13280 - Evolution of heterogeneous cloud structure through the T dwarf sequence

Cycle: 21, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) 2MASS-J05591914-1404488	WFC3/IR	5	07-Oct-2013 21:12:23.0	yes
02	(2) 2MASS-J16241436+0029158	WFC3/IR	5	07-Oct-2013 21:16:13.0	yes
03	(3) 2MASS-J10491891-5319100	WFC3/IR	5	07-Oct-2013 21:26:17.0	yes

15 Total Orbits Used

ABSTRACT

We propose to use time-resolved grism observations of three spectroscopically-variable T dwarfs to test theoretical models of cloud evolution in cool brown dwarfs. The overall spectral evolution of brown dwarfs is driven by two main factors: changes in temperatures and changes in the cloud structure. Models predict that the drastic change in spectral characteristics between L and T dwarfs stems primarily from cloud dispersal, either

through hole growth or thinning due to rainout. We have used the WFC3 IR grism to carry out the first successful spectroscopic variability study of brown dwarfs with intriguing results: two T2 dwarfs show evidence for a mixed thick and thin cloud structure, but no cloud holes; a T6 dwarf exhibits multiple out-of-phase variable components, with the phase lag correlating with the pressure probed at that wavelength.

Do these results show a systematic pattern of cloud evolution? To further probe this complex behavior, we propose to expand coverage to a broader range of spectral types. We target 3 T dwarfs (T3.5, T4.5, T6) that are identified as spectroscopic variables from our SNAP survey. We will combine time-resolved WFC3/G141 grism data with simultaneous Spitzer/IRAC photometry to follow their variability over a substantial fraction of a rotation period. We will get unique horizontal and vertical structure information by probing several pressure levels simultaneously. We can then compare the heterogeneous atmospheres of T dwarfs at three distinct cloud dissipation stages for two objects each: the still cloudy T2s, the T4s near the end of the L/T transition, and the T6s, where silicate clouds should have disappeared but new clouds may appear.

OBSERVING DESCRIPTION

We are observing 3 Brown Dwarfs with WFC3 IR slitless spectroscopy with grism G141 to search for time variability. Each object is observed for 5 consecutive orbits. At the beginning of each orbit, a direct image is taken for wavelength calibration. 2 of the 3 objects will be observed simulateously with Spitzer and scheduling must be coordinated.

ADDITIONAL COMMENTS

2 target changes were approved by STScI.

Visit

Proposal 13280, Visit 01, implementation Tue Oct 08 01:27:29 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 177D TO 53 D; ORIENT 59D TO 171 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	2MASS-J05591914-1404488	RA: 05 59 19.1430 (89.8297625d) Dec: -14 04 48.88 (-14.08024d) Equinox: J2000	Proper Motion RA: 0.563 arcsec/yr Proper Motion Dec: -0.346 arcsec/yr Epoch of Position: 1999.0	V=(?) J=13.8	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 2MASS-J05591914-1404488	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=2; SAMP-SEQ=SPARS10			7.624302 Secs (7.624 Secs) *[==>]*	 ***[1]***
2		(1) 2MASS-J05591914-1404488	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=4; SAMP-SEQ=SPARS25			67.315932 Secs X 33 (2221.426 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]* *[==>(Copy 24)]* *[==>(Copy 25)]* *[==>(Copy 26)]* *[==>(Copy 27)]* *[==>(Copy 28)]* *[==>(Copy 29)]* *[==>(Copy 30)]* *[==>(Copy 31)]* *[==>(Copy 32)]* *[==>(Copy 33)]*	 ***[1]***
3		(1) 2MASS-J05591914-1404488	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=2; SAMP-SEQ=SPARS10			7.624302 Secs (7.624 Secs) *[==>]*	 ***[2]***

	4	(1) 2MASS-J05591914-1404488	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=4; SAMP-SEQ=SPARS25	67.315932 Secs X 34 (2288.742 Secs)	
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	5	(1) 2MASS-J05591914-1404488	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=2; SAMP-SEQ=SPARS10	7.624302 Secs (7.624 Secs)	
						[==>]	***[3]***

	6	(1) 2MASS-J05591914-1404488	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=4; SAMP-SEQ=SPARS25	67.315932 Secs X 34 (2288.742 Secs)	
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	7	(1) 2MASS-J05591914-1404488	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=2; SAMP-SEQ=SPARS10	7.624302 Secs (7.624 Secs)	
						[==>]	***[4]***

	8	(1) 2MASS-J05591914-1404488	WFC3/IR, MULTIACCUM, GRISM256	G141	NSAMP=4; SAMP-SEQ=SPARS25	67.315932 Secs X 34 (2288.742 Secs)	
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	9	(1) 2MASS-J05591914-1404488	WFC3/IR, MULTIACCUM, GRISM256	F132N	NSAMP=2; SAMP-SEQ=SPARS10	7.624302 Secs (7.624 Secs)	
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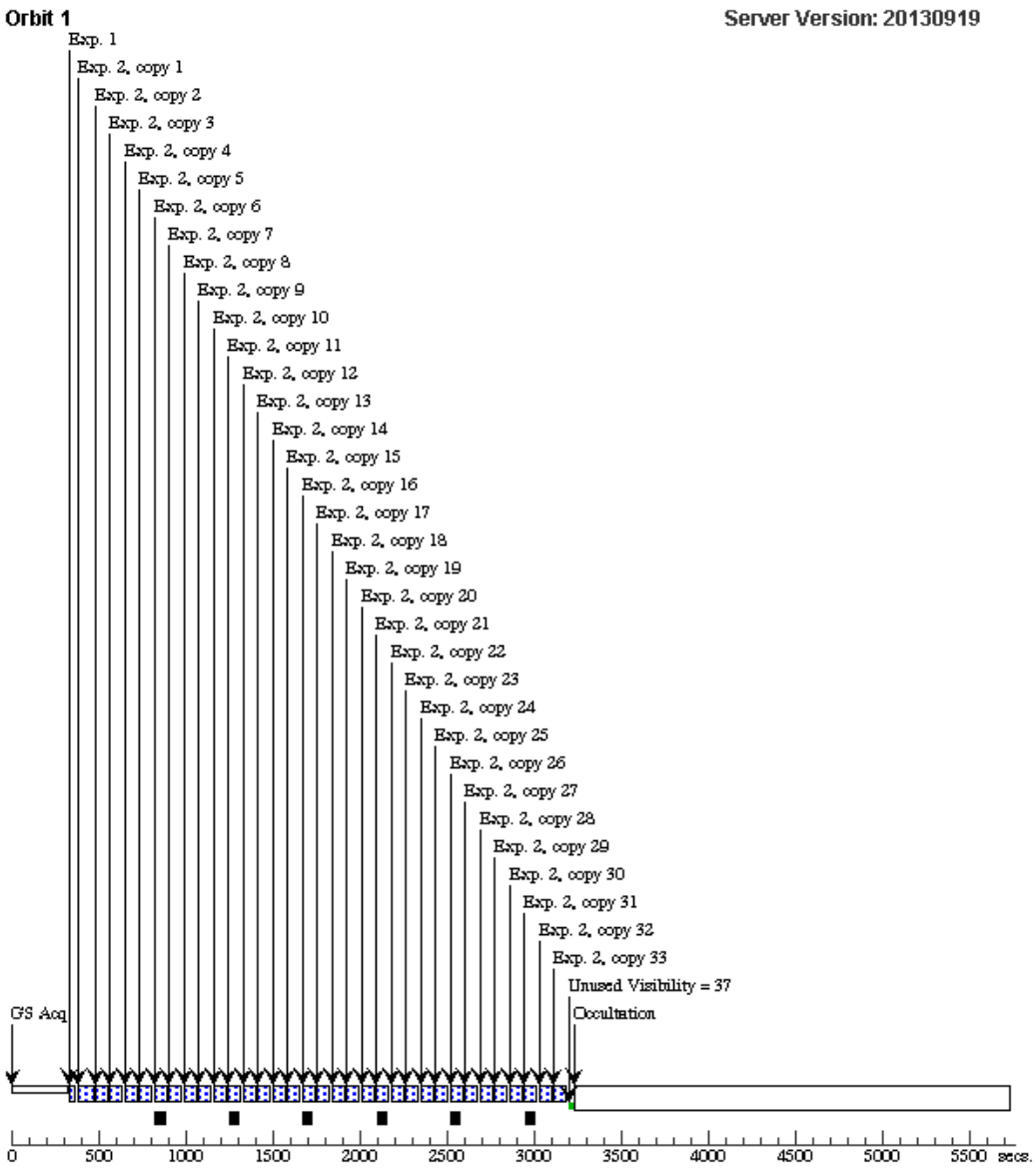

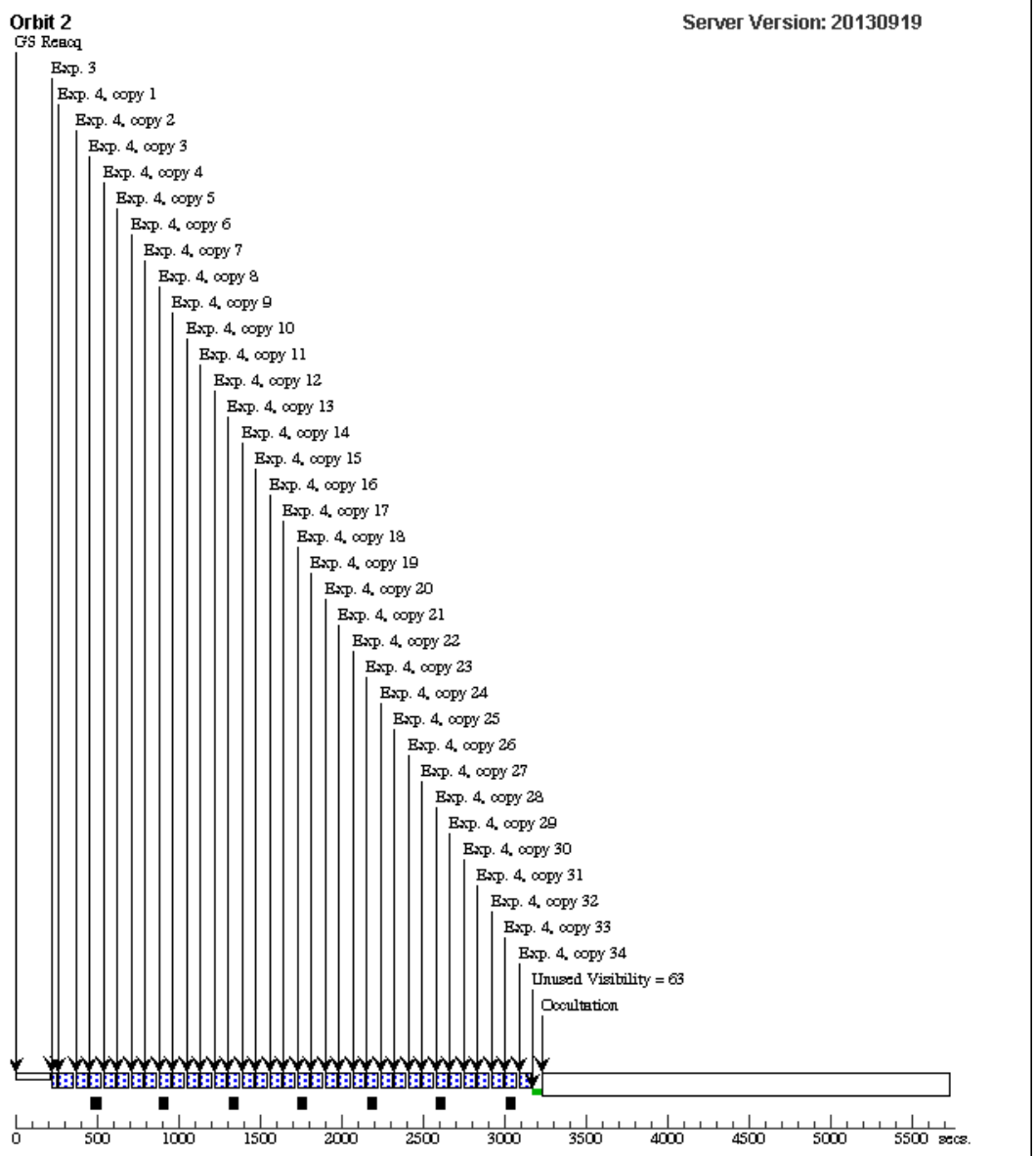
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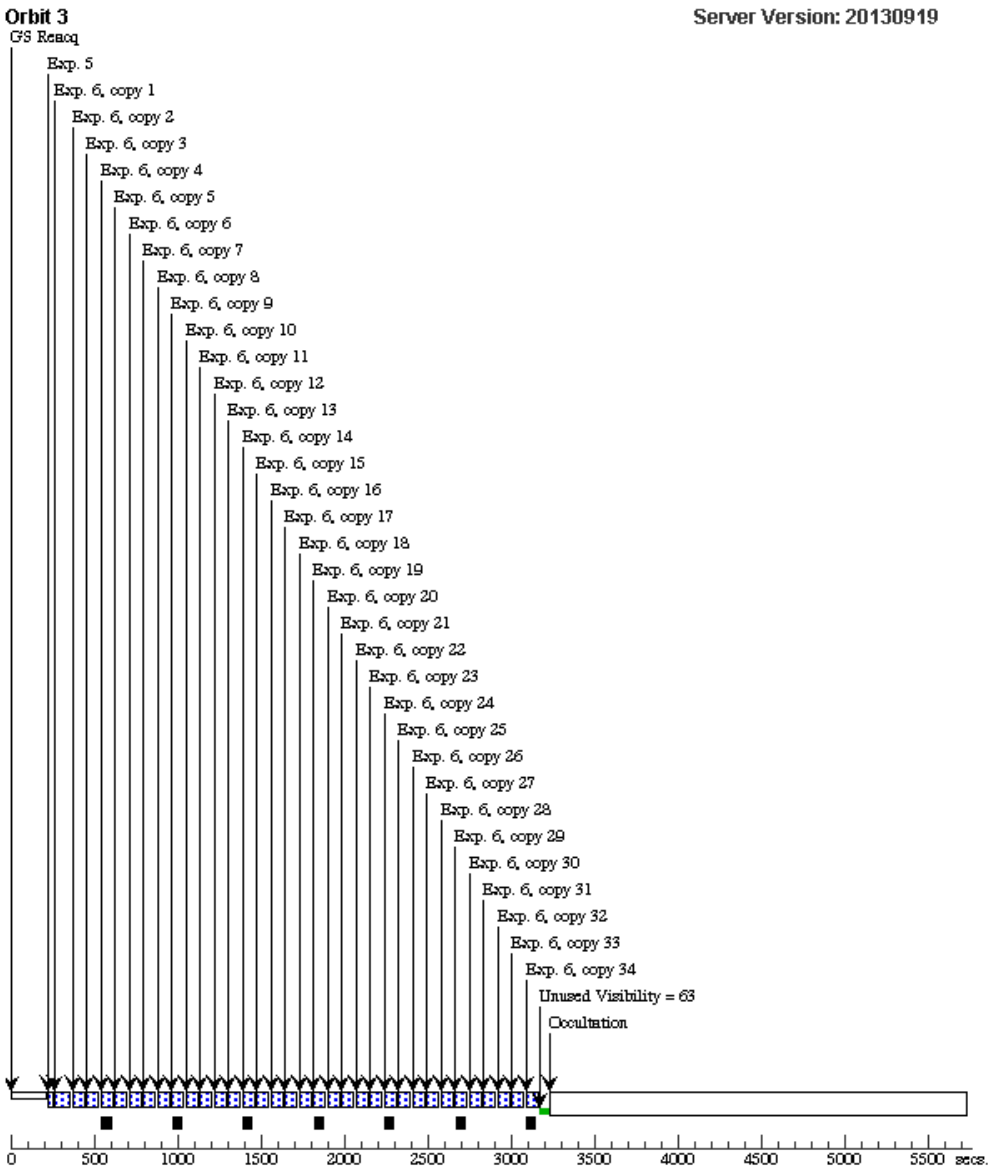
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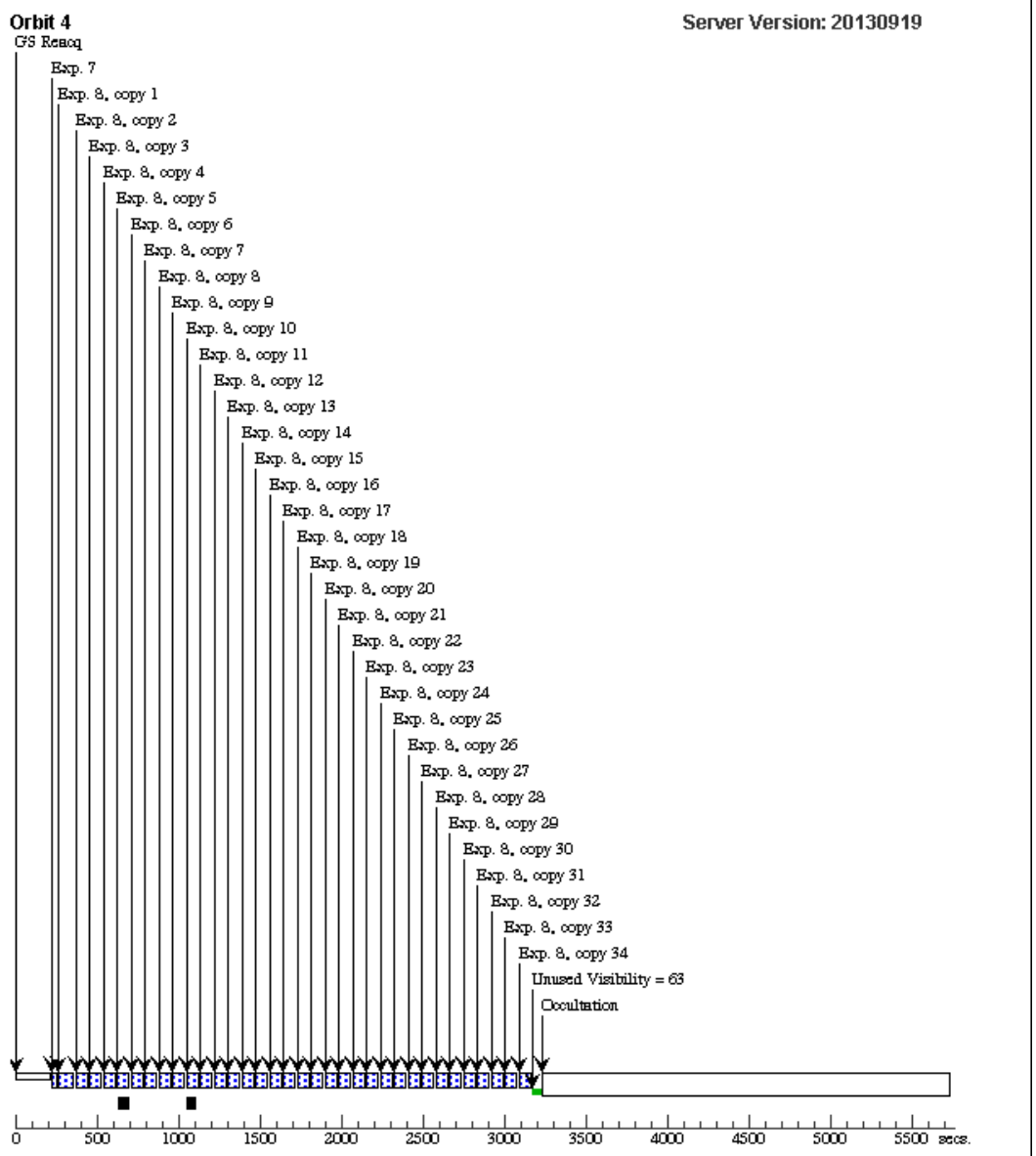
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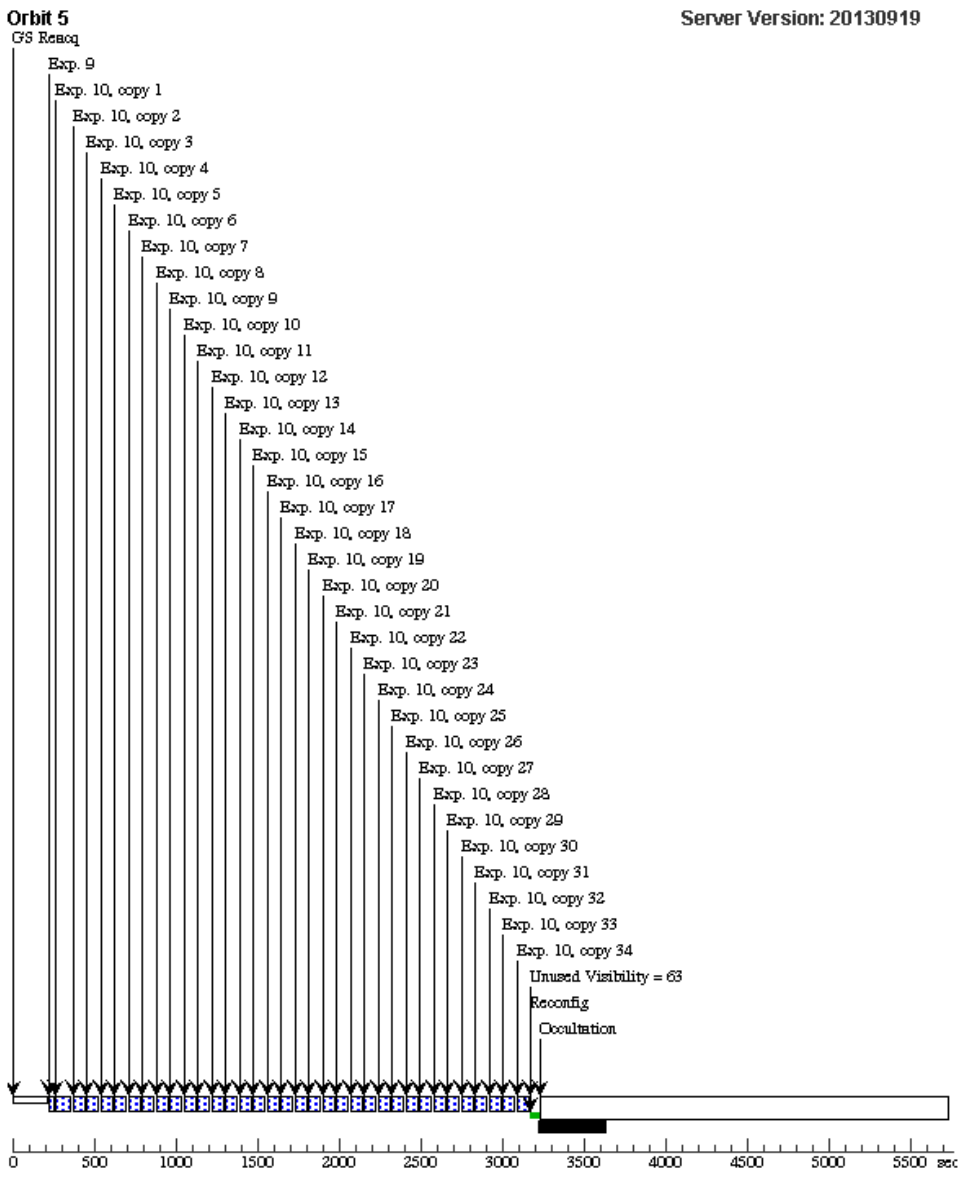
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Exp. 10, copy 30
Exp. 10, copy 31
Exp. 10, copy 32
Exp. 10, copy 33
Exp. 10, copy 34
Unused Visibility = 63
Reconfig
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13280, Visit 02, implementation Tue Oct 08 01:27:37 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 305D TO 54 D; ORIENT 68D TO 111 D; ORIENT 125D TO 234 D; ORIENT 248D TO 291 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	2MASS-J16241436+0029158 Alt Name1: SDSSP-J162414.37+002915.6	RA: 16 24 14.3670 (246.0598625d) Dec: +00 29 15.82 (.48773d) Equinox: J2000	Proper Motion RA: -0.373 arcsec/yr Proper Motion Dec: -0.009 arcsec/yr Epoch of Position: 1999.3	V=(?) J=15.5	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	F127M	SAMP-SEQ=SPARS10; NSAMP=3		Sequence 1-2 Non-Int in Visit 02	14.970789 Secs (14.971 Secs) *[==>]*	 ***[1]***
2		(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS25; NSAMP=6		Sequence 1-2 Non-Int in Visit 02	112.00801 Secs X 21 (2352.168 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]*	 ***[1]***
3		(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	F127M	SAMP-SEQ=SPARS10; NSAMP=3		Sequence 3-4 Non-Int in Visit 02	14.970789 Secs (14.971 Secs) *[==>]*	 ***[2]***

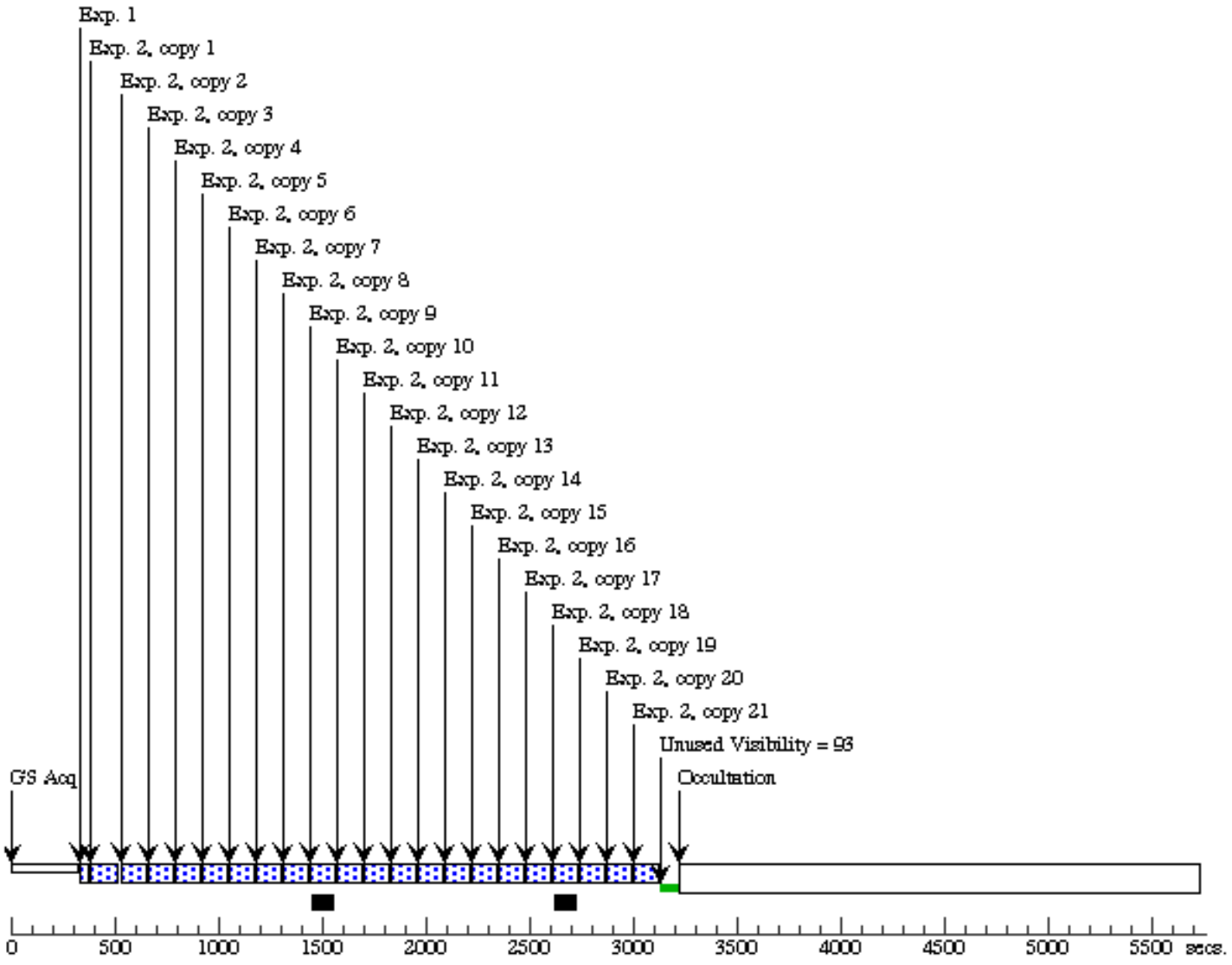
	4	(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS25; NSAMP=6	Sequence 3-4 Non-Int in Visit 02	112.00801 Secs X 22 (2464.176 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]*	***[2]***
	5	(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	F127M	SAMP-SEQ=SPARS10; NSAMP=3	Sequence 5-6 Non-Int in Visit 02	14.970789 Secs (14.971 Secs) *[==>]*	***[3]***

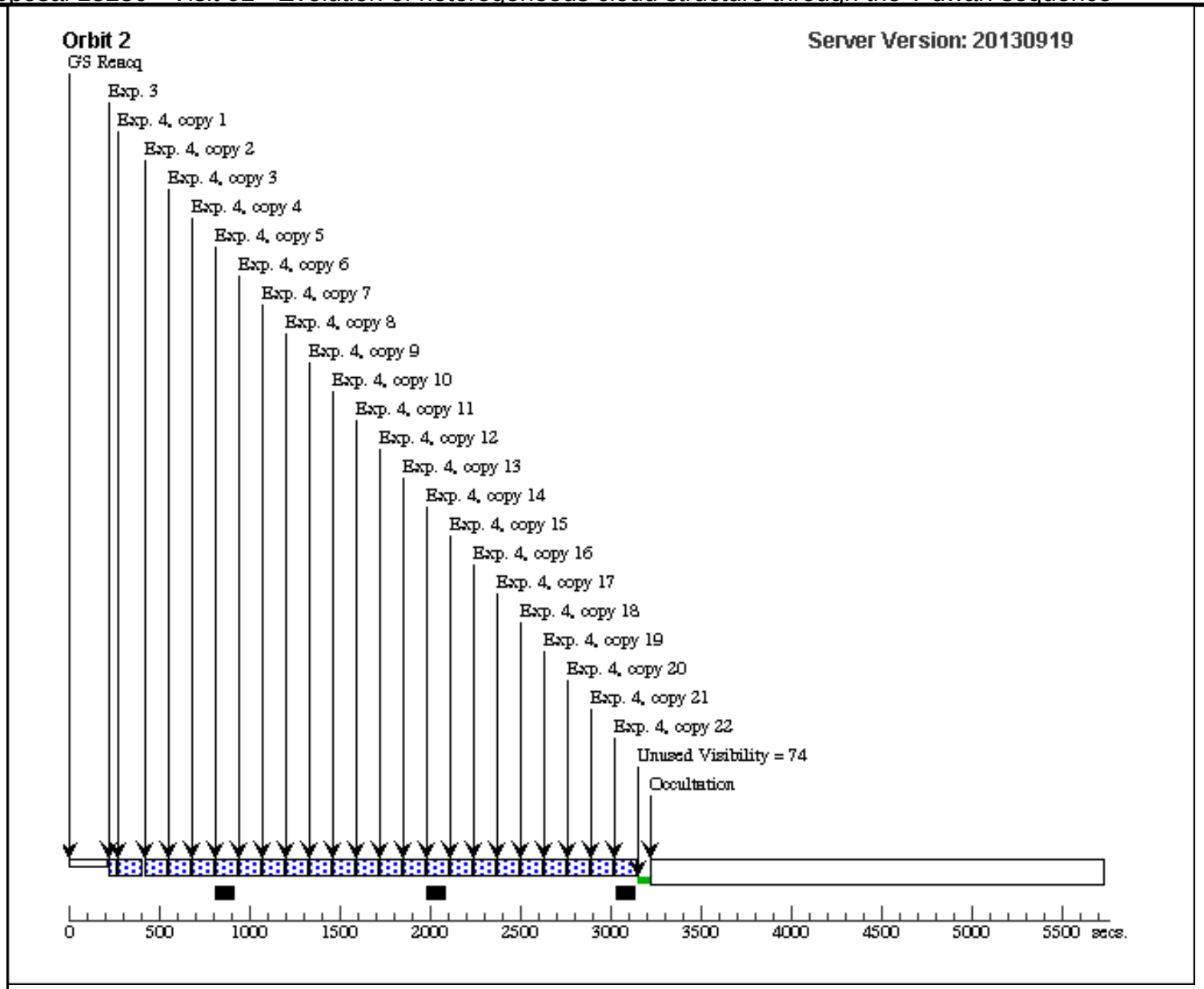
	6	(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS25; NSAMP=6	Sequence 5-6 Non-Int in Visit 02	112.00801 Secs X 22 (2464.176 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]*	***[3]***
	7	(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	F127M	SAMP-SEQ=SPARS10; NSAMP=3	Sequence 7-8 Non-Int in Visit 02	14.970789 Secs (14.971 Secs) *[==>]*	***[4]***

	8	(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS25; NSAMP=6	Sequence 7-8 Non-Int in Visit 02	112.00801 Secs X 22 (2464.176 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]*	***[4]***
	9	(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	F127M	SAMP-SEQ=SPARS10; NSAMP=3	Sequence 9-10 Non-Int in Visit 02	14.970789 Secs (14.971 Secs) *[==>]*	***[5]***

	10	(2) 2MASS-J16241436+0029158	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS25; NSAMP=6	Sequence 9-10 Non-Int in Visit 02	112.00801 Secs X 22 (2464.176 Secs) *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]*	***[5]***

Orbit Structure

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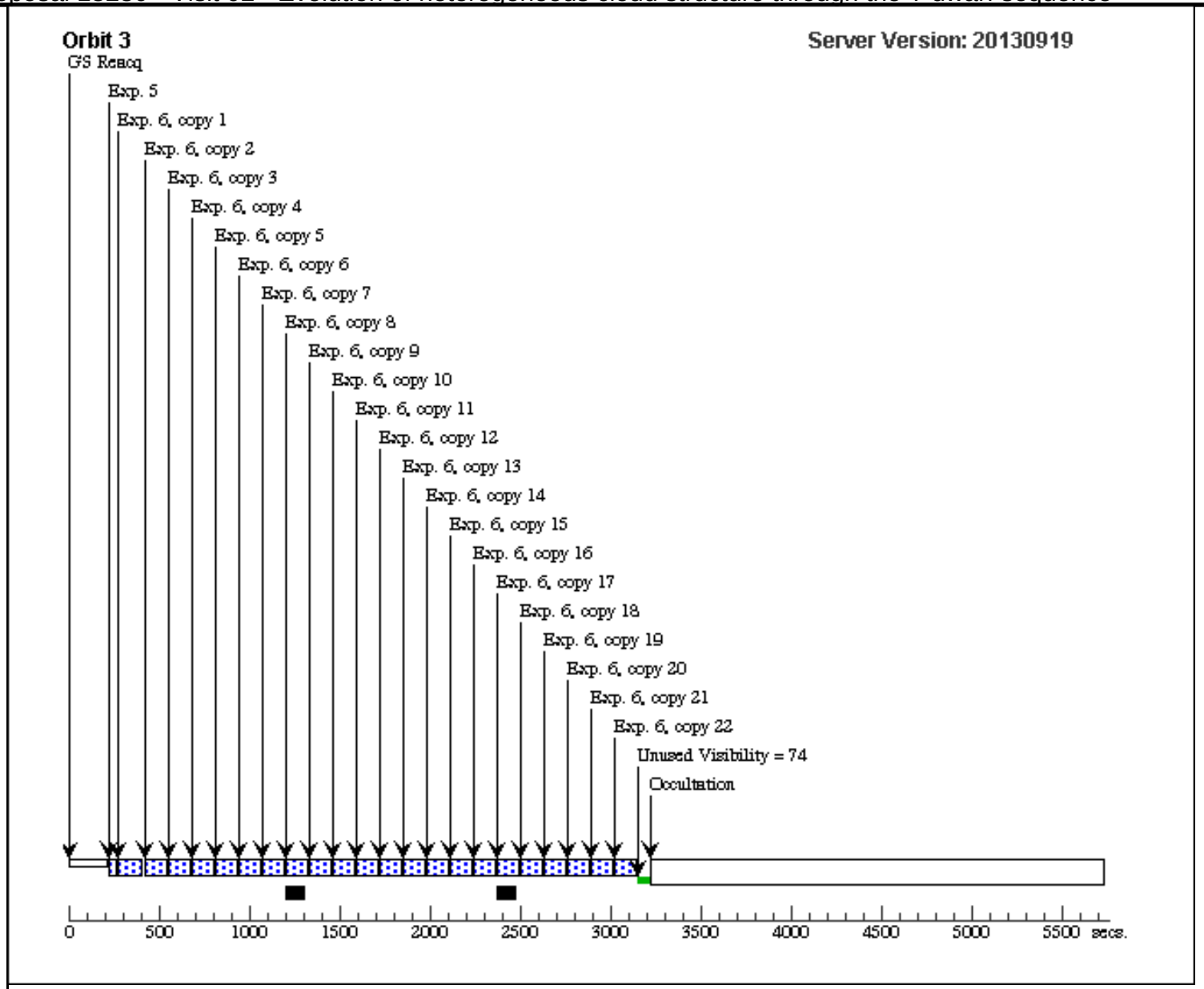
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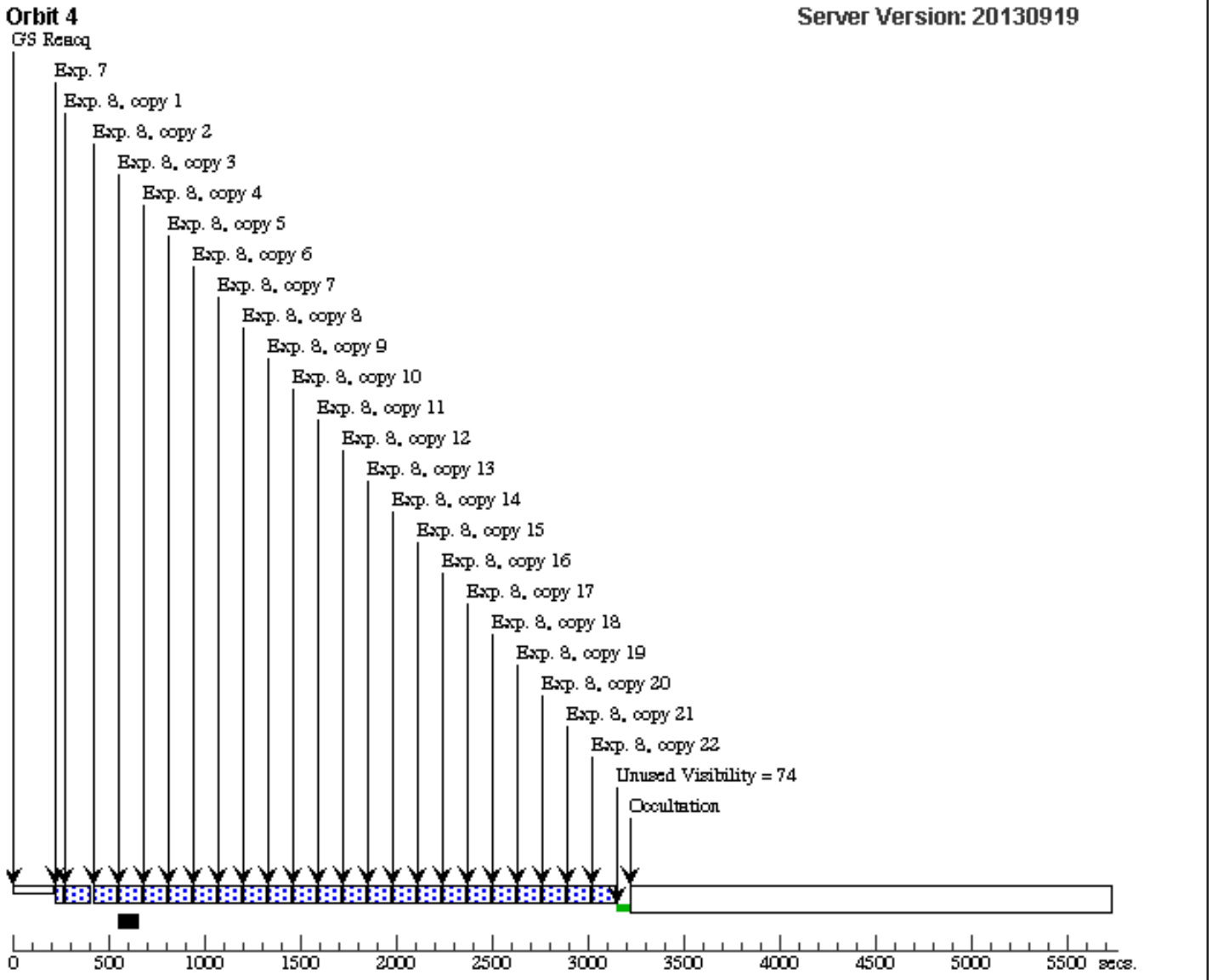
secs.


Orbit 4
Server Version: 20130919
GS Reacq
Exp. 7
Exp. 8, copy 1
Exp. 8, copy 2
Exp. 8, copy 3
Exp. 8, copy 4
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Exp. 8, copy 6
Exp. 8, copy 7
Exp. 8, copy 8
Exp. 8, copy 9
Exp. 8, copy 10
Exp. 8, copy 11
Exp. 8, copy 12
Exp. 8, copy 13
Exp. 8, copy 14
Exp. 8, copy 15
Exp. 8, copy 16
Exp. 8, copy 17
Exp. 8, copy 18
Exp. 8, copy 19
Exp. 8, copy 20
Exp. 8, copy 21
Exp. 8, copy 22
Unused Visibility = 74
Occultation
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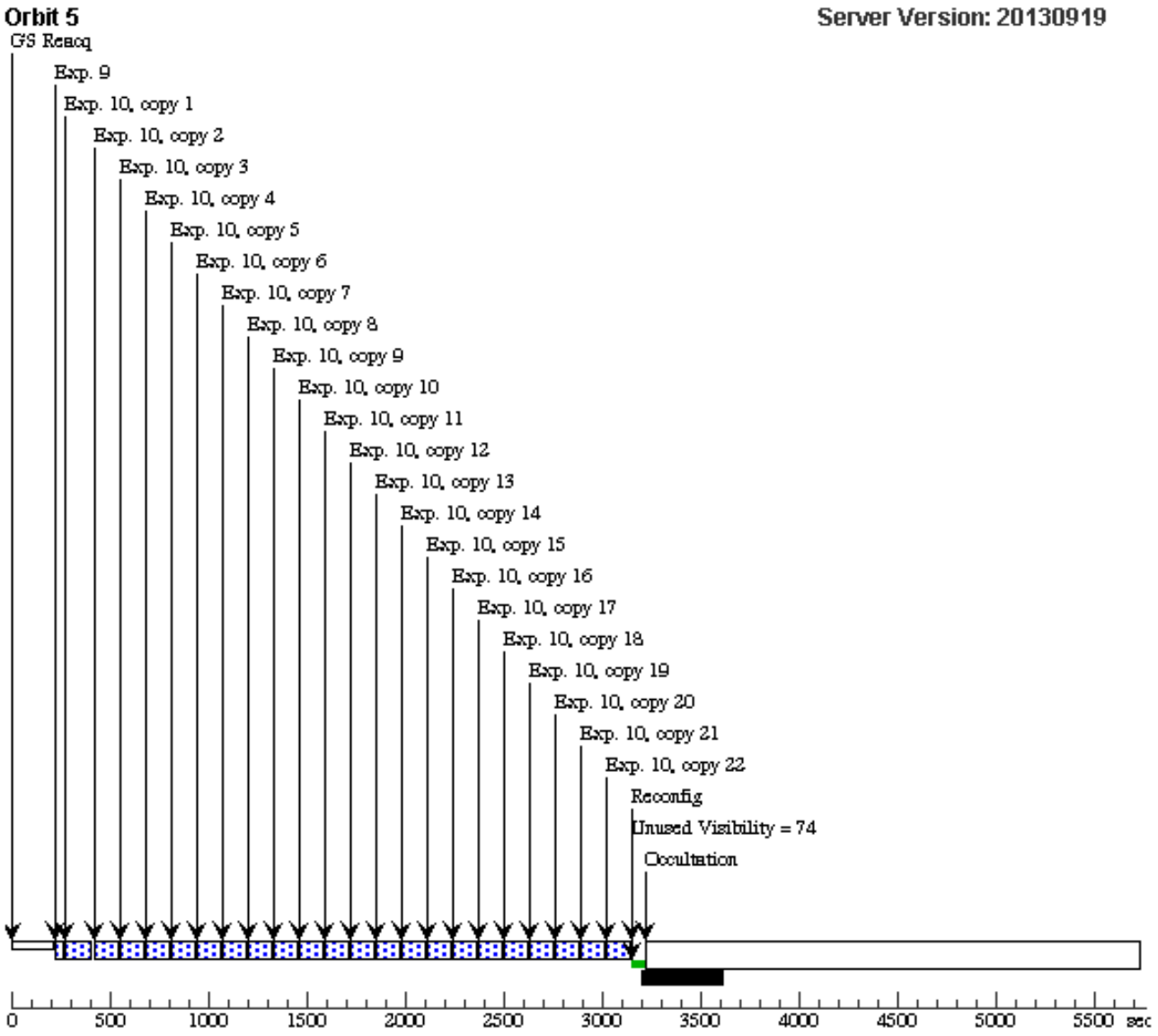
2000
2500
3000
3500
4000
4500
5000
5500
secs.


Orbit 5
Server Version: 20130919
GS Reacq
Exp. 9
Exp. 10, copy 1
Exp. 10, copy 2
Exp. 10, copy 3
Exp. 10, copy 4
Exp. 10, copy 5
Exp. 10, copy 6
Exp. 10, copy 7
Exp. 10, copy 8
Exp. 10, copy 9
Exp. 10, copy 10
Exp. 10, copy 11
Exp. 10, copy 12
Exp. 10, copy 13
Exp. 10, copy 14
Exp. 10, copy 15
Exp. 10, copy 16
Exp. 10, copy 17
Exp. 10, copy 18
Exp. 10, copy 19
Exp. 10, copy 20
Exp. 10, copy 21
Exp. 10, copy 22
Reconfig
Unused Visibility = 74
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 13280, Visit 03, implementation Tue Oct 08 01:27:41 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 67D TO 107 D; ORIENT 247D TO 287 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	2MASS-J10491891-5319100 Alt Name1: WISE-J104915.57-531906.1	RA: 10 49 15.4270 (162.3142792d) Dec: -53 19 6.30 (-53.31842d) Equinox: J2000	Proper Motion RA: -2.759 arcsec/yr Proper Motion Dec: 0.354 arcsec/yr Parallax: 0.5" Epoch of Position: 2011.0	V=(?) J=11.2, H=10.4	Reference Frame: ICRS

Comments: Coordinates from Luhman et al. 2013, last WISE measurement, Jan 6 2011

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	F132N	SAMP-SEQ=SPARS10; NSAMP=1			0.277815 Secs (0.278 Secs) *[==>]*	*[1]*

	2	(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS10; NSAMP=2	7.624302 Secs X 100 (762.43 Secs)	

		[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]* *[==>(Copy 24)]* *[==>(Copy 25)]* *[==>(Copy 26)]* *[==>(Copy 27)]* *[==>(Copy 28)]* *[==>(Copy 29)]* *[==>(Copy 30)]* *[==>(Copy 31)]* *[==>(Copy 32)]* *[==>(Copy 33)]* *[==>(Copy 34)]* *[==>(Copy 35)]* *[==>(Copy 36)]* *[==>(Copy 37)]* *[==>(Copy 38)]* *[==>(Copy 39)]* *[==>(Copy 40)]* *[==>(Copy 41)]* *[==>(Copy 42)]* *[==>(Copy 43)]* *[==>(Copy 44)]* *[==>(Copy 45)]*	***[1]***

		[==>(Copy 46)] *[==>(Copy 47)]* *[==>(Copy 48)]* *[==>(Copy 49)]* *[==>(Copy 50)]* *[==>(Copy 51)]* *[==>(Copy 52)]* *[==>(Copy 53)]* *[==>(Copy 54)]* *[==>(Copy 55)]* *[==>(Copy 56)]* *[==>(Copy 57)]* *[==>(Copy 58)]* *[==>(Copy 59)]* *[==>(Copy 60)]* *[==>(Copy 61)]* *[==>(Copy 62)]* *[==>(Copy 63)]* *[==>(Copy 64)]* *[==>(Copy 65)]* *[==>(Copy 66)]* *[==>(Copy 67)]* *[==>(Copy 68)]* *[==>(Copy 69)]* *[==>(Copy 70)]* *[==>(Copy 71)]* *[==>(Copy 72)]* *[==>(Copy 73)]* *[==>(Copy 74)]* *[==>(Copy 75)]* *[==>(Copy 76)]* *[==>(Copy 77)]* *[==>(Copy 78)]* *[==>(Copy 79)]* *[==>(Copy 80)]* *[==>(Copy 81)]* *[==>(Copy 82)]* *[==>(Copy 83)]* *[==>(Copy 84)]* *[==>(Copy 85)]* *[==>(Copy 86)]* *[==>(Copy 87)]* *[==>(Copy 88)]* *[==>(Copy 89)]* *[==>(Copy 90)]*	

					[==>(Copy 91)] *[==>(Copy 92)]* *[==>(Copy 93)]* *[==>(Copy 94)]* *[==>(Copy 95)]* *[==>(Copy 96)]* *[==>(Copy 97)]* *[==>(Copy 98)]* *[==>(Copy 99)]* *[==>(Copy 100)]*	
3	(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	F132N	SAMP-SEQ=SPARS10; NSAMP=1	0.277815 Secs (0.278 Secs) *[==>]*	***[2]***

	4	(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS10; NSAMP=2	7.624302 Secs X 100 (762.43 Secs)	

		[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]* *[==>(Copy 24)]* *[==>(Copy 25)]* *[==>(Copy 26)]* *[==>(Copy 27)]* *[==>(Copy 28)]* *[==>(Copy 29)]* *[==>(Copy 30)]* *[==>(Copy 31)]* *[==>(Copy 32)]* *[==>(Copy 33)]* *[==>(Copy 34)]* *[==>(Copy 35)]* *[==>(Copy 36)]* *[==>(Copy 37)]* *[==>(Copy 38)]* *[==>(Copy 39)]* *[==>(Copy 40)]* *[==>(Copy 41)]* *[==>(Copy 42)]* *[==>(Copy 43)]* *[==>(Copy 44)]* *[==>(Copy 45)]*	***[2]***

		[==>(Copy 46)] *[==>(Copy 47)]* *[==>(Copy 48)]* *[==>(Copy 49)]* *[==>(Copy 50)]* *[==>(Copy 51)]* *[==>(Copy 52)]* *[==>(Copy 53)]* *[==>(Copy 54)]* *[==>(Copy 55)]* *[==>(Copy 56)]* *[==>(Copy 57)]* *[==>(Copy 58)]* *[==>(Copy 59)]* *[==>(Copy 60)]* *[==>(Copy 61)]* *[==>(Copy 62)]* *[==>(Copy 63)]* *[==>(Copy 64)]* *[==>(Copy 65)]* *[==>(Copy 66)]* *[==>(Copy 67)]* *[==>(Copy 68)]* *[==>(Copy 69)]* *[==>(Copy 70)]* *[==>(Copy 71)]* *[==>(Copy 72)]* *[==>(Copy 73)]* *[==>(Copy 74)]* *[==>(Copy 75)]* *[==>(Copy 76)]* *[==>(Copy 77)]* *[==>(Copy 78)]* *[==>(Copy 79)]* *[==>(Copy 80)]* *[==>(Copy 81)]* *[==>(Copy 82)]* *[==>(Copy 83)]* *[==>(Copy 84)]* *[==>(Copy 85)]* *[==>(Copy 86)]* *[==>(Copy 87)]* *[==>(Copy 88)]* *[==>(Copy 89)]* *[==>(Copy 90)]*	

						[==>(Copy 91)] *[==>(Copy 92)]* *[==>(Copy 93)]* *[==>(Copy 94)]* *[==>(Copy 95)]* *[==>(Copy 96)]* *[==>(Copy 97)]* *[==>(Copy 98)]* *[==>(Copy 99)]* *[==>(Copy 100)]*	
	5	(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	F132N	SAMP-SEQ=SPARS 10; NSAMP=1 NEW OBSET	0.277815 Secs (0.278 Secs) *[==>]*	***[3]***

	6	(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS10; NSAMP=2	7.624302 Secs X 100 (762.43 Secs)	

		[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]* *[==>(Copy 24)]* *[==>(Copy 25)]* *[==>(Copy 26)]* *[==>(Copy 27)]* *[==>(Copy 28)]* *[==>(Copy 29)]* *[==>(Copy 30)]* *[==>(Copy 31)]* *[==>(Copy 32)]* *[==>(Copy 33)]* *[==>(Copy 34)]* *[==>(Copy 35)]* *[==>(Copy 36)]* *[==>(Copy 37)]* *[==>(Copy 38)]* *[==>(Copy 39)]* *[==>(Copy 40)]* *[==>(Copy 41)]* *[==>(Copy 42)]* *[==>(Copy 43)]* *[==>(Copy 44)]* *[==>(Copy 45)]*	***[3]***

		[==>(Copy 46)] *[==>(Copy 47)]* *[==>(Copy 48)]* *[==>(Copy 49)]* *[==>(Copy 50)]* *[==>(Copy 51)]* *[==>(Copy 52)]* *[==>(Copy 53)]* *[==>(Copy 54)]* *[==>(Copy 55)]* *[==>(Copy 56)]* *[==>(Copy 57)]* *[==>(Copy 58)]* *[==>(Copy 59)]* *[==>(Copy 60)]* *[==>(Copy 61)]* *[==>(Copy 62)]* *[==>(Copy 63)]* *[==>(Copy 64)]* *[==>(Copy 65)]* *[==>(Copy 66)]* *[==>(Copy 67)]* *[==>(Copy 68)]* *[==>(Copy 69)]* *[==>(Copy 70)]* *[==>(Copy 71)]* *[==>(Copy 72)]* *[==>(Copy 73)]* *[==>(Copy 74)]* *[==>(Copy 75)]* *[==>(Copy 76)]* *[==>(Copy 77)]* *[==>(Copy 78)]* *[==>(Copy 79)]* *[==>(Copy 80)]* *[==>(Copy 81)]* *[==>(Copy 82)]* *[==>(Copy 83)]* *[==>(Copy 84)]* *[==>(Copy 85)]* *[==>(Copy 86)]* *[==>(Copy 87)]* *[==>(Copy 88)]* *[==>(Copy 89)]* *[==>(Copy 90)]*	

					[==>(Copy 91)] *[==>(Copy 92)]* *[==>(Copy 93)]* *[==>(Copy 94)]* *[==>(Copy 95)]* *[==>(Copy 96)]* *[==>(Copy 97)]* *[==>(Copy 98)]* *[==>(Copy 99)]* *[==>(Copy 100)]*	
7	(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	F132N	SAMP-SEQ=SPARS10; NSAMP=1	0.277815 Secs (0.278 Secs) *[==>]*	***[4]***

	8	(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS10; NSAMP=2	7.624302 Secs X 100 (762.43 Secs)	

		[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]* *[==>(Copy 24)]* *[==>(Copy 25)]* *[==>(Copy 26)]* *[==>(Copy 27)]* *[==>(Copy 28)]* *[==>(Copy 29)]* *[==>(Copy 30)]* *[==>(Copy 31)]* *[==>(Copy 32)]* *[==>(Copy 33)]* *[==>(Copy 34)]* *[==>(Copy 35)]* *[==>(Copy 36)]* *[==>(Copy 37)]* *[==>(Copy 38)]* *[==>(Copy 39)]* *[==>(Copy 40)]* *[==>(Copy 41)]* *[==>(Copy 42)]* *[==>(Copy 43)]* *[==>(Copy 44)]* *[==>(Copy 45)]*	***[4]***

		[==>(Copy 46)] *[==>(Copy 47)]* *[==>(Copy 48)]* *[==>(Copy 49)]* *[==>(Copy 50)]* *[==>(Copy 51)]* *[==>(Copy 52)]* *[==>(Copy 53)]* *[==>(Copy 54)]* *[==>(Copy 55)]* *[==>(Copy 56)]* *[==>(Copy 57)]* *[==>(Copy 58)]* *[==>(Copy 59)]* *[==>(Copy 60)]* *[==>(Copy 61)]* *[==>(Copy 62)]* *[==>(Copy 63)]* *[==>(Copy 64)]* *[==>(Copy 65)]* *[==>(Copy 66)]* *[==>(Copy 67)]* *[==>(Copy 68)]* *[==>(Copy 69)]* *[==>(Copy 70)]* *[==>(Copy 71)]* *[==>(Copy 72)]* *[==>(Copy 73)]* *[==>(Copy 74)]* *[==>(Copy 75)]* *[==>(Copy 76)]* *[==>(Copy 77)]* *[==>(Copy 78)]* *[==>(Copy 79)]* *[==>(Copy 80)]* *[==>(Copy 81)]* *[==>(Copy 82)]* *[==>(Copy 83)]* *[==>(Copy 84)]* *[==>(Copy 85)]* *[==>(Copy 86)]* *[==>(Copy 87)]* *[==>(Copy 88)]* *[==>(Copy 89)]* *[==>(Copy 90)]*	

					[==>(Copy 91)] *[==>(Copy 92)]* *[==>(Copy 93)]* *[==>(Copy 94)]* *[==>(Copy 95)]* *[==>(Copy 96)]* *[==>(Copy 97)]* *[==>(Copy 98)]* *[==>(Copy 99)]* *[==>(Copy 100)]*	
	9	(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	F132N	SAMP-SEQ=SPARS10; NSAMP=1	0.277815 Secs (0.278 Secs) *[==>]*

[5]

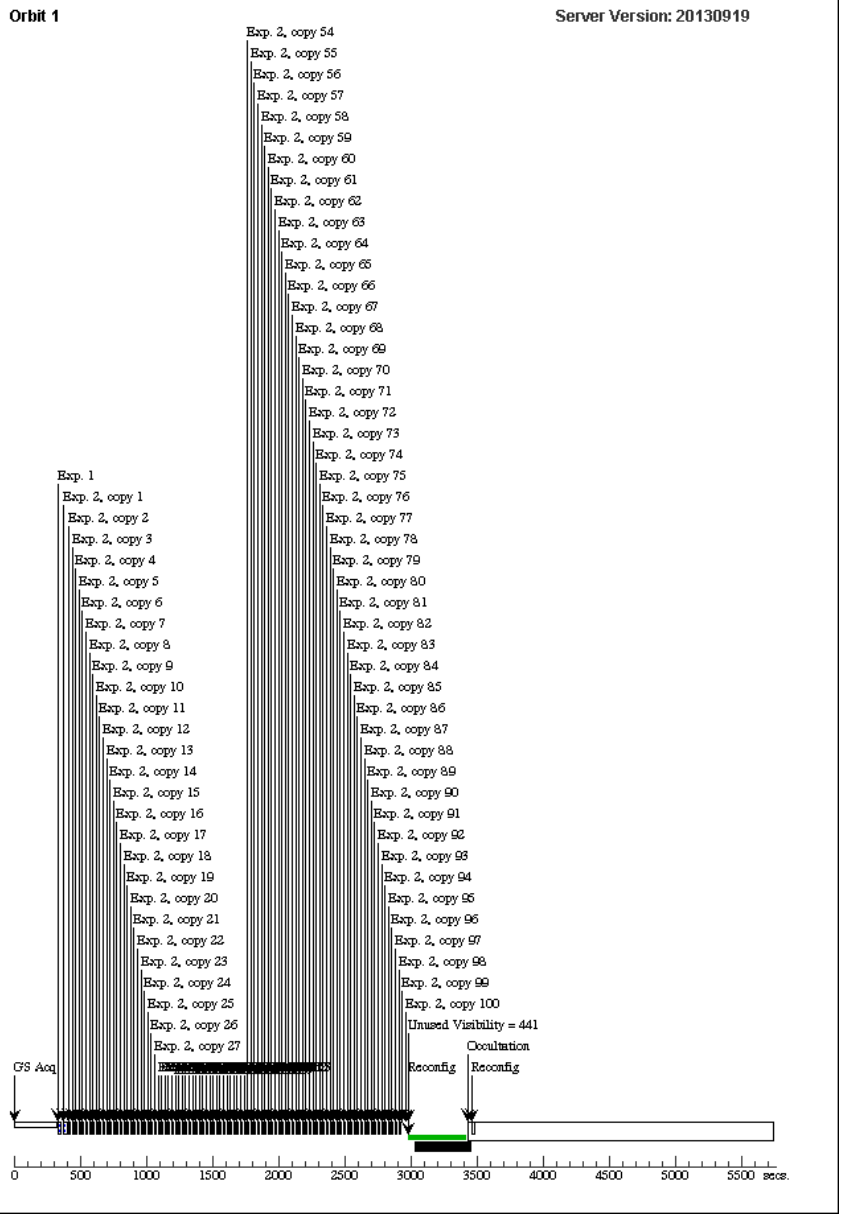
	10	(3) 2MASS-J10491891-5319100	WFC3/IR, MULTIACCUM, GRISM256	G141	SAMP-SEQ=SPARS10; NSAMP=2	7.624302 Secs X 100 (762.43 Secs)	

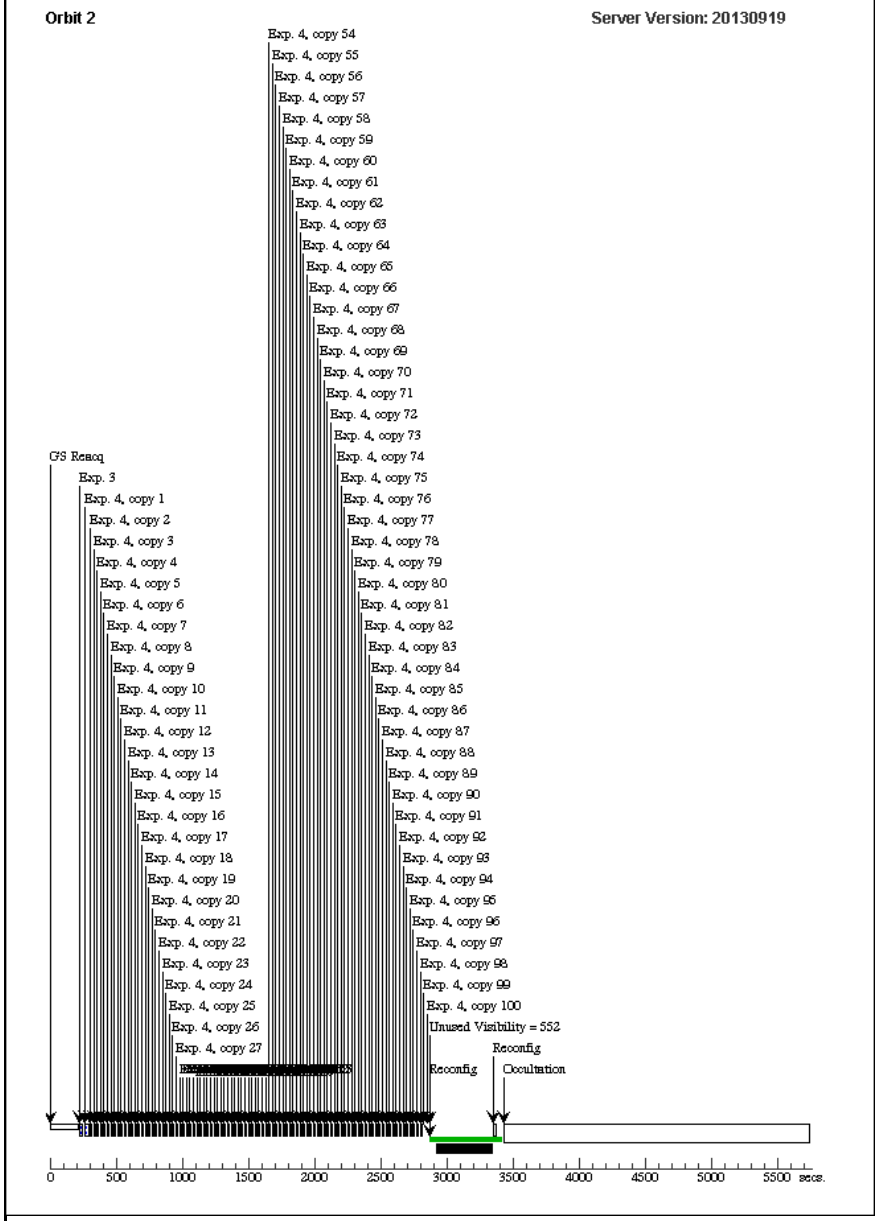
		[==>(Copy 1)] *[==>(Copy 2)]* *[==>(Copy 3)]* *[==>(Copy 4)]* *[==>(Copy 5)]* *[==>(Copy 6)]* *[==>(Copy 7)]* *[==>(Copy 8)]* *[==>(Copy 9)]* *[==>(Copy 10)]* *[==>(Copy 11)]* *[==>(Copy 12)]* *[==>(Copy 13)]* *[==>(Copy 14)]* *[==>(Copy 15)]* *[==>(Copy 16)]* *[==>(Copy 17)]* *[==>(Copy 18)]* *[==>(Copy 19)]* *[==>(Copy 20)]* *[==>(Copy 21)]* *[==>(Copy 22)]* *[==>(Copy 23)]* *[==>(Copy 24)]* *[==>(Copy 25)]* *[==>(Copy 26)]* *[==>(Copy 27)]* *[==>(Copy 28)]* *[==>(Copy 29)]* *[==>(Copy 30)]* *[==>(Copy 31)]* *[==>(Copy 32)]* *[==>(Copy 33)]* *[==>(Copy 34)]* *[==>(Copy 35)]* *[==>(Copy 36)]* *[==>(Copy 37)]* *[==>(Copy 38)]* *[==>(Copy 39)]* *[==>(Copy 40)]* *[==>(Copy 41)]* *[==>(Copy 42)]* *[==>(Copy 43)]* *[==>(Copy 44)]* *[==>(Copy 45)]*	***[5]***

		[==>(Copy 46)] *[==>(Copy 47)]* *[==>(Copy 48)]* *[==>(Copy 49)]* *[==>(Copy 50)]* *[==>(Copy 51)]* *[==>(Copy 52)]* *[==>(Copy 53)]* *[==>(Copy 54)]* *[==>(Copy 55)]* *[==>(Copy 56)]* *[==>(Copy 57)]* *[==>(Copy 58)]* *[==>(Copy 59)]* *[==>(Copy 60)]* *[==>(Copy 61)]* *[==>(Copy 62)]* *[==>(Copy 63)]* *[==>(Copy 64)]* *[==>(Copy 65)]* *[==>(Copy 66)]* *[==>(Copy 67)]* *[==>(Copy 68)]* *[==>(Copy 69)]* *[==>(Copy 70)]* *[==>(Copy 71)]* *[==>(Copy 72)]* *[==>(Copy 73)]* *[==>(Copy 74)]* *[==>(Copy 75)]* *[==>(Copy 76)]* *[==>(Copy 77)]* *[==>(Copy 78)]* *[==>(Copy 79)]* *[==>(Copy 80)]* *[==>(Copy 81)]* *[==>(Copy 82)]* *[==>(Copy 83)]* *[==>(Copy 84)]* *[==>(Copy 85)]* *[==>(Copy 86)]* *[==>(Copy 87)]* *[==>(Copy 88)]* *[==>(Copy 89)]* *[==>(Copy 90)]*	

		[==>(Copy 91)] *[==>(Copy 92)]* *[==>(Copy 93)]* *[==>(Copy 94)]* *[==>(Copy 95)]* *[==>(Copy 96)]* *[==>(Copy 97)]* *[==>(Copy 98)]* *[==>(Copy 99)]* *[==>(Copy 100)]*	

Orbit Structure




Orbit 2
Server Version: 20130919
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Exp. 4, copy 95
Exp. 4, copy 96
Exp. 4, copy 97
Exp. 4, copy 98
Exp. 4, copy 99
Exp. 4, copy 100
Unused Visibility = 552
GS Reacq
Exp. 3
Exp. 4, copy 1
Exp. 4, copy 2
Exp. 4, copy 3
Exp. 4, copy 4
Exp. 4, copy 5
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Exp. 4, copy 7
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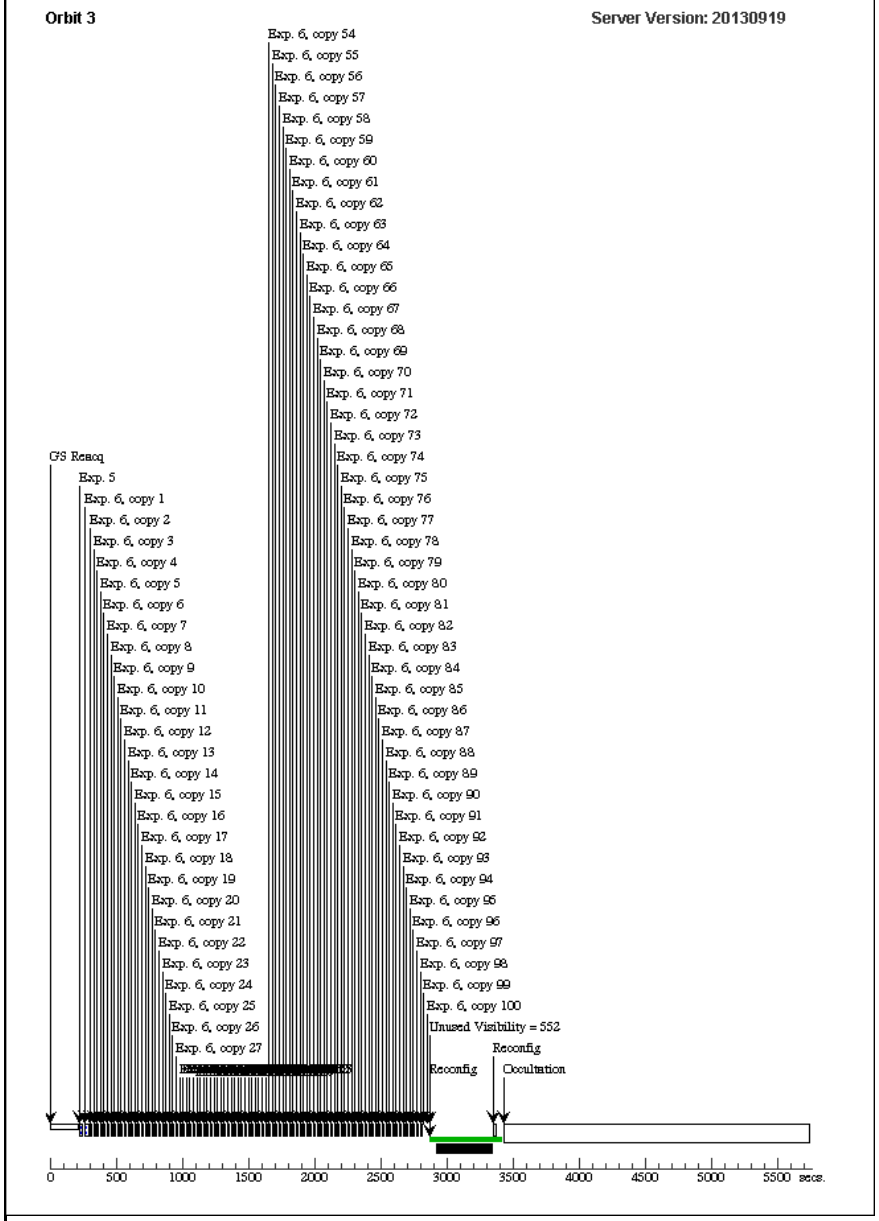
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Exp. 6, copy 98
Exp. 6, copy 99
Exp. 6, copy 100
Unused Visibility = 552
Reconfig
Occultation
GS Reacq
Exp. 5
Exp. 6, copy 1
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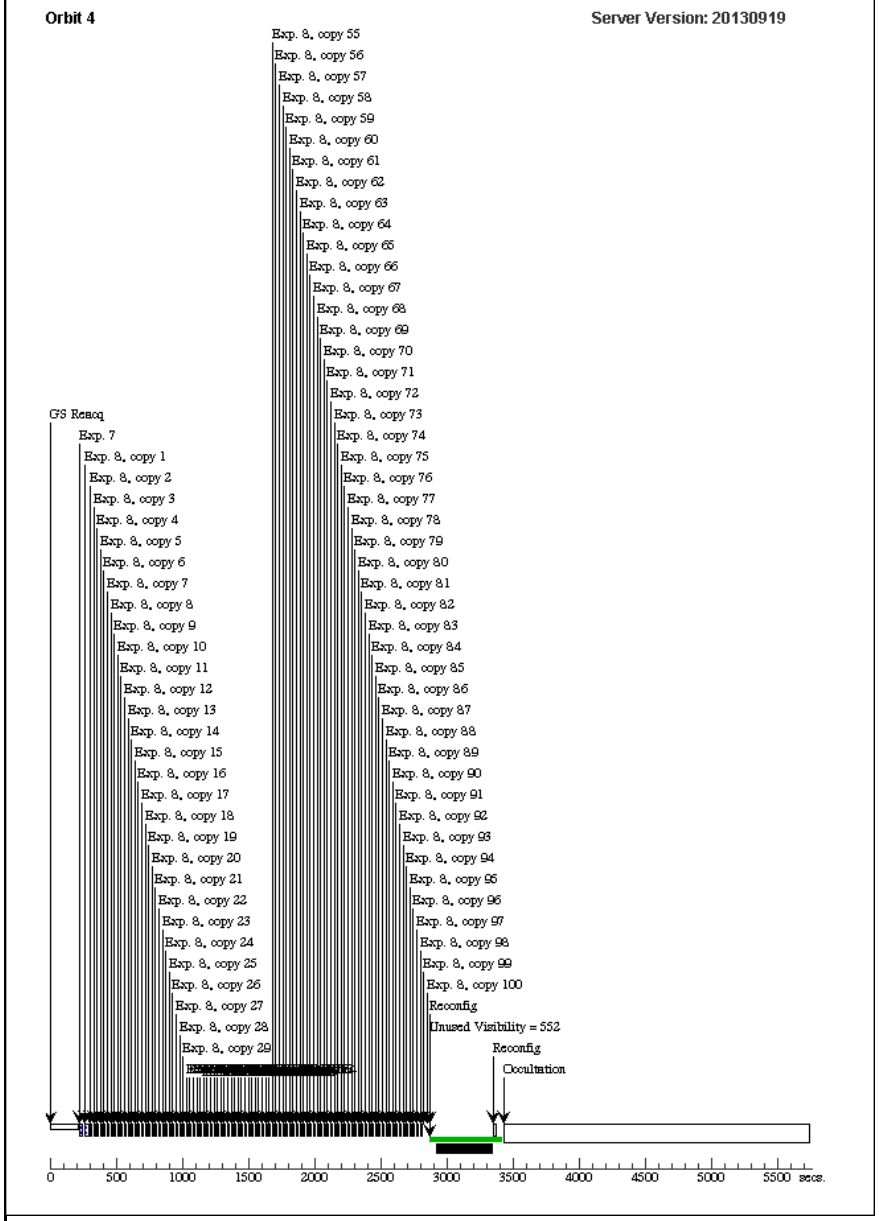
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Reconfig
Unused Visibility = 552
Reconfig
Occultation
GS Reacq
Exp. 7
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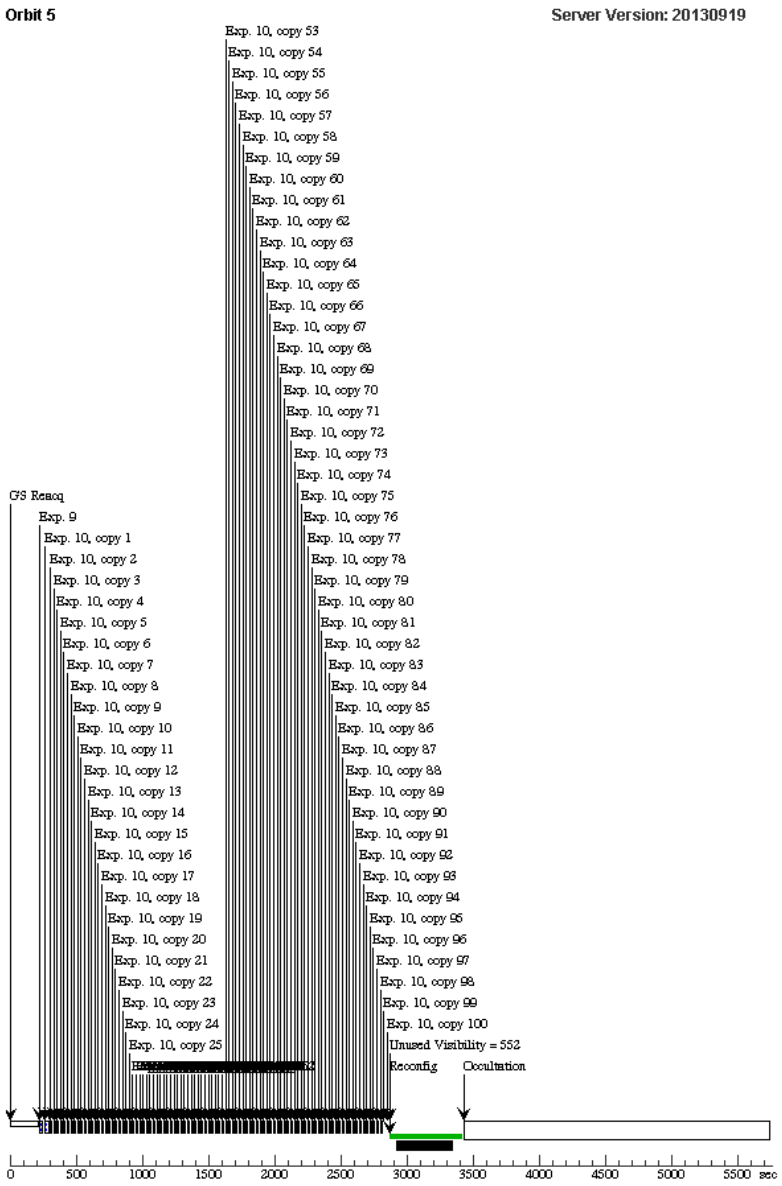
Orbit 5
Server Version: 20130919
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Exp. 10, copy 55
Exp. 10, copy 56
Exp. 10, copy 57
Exp. 10, copy 58
Exp. 10, copy 59
Exp. 10, copy 60
Exp. 10, copy 61
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Exp. 10, copy 85
Exp. 10, copy 86
Exp. 10, copy 87
Exp. 10, copy 88
Exp. 10, copy 89
Exp. 10, copy 90
Exp. 10, copy 91
Exp. 10, copy 92
Exp. 10, copy 93
Exp. 10, copy 94
Exp. 10, copy 95
Exp. 10, copy 96
Exp. 10, copy 97
Exp. 10, copy 98
Exp. 10, copy 99
Exp. 10, copy 100
Unused Visibility = 552
Reconfig
Occultation
GS Reacq
Exp. 9
Exp. 10, copy 1
Exp. 10, copy 2
Exp. 10, copy 3
Exp. 10, copy 4
Exp. 10, copy 5
Exp. 10, copy 6
Exp. 10, copy 7
Exp. 10, copy 8
Exp. 10, copy 9
Exp. 10, copy 10
Exp. 10, copy 11
Exp. 10, copy 12
Exp. 10, copy 13
Exp. 10, copy 14
Exp. 10, copy 15
Exp. 10, copy 16
Exp. 10, copy 17
Exp. 10, copy 18
Exp. 10, copy 19
Exp. 10, copy 20
Exp. 10, copy 21
Exp. 10, copy 22
Exp. 10, copy 23
Exp. 10, copy 24
Exp. 10, copy 25
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec