



16861 - Testing a New Method for Pinning Down CTE losses

Cycle: 29, Proposal Category: CAL/WFC3

(Availability Mode: RESTRICTED)

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	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:11.0	yes
02	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:12.0	yes
03	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:12.0	yes
04	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:12.0	yes
05	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:13.0	yes
06	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:13.0	yes
07	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:13.0	yes
08	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:14.0	yes
09	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:14.0	yes
10	DARK-NM	WFC3/UVIS	1	14-Dec-2021 17:00:14.0	yes

10 Total Orbits Used

ABSTRACT

Understanding CTE losses in WFC3/UVIS has very much been a learning experience. Once it became clear that there were significant losses at the small-electron-packet end, we realized that we needed more than the strategy that had worked so well for ACS: namely, just measuring the trails found behind the warm pixels (WPs) in the calibration long darks.

We devised a strategy that used a combination of short-darks and long-darks. The long-darks allowed us to know the true intensity of each warm pixel, and the short darks with variable background allowed us to measure electron-survival as a function of background. This new strategy has worked well, but there are not as many WPs in the short darks as we would like.

We experient here with a different approach. We will take the standard 900s long darks with a variety of post-flash levels so that the relative losses-vs-background can be assessed. This approach is not as direct as the short-long approach, but it may provide more data and it is actually more in-line with what actually gets done for science. Also, this new approach provides a lot more WPs to study, which should give us much better resolution on losses as a function of background. The short-dark data taken in the previous calibration cycle has noisy trends for backgrounds between 20e and 100e. This program should remedy that significantly.

OBSERVING DESCRIPTION

The observing strategy here is pretty straightforward. We will take long 900s darks at a variety of background levels. The standard calibration programs take 900s darks with zero post-flash background and with 20e added postflash, so this program will supplement those levels with twenty 900s exposures with a wide variety of backgrounds.

In the end, we will have long darks with 22 different background levels: (0e), 4e, 8e, 12e, 16e, (20e), 24e, 28e, 35e, 42e, 49e, 46e, 63e, 70e, 77e, 84e, 98e, 126e, 161e, 203e, 252e, and 322e.

The reduction plans are straightforward. The routine calibrations will give us around 20x900s darks with PF=20e from the same anneal period of this program. We will stack these images and make a list of the stable WPs. We will next select (say) WPs with between 45e and 55e found in the top ~250 pixels of the detector (i.e., the ones that suffer more than 1750 parallel transfers from the readout register). We will then examine the number of electrons read out for these pixels for the 22 background levels explored. We can do the same for fainter and brighter WPs. These plots should provide more resolution than we have previously had to explore details in the charge-transfer model. We can of course compare these curves against predictions of the pixel-based model.

Visit	Proposal 16861, PF005-PF010 (01) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	(PF005-PF010 (01)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU (900s PF004 (01.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (900s PF008 (01.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF004	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=LOW; FLASHEXP=1.5			900.0 Secs (900 Secs) [==>]	[1]
	2	900s PF008	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=LOW; FLASHEXP=3.0			900.0 Secs (900 Secs) [==>]	[1]
	<p>Orbit 1 Unused Orbital Visibility = 3142</p> <p>The diagram shows a timeline from 0 to 6000 seconds. Two exposures are shown as green bars: Exp. 1 from 0 to ~2100s and Exp. 2 from ~1000s to ~2100s. An occultation is shown as a black bar from ~2700s to ~3100s. A white bar representing the rest of the orbit extends from ~3100s to ~5700s.</p>									
Orbit Structure	Server Version: 20210514									
	(This row is part of the Orbit Structure visualization area)									

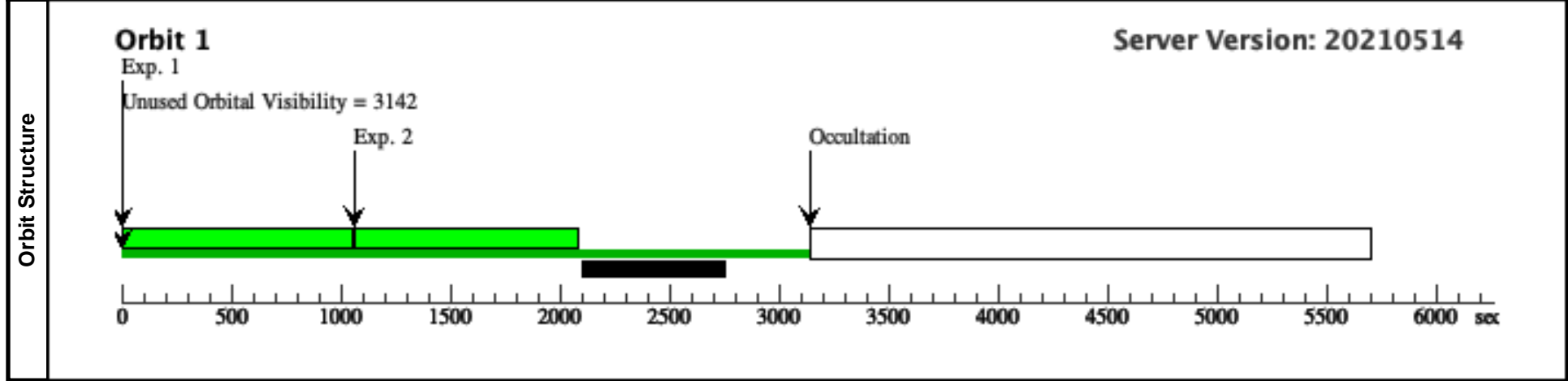
Proposal 16861 - PF015-PF018 (02) - Testing a New Method for Pinning Down CTE losses

Tue Dec 14 22:00:15 GMT 2021

Visit	<p>Proposal 16861, PF015-PF018 (02)</p> <p>Diagnostic Status: Warning</p> <p>Scientific Instruments: WFC3/UVIS</p> <p>Special Requirements: AFTER 01 BY 0 D TO 5 D</p>
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Diagnostics	<p>(PF015-PF018 (02)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU</p> <p>(900s PF012 (02.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p> <p>(900s PF016 (02.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser</p>
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Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF012	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=LOW; FLASHEXP=4.5				900.0 Secs (900 Secs) [==>]
2	900s PF016	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=LOW; FLASHEXP=6.0				900.0 Secs (900 Secs) [==>]	[1]



Proposal 16861 - PF023-PF026 (03) - Testing a New Method for Pinning Down CTE losses

Tue Dec 14 22:00:15 GMT 2021

Visit	Proposal 16861, PF023-PF026 (03) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	(PF023-PF026 (03)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU (900s PF024 (03.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (900s PF028 (03.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF024	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=LOW; FLASHEXP=9.2			900.0 Secs (900 Secs) [==>]	[1]
	2	900s PF028	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=0.4			900.0 Secs (900 Secs) [==>]	[1]
Orbit Structure	<p>Orbit 1 Server Version: 20210514</p> <p>Unused Orbital Visibility = 3142</p> <p>Exp. 1 Exp. 2 Occultation</p> <p>0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 sec</p>									

Proposal 16861 - PF030-PF035 (04) - Testing a New Method for Pinning Down CTE losses

Tue Dec 14 22:00:15 GMT 2021

Visit	Proposal 16861, PF030-PF035 (04) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	(PF030-PF035 (04)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU (900s PF035 (04.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (900s PF042 (04.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF035	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=0.5			900.0 Secs (900 Secs) [==>]	[1]
2	900s PF042	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=0.6			900.0 Secs (900 Secs) [==>]	[1]	
Orbit Structure	Orbit 1 Unused Orbital Visibility = 3142 Server Version: 20210514									
	<p>The diagram illustrates the orbit structure for Orbit 1. The x-axis represents time in seconds, ranging from 0 to 6000. Two exposures are shown: Exp. 1 (0 to 2100s) and Exp. 2 (1000 to 2100s). An occultation period is indicated from 3100 to 5700s. A black bar is present between 2100 and 2800s. The total unused orbital visibility is 3142 seconds.</p>									

Proposal 16861 - PF040-PF045 (05) - Testing a New Method for Pinning Down CTE losses

Tue Dec 14 22:00:15 GMT 2021

Visit	Proposal 16861, PF040-PF045 (05) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	(PF040-PF045 (05)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU (900s PF049 (05.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (900s PF056 (05.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF049	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=0.7			900.0 Secs (900 Secs) [==>]	[1]
2	900s PF056	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=0.8			900.0 Secs (900 Secs) [==>]	[1]	
Orbit Structure	Orbit 1 Unused Orbital Visibility = 3142 Server Version: 20210514									
	<p>The diagram shows a horizontal timeline from 0 to 6000 seconds. Two green bars represent exposures: 'Exp. 1' from 0 to approximately 2100 seconds, and 'Exp. 2' from approximately 1050 to 2100 seconds. A black bar from approximately 2100 to 2800 seconds is labeled 'Occultation'. A white bar from approximately 3100 to 5700 seconds is also labeled 'Occultation'. The x-axis has major ticks every 500 seconds.</p>									

Proposal 16861 - PF050-PF060 (06) - Testing a New Method for Pinning Down CTE losses

Tue Dec 14 22:00:15 GMT 2021

Visit	Proposal 16861, PF050-PF060 (06) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	(PF050-PF060 (06)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU (900s PF063 (06.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (900s PF070 (06.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF063	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=0.9			900.0 Secs (900 Secs) [==>]	[1]
2	900s PF070	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=1.0			900.0 Secs (900 Secs) [==>]	[1]	
Orbit Structure	Orbit 1 Unused Orbital Visibility = 3142 Server Version: 20210514									
	<p>The diagram shows a horizontal timeline from 0 to 6000 seconds. Two exposure periods are highlighted in green: 'Exp. 1' from 0 to approximately 2100 seconds, and 'Exp. 2' from approximately 1000 to 2100 seconds. A black bar representing 'Occultation' is shown from approximately 2100 to 2800 seconds. A white bar representing another 'Occultation' is shown from approximately 3100 to 5700 seconds. The x-axis is labeled 'sec' and has major tick marks every 500 units.</p>									

Proposal 16861 - PF070-PF085 (07) - Testing a New Method for Pinning Down CTE losses

Tue Dec 14 22:00:15 GMT 2021

Visit	Proposal 16861, PF070-PF085 (07) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	Diagnosics (PF070-PF085 (07)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU (900s PF077 (07.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (900s PF084 (07.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF077	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=1.1			900.0 Secs (900 Secs) [==>]	[1]
2	900s PF084	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=1.2			900.0 Secs (900 Secs) [==>]	[1]	
Orbit Structure	<p>Orbit 1 Server Version: 20210514</p> <p>Exp. 1 Unused Orbital Visibility = 3142</p> <p>Exp. 2</p> <p>Occultation</p> <p>0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 sec</p>									

Proposal 16861 - PF100-PF125 (08) - Testing a New Method for Pinning Down CTE losses

Tue Dec 14 22:00:15 GMT 2021

Visit	Proposal 16861, PF100-PF125 (08) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	Diagnosics (PF100-PF125 (08)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU (900s PF098 (08.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (900s PF126 (08.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF098	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=1.4			900.0 Secs (900 Secs) [==>]	[1]
2	900s PF126	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=1.8			900.0 Secs (900 Secs) [==>]	[1]	
Orbit Structure	<p>Orbit 1 Server Version: 20210514</p> <p>Exp. 1 Unused Orbital Visibility = 3142</p> <p>Exp. 2</p> <p>Occultation</p> <p>0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 sec</p>									

Proposal 16861 - PF160-PF200 (09) - Testing a New Method for Pinning Down CTE losses

Tue Dec 14 22:00:15 GMT 2021

Visit	Proposal 16861, PF160-PF200 (09) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	(PF160-PF200 (09)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU (900s PF161 (09.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (900s PF203 (09.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF161	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=2.3			900.0 Secs (900 Secs) [==>]	[1]
2	900s PF203	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=1.9			900.0 Secs (900 Secs) [==>]	[1]	
Orbit Structure	Orbit 1 Server Version: 20210514 Exp. 1 Unused Orbital Visibility = 3142 Exp. 2 Occultation									
	<p>The diagram shows a timeline for Orbit 1. The x-axis represents time in seconds, from 0 to 6000. A green bar indicates the total exposure time from 0 to 2100 seconds. A black bar indicates the occultation period from 2100 to 2800 seconds. Two arrows point to the start of the exposure sequence: 'Exp. 1' at 0s and 'Exp. 2' at 1000s. The text 'Unused Orbital Visibility = 3142' is shown above the timeline. The server version is noted as 20210514.</p>									

Proposal 16861 - PF250-PF300 (10) - Testing a New Method for Pinning Down CTE losses

Tue Dec 14 22:00:15 GMT 2021

Visit	Proposal 16861, PF250-PF300 (10) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	(PF250-PF300 (10)) Warning (Orbit Planner): MAXIMUM DURATION EXCEEDED FOR INTERNAL OR EARTH CALIB SU (900s PF252 (10.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (900s PF322 (10.002)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	900s PF252	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=3.6			900.0 Secs (900 Secs) [==>]	[1]
2	900s PF322	DARK-NM	WFC3/UVIS, ACCUM, UVIS	F487N	GAIN=1.5; FLASHCUR=MEDIUM; FLASHEXP=4.6			900.0 Secs (900 Secs) [==>]	[1]	
Orbit Structure	Orbit 1 Unused Orbital Visibility = 3142 Server Version: 20210514									
	<p>The diagram shows a horizontal timeline from 0 to 6000 seconds. Two exposure periods are highlighted in green: 'Exp. 1' from 0 to approximately 2100 seconds, and 'Exp. 2' from approximately 1000 to 2100 seconds. A black bar representing 'Occultation' is shown from approximately 2300 to 2800 seconds. A white bar representing another 'Occultation' is shown from approximately 3100 to 5700 seconds. The x-axis is labeled 'sec' and has major tick marks every 500 units.</p>									