits should be spaced at 2-3 week intervals and before 288P enters the solar exclusion zone in mid-February. This will give us three high-resolution measurements of the dust sheet from a perspective south of the orbital plane, complementary to our existing observations (from GO 14790 and GO 14864) obtained from a northern perspective. The three measurements will allow us to sufficiently sample the temporal evolution of the dust tail and coma to distinguish between episodic and continuous emission.

We will follow the same successful observation strategy as for our programs GO 14790 and 14864, ensuring a maximum comparability of the data.

The orbital visibility for a solar system target near the ecliptic plane is 54 min (Section 6.3 of the HST Primer document). In each orbit, we will take 8 exposures of ~ 230 s using the 1k subarray of WFC3. We will perform a subsampling dither box pattern, obtaining 2 exposures at each dither point. We will carefully drizzle our subsampled images to a finer output pixel scale to extract the extra spatial information gathered by our subsampling strategy. This enhanced resolution will allow us to extract the maximum possible information on the two nuclei and the dust distribution in the innermost coma. The dithering will also enable us to reject hot pixels and cosmic ray hits.

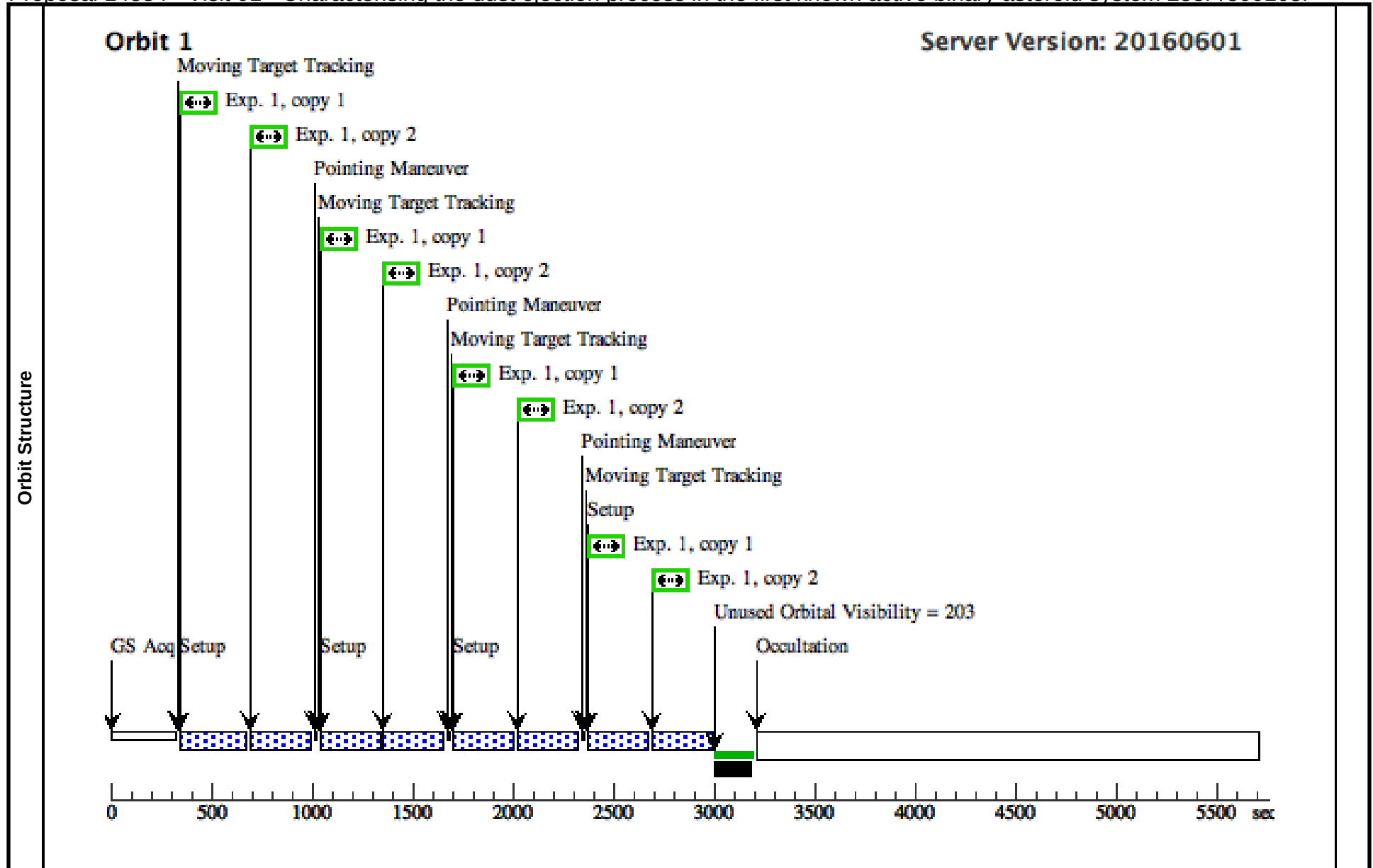
This strategy gives us a total exposure time of 1840 s = 30min per orbit, and estimated overheads of 6 min for guide-star acquisition, 2.6 min for the first exposure, a total of 14.7 min for the subsequent 7 exposures, and 1.5 min for the three spacecraft maneuvers required for dithering, which adds up to a total execution time of 54 min per orbit. Our observations of GO 14790 and 14864 show that this exposure time is adequate to detect the

dust tail at good S/N.

We will use the wide bandpass filter F606W for an optimum trade-off between sensitivity and highest resolution: the bandpass (475 -- 700 nm) covers the maximum of the solar spectrum, and is in the wavelength range where the PSF is smallest (FWHM < 0.07 arcsec, from the WFC3 instrument handbook for Cycle 24), such that we can optimally exploit our subsampling dither strategy. In addition, F606W is the same filter we used to observe 288P in GO 12597, 14790 and 14864, enabling a direct comparison of the data sets.

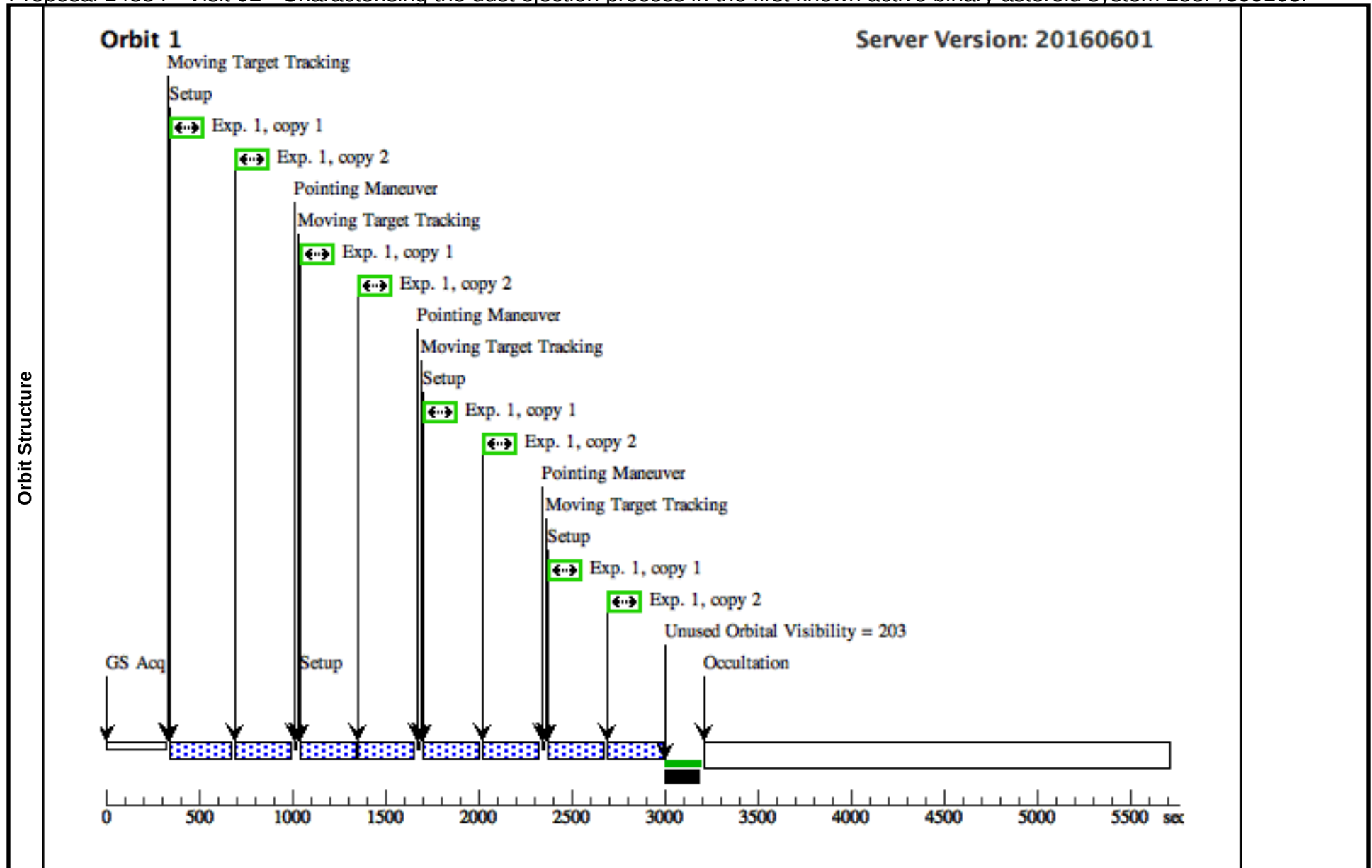
Proposal 14884 - Visit 01 - Characterising the dust ejection process in the first known active binary asteroid system 288P/300163.

Visit	Proposal 14884, Visit 01, implementation										Wed Nov 30 02:16:18 GMT 2016	
	Diagnostic Status: Warning											
	Scientific Instruments: WFC3/UVIS											
	Special Requirements: BETWEEN 14-DEC-2016:00:00:00 AND 16-DEC-2016:00:00:00											
Diagnostics	(Exposure 1 (Pattern 1, Exps 1-1 in Visit 01)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser											
Patterns	#	Primary Pattern					Secondary Pattern				Exposures	
	(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112					Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false				(1)	
Solar System Targets	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center					
	(1)	288P	TYPE=COMET,Q=2.437997636061935,E=.2002773126787514,I=3.239254302184838,O=83.22502588733704,W=281.9669249151093,T=18-JUL-2011:22:51:20,TTIMEscale=UTC,EQUINOX=J2000,EPOCH=19-JUN-2010:00:00:00,EpochTimeScale=TDB				EARTH					
Comments: Extended=YES												
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1	(WFC3UVIS.im.845622)	(1) 288P	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F606W	CR-SPLIT=NO		Pattern 1, Exps 1-1 in Visit 01 (1)	230 Secs X 2 (1840 Secs) [==>(Pattern 1, Copy 1)] [==>(Pattern 1, Copy 2)] [==>(Pattern 2, Copy 1)] [==>(Pattern 2, Copy 2)] [==>(Pattern 3, Copy 1)] [==>(Pattern 3, Copy 2)] [==>(Pattern 4, Copy 1)] [==>(Pattern 4, Copy 2)]		[1]	



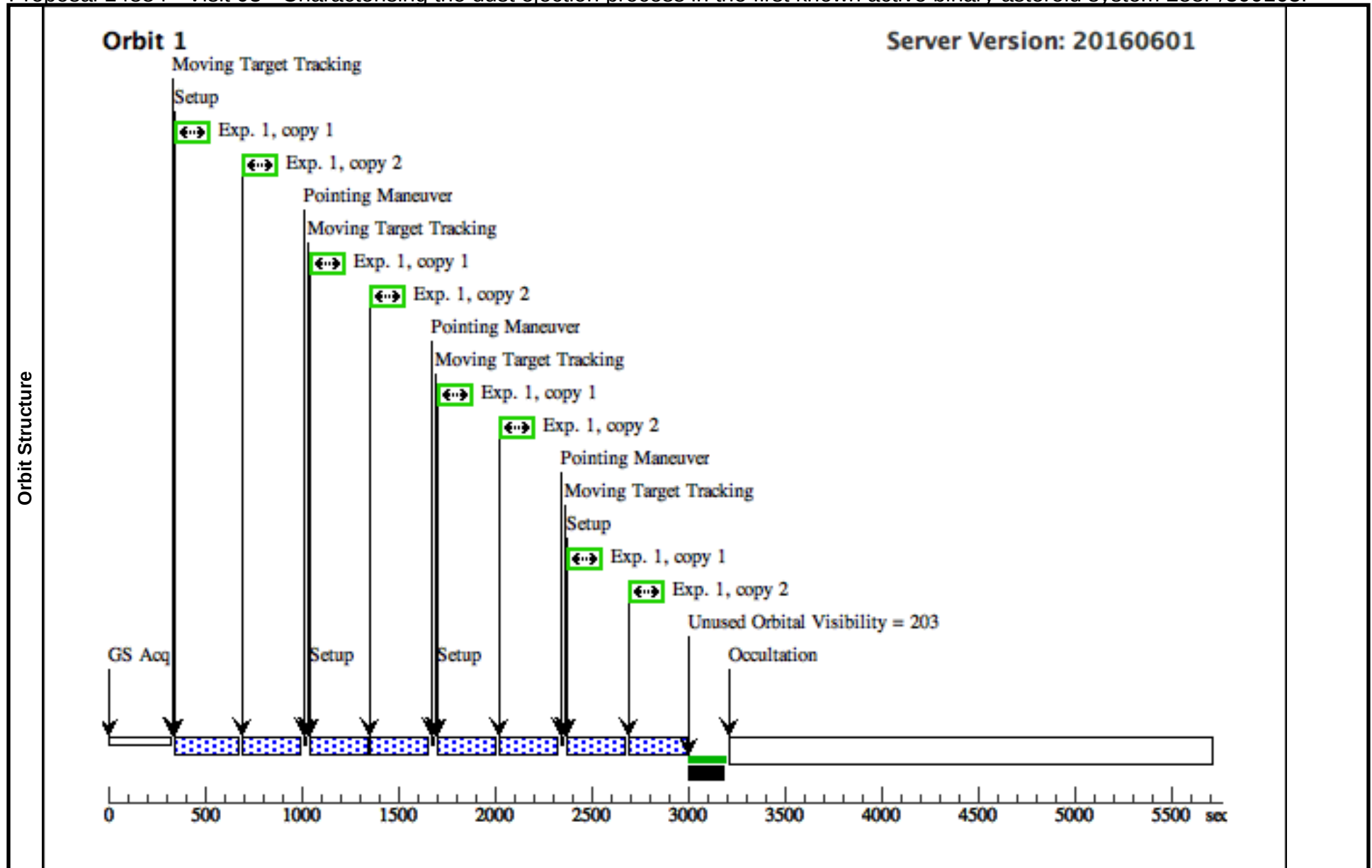
Proposal 14884 - Visit 02 - Characterising the dust ejection process in the first known active binary asteroid system 288P/300163.

Visit	Proposal 14884, Visit 02, implementation										Wed Nov 30 02:16:18 GMT 2016			
	Diagnostic Status: Warning													
	Scientific Instruments: WFC3/UVIS													
	Special Requirements: BETWEEN 26-DEC-2016:00:00:00 AND 01-JAN-2017:00:00:00													
Diagnostics	(Exposure 1 (Pattern 1, Exps 1-1 in Visit 02)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser													
Patterns	#	Primary Pattern						Secondary Pattern				Exposures		
	(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112						Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false				(1)		
Solar System Targets	#	Name	Level 1		Level 2		Level 3		Window		Ephem Center			
	(1)	288P	TYPE=COMET,Q=2.437997636061935,E=.2002773126787514,I=3.239254302184838,O=83.22502588733704,W=281.9669249151093,T=18-JUL-2011:22:51:20,TTIMEscale=UTC,EQUINOX=J2000,EPOCH=19-JUN-2010:00:00:00,EpochTimeScale=TDB								EARTH			
Comments: Extended=YES														
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit		
	1	(WFC3UVIS.im.845622)	(1) 288P	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F606W	CR-SPLIT=NO		Pattern 1, Exps 1-1 in Visit 02 (1)	230 Secs X 2 (1840 Secs)				
[1]														



Proposal 14884 - Visit 03 - Characterising the dust ejection process in the first known active binary asteroid system 288P/300163.

Visit	Proposal 14884, Visit 03, implementation										Wed Nov 30 02:16:18 GMT 2016			
	Diagnostic Status: Warning													
	Scientific Instruments: WFC3/UVIS													
	Special Requirements: BETWEEN 13-JAN-2017:00:00:00 AND 20-JAN-2017:00:00:00													
Diagnostics	(Exposure 1 (Pattern 1, Exps 1-1 in Visit 03)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser													
Patterns	#	Primary Pattern					Secondary Pattern					Exposures		
	(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112					Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false					(1)		
Solar System Targets	#	Name	Level 1		Level 2		Level 3		Window		Ephem Center			
	(1)	288P	TYPE=COMET,Q=2.437997636061935,E=.2002773126787514,I=3.239254302184838,O=83.22502588733704,W=281.9669249151093,T=18-JUL-2011:22:51:20,TTIMEscale=UTC,EQUINOX=J2000,EPOCH=19-JUN-2010:00:00:00,EpochTimeScale=TDB								EARTH			
Comments: Extended=YES														
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit		
	1	(WFC3UVIS.im.845622)	(1) 288P	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F606W	CR-SPLIT=NO		Pattern 1, Exps 1-1 in Visit 03 (1)	230 Secs X 2 (1840 Secs)		[1]		
[==>(Pattern 1, Copy 1)]														
[==>(Pattern 1, Copy 2)]														
[==>(Pattern 2, Copy 1)]														
[==>(Pattern 2, Copy 2)]														
[==>(Pattern 3, Copy 1)]														
[==>(Pattern 3, Copy 2)]														
[==>(Pattern 4, Copy 1)]														
[==>(Pattern 4, Copy 2)]														



Proposal 14884 - Visit 04 - Characterising the dust ejection process in the first known active binary asteroid system 288P/300163.

Visit	Proposal 14884, Visit 04, implementation										Wed Nov 30 02:16:18 GMT 2016			
	Diagnostic Status: Warning													
	Scientific Instruments: WFC3/UVIS													
	Special Requirements: BETWEEN 30-JAN-2017:00:00:00 AND 05-FEB-2017:00:00:00													
Diagnostics	(Exposure 1 (Pattern 1, Exps 1-1 in Visit 04)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser													
Patterns	#	Primary Pattern					Secondary Pattern					Exposures		
	(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112					Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false					(1)		
Solar System Targets	#	Name	Level 1		Level 2		Level 3		Window		Ephem Center			
	(1)	288P	TYPE=COMET,Q=2.437997636061935,E=.2002773126787514,I=3.239254302184838,O=83.22502588733704,W=281.9669249151093,T=18-JUL-2011:22:51:20,TTimeScale=UTC,EQUINOX=J2000,EPOCH=19-JUN-2010:00:00:00,EpochTimeScale=TDB								EARTH			
Comments: Extended=YES														
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit		
	1	(WFC3UVIS.im.845622)	(1) 288P	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB		F606W	CR-SPLIT=NO		Pattern 1, Exps 1-1 in Visit 04 (1)	230 Secs X 2 (1840 Secs)				
										[==>(Pattern 1, Copy 1)]		[1]		
										[==>(Pattern 1, Copy 2)]				
									[==>(Pattern 2, Copy 1)]					
									[==>(Pattern 2, Copy 2)]					
									[==>(Pattern 3, Copy 1)]					
									[==>(Pattern 3, Copy 2)]					
									[==>(Pattern 4, Copy 1)]					
									[==>(Pattern 4, Copy 2)]					

