Prop. ID	Title	External	Internal	Status/End obs
Cycle 17				
11891	NUV MAMA Fold Distribution	0	2	last visit on hold
11894	NUV Detector Dark Monitor	0	114	Oct. 31, 2010
11896	NUV Spectroscopic Sensitivity Monitor	40	0	Oct. 24, 2010
11899	NUV Imaging Sensitivity	2	0	complete
11900	NUV Internal/External Wavelength Scale Monitor	18	0	Oct. 31, 2010
11892	NUV Detector Recovery			
11895	FUV Detector Dark Monitor	0	325	Oct. 31, 2010
11897	FUV Detector Sensitivity Monitor	36	0	Oct. 3, 2010
11997	FUV Internal/External Wavelength Scale Monitor	12	0	Sept. 20, 2010
11893	FUV Detector Recovery			
12010	COS FUV Line Spread Function	2	0	complete
Supplemental				
11897+	Additional FUV sensitivity monitoring	10	0	Oct. 3, 2010
12052	NUV Grating Efficiency Test	0	4	complete
12080	G140L Focus Sweep	5	0	Sept. 18, 2010
12081	Flux Calibration below 1150A with G140L/1280	3	0	Oct. 24, 2010
12082	2 new central wavelengths of G130M	5	0	complete
12083	G140L/1280 wavecal template	0	1	complete
12084	G140L/1280 Internal to External Wavelength Scales	1	0	Nov. 29, 2010
12085	Internal to External Offsets in G230L	1	0	complete
12086	Generation of 1-D Fixed Pattern Templates	11	0	complete
12096	COS FUV Detector Lifetime Positions Test	3	0	complete
Totals		**149**	**446**	

COS Cycle 17:
20 programs
149 external orbits
446 internals

COS observations comprise 23.1% of prime orbits in Cycle 18

COS Cycle 18 usage statistics

configuration/mode	prime usage	SNAP usage
FUV/spectroscopy	20.8%	29.4%
NUV/imaging	0%	0%
NUV/spectroscopy	2.3%	0%

COS Cycle 18 calibration request

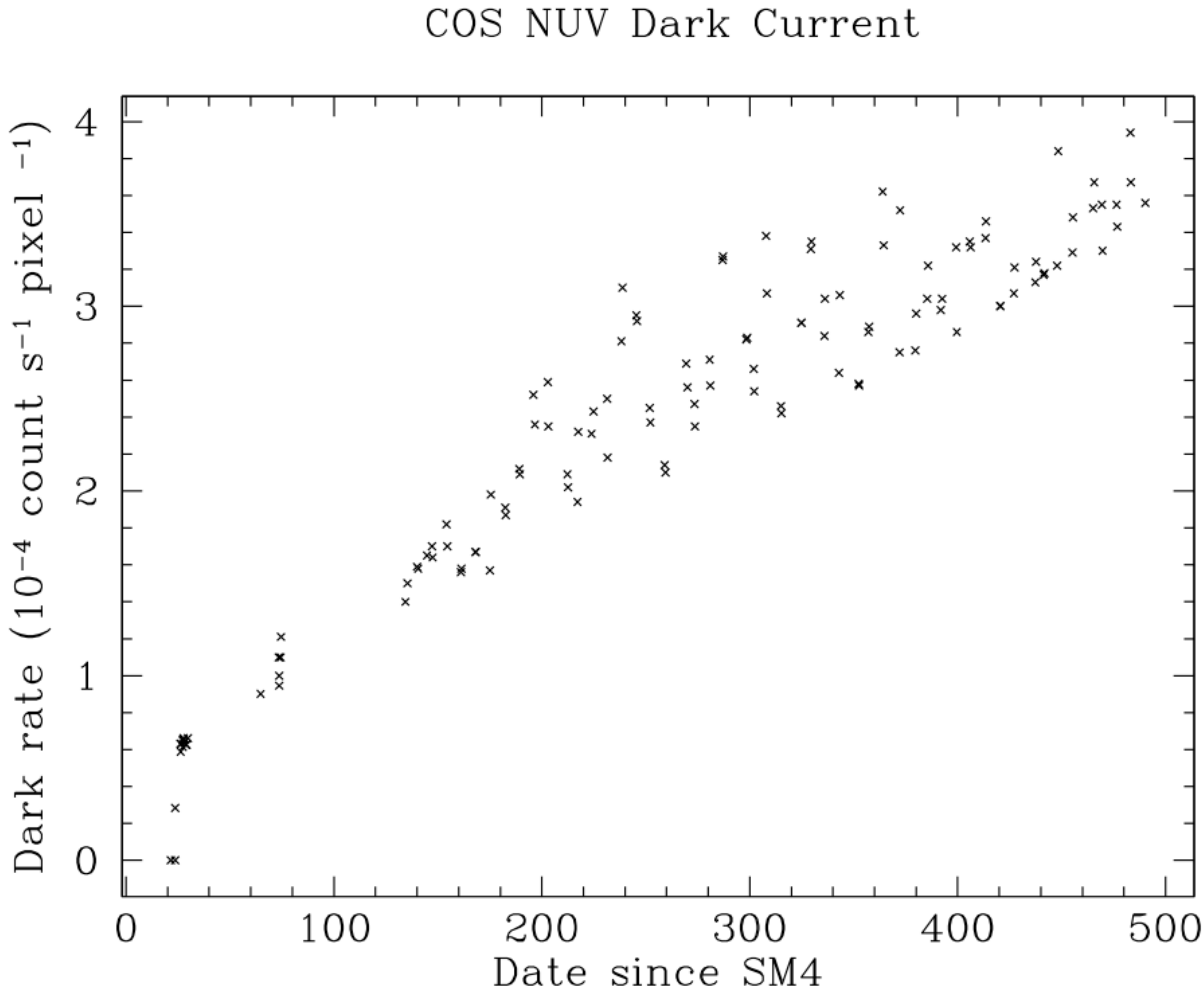
PID	Title	External	Parallel	Internal	Frequency
	NUV Monitors				
12419	NUV MAMA Fold Distribution			1	once
12420	NUV Detector Dark Monitor			52	1/wk
12421	NUV Spectroscopic Sensitivity Monitor	12			3x2/L, 3x2/M
12422	NUV Internal/External Wavelength Scale Monitor	3			3x1
12430	NUV Detector Recovery After Anomalous Shutdown				
	FUV Monitors				
12423	FUV Detector Dark Monitor			130	5/alt. wks
12424	FUV Spectroscopic Sensitivity Monitor	34			12x2/G140L +G130M, 10x1/
12425	FUV Internal/External Wavelength Scale Monitor	6			6x1
12431	FUV Detector Recovery After Anomalous Shutdown				
	Special Programs				
	COS Observations of Geocoronal Lyman-Alpha Emission		5		
12426	FUV Sensitivity Characterization	10			5x1/G130M, 5x1/G160M
12432	COS FUV Detector Gain Sag vs. High Voltage	2		5	once
	Totals	**67**	**5**	**188**	

NUV MAMA Fold Distribution
P.I. Tom Wheeler

Purpose	The performance of the MAMA microchannel plates can be monitored using a MAMA fold analysis procedure that provides a measurement of the distribution of charge cloud sizes incident upon the anode giving some measure of change in the pulse-height distribution of hte MCP, and therefore, MCP gain.
Description	While illuminating the detector with a flat field, the valid event (VE) rate counter is monitored while various combinations of row and column folds are selected. The process is implemented using a time-tag exposure and special commanding. This proposal executes the same steps as Cycle 17 proposal and is described in COS TIR 2010-01.
Fraction GO/GTO Programs Supported	7.9% of COS prime exposures use the NUV MAMA, 5.9% of COS SNAP exposures use the NUV MAMA.
Resources Required: Observations	1 internal orbit
Resources Required: Analysis	0.2 FTE weeks
Products	The fold analysis findings are reported to the COS Science Team and V. Argabright of Ball Aerospace after completion of the analysis, typically one-two weeks after execution of the test.
Accuracy Goals	position of the peak in the fold distribution can be measured to about 5% accuracy from this procedure.
Scheduling & Special Requirements	special commanding is required
Changes from Cycle 17	dropped from biannual frequency to annual

NUV Detector Dark Monitor
P.I. Wei Zheng

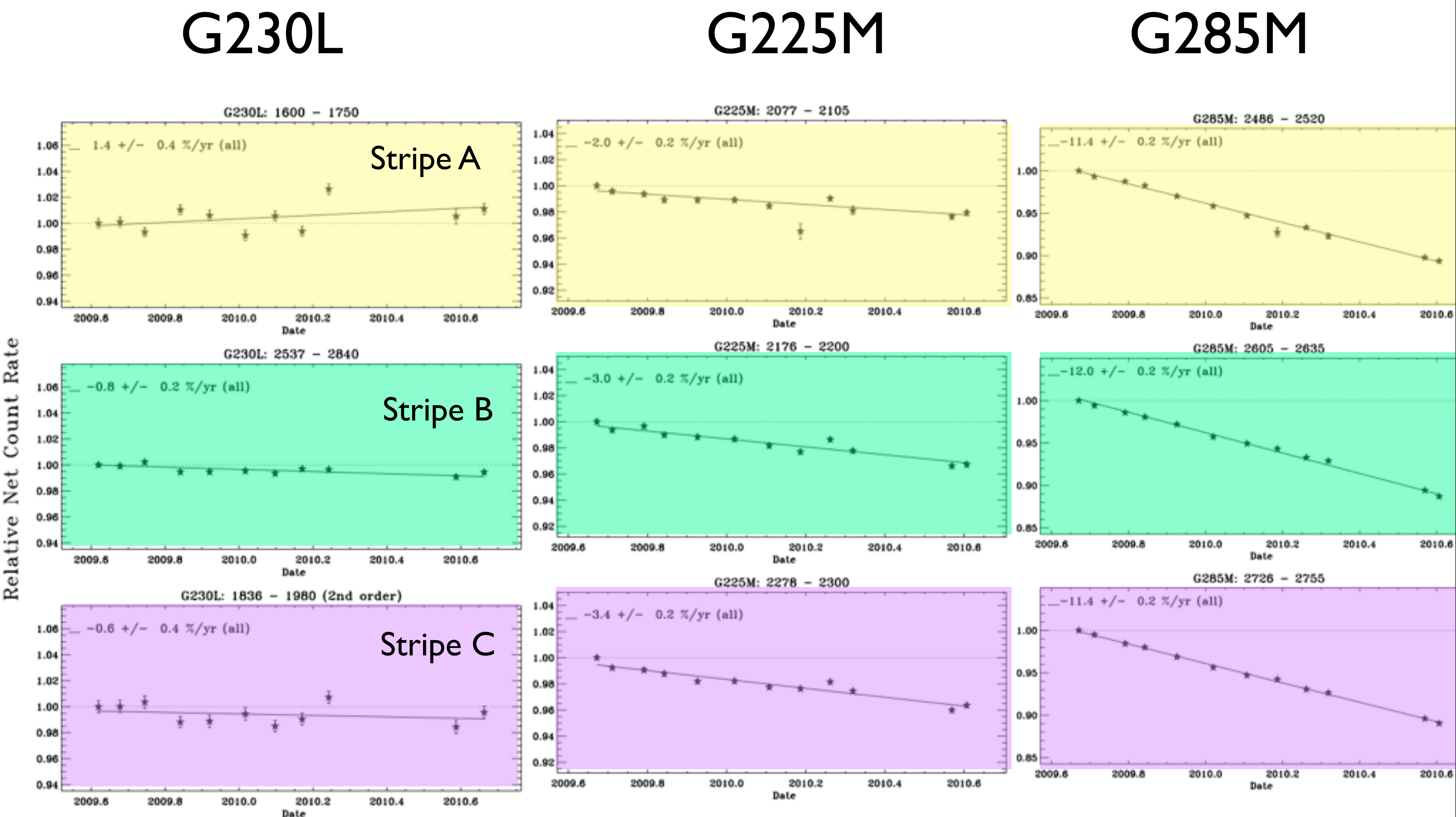
Purpose	Perform routine monitoring of MAMA detector dark current. The main purpose is to look for evidence of a change in the dark, both to track on-orbit time dependence and to check for a detector problem developing.
Description	Monitor the NUV detector dark rate by taking TIME-TAG science exposures without illuminating the detector. Once a week a 22-min exposure is taken with the NUV (MAMA) detector with the shutter closed. The length of the exposures is chosen to make them fit in Earth occultations.
Fraction GO/GTO Programs Supported	25% of COS
Resources Required: Observations	52 internal orbits
Resources Required: Analysis	4 FTE weeks
Products	CDBS Dark and bad-pixel reference file, ISR
Accuracy Goals	5%
Scheduling & Special Requirements	one exposure every week
Changes from Cycle 17	change frequency from twice per week to once per week


COS NUV Dark Current
Dark rate (10⁻⁴ count s⁻¹ pixel ⁻¹)
Date since SM4
0
1
2
3
4
0
100
200
300
400
500

NUV Spectroscopic Sensitivity Monitor
P.I. Rachel Osten

Purpose	Monitor sensitivity of each NUV grating mode to detect any change due to contamination or other causes.
Description	Obtain exposures in all NUV gratings -- G230L, G185M, G225M, and G285M -- quarterly. The first two gratings have stable behavior, while the last two are experiencing steady sensitivity declines. However, they are rarely used in Cycle 18 so quarterly observations will suffice to monitor the trends.
Fraction GO/GTO Programs Supported	8.1% of COS exposures are NUV gratings (by exposure time); this breaks down to 6.8% for L-modes and 1.3% for all M-modes.
Resources Required: Observations	12 external orbits
Resources Required: Analysis	3 FTE weeks
Products	ISR, Time-Dependent Sensitivity Reference File
Accuracy Goals	SNR of 30 per resel at the central wavelength
Scheduling & Special Requirements	3 two-orbit visits for G230L; 3 two-orbit visits for M-modes, observed roughly every 3 months.
Changes from Cycle 17	quarterly observations instead of monthly.

COS NUV TDS measurements



NUV Internal to External Wavelength Scale Monitor
P.I. Cristina Oliveira

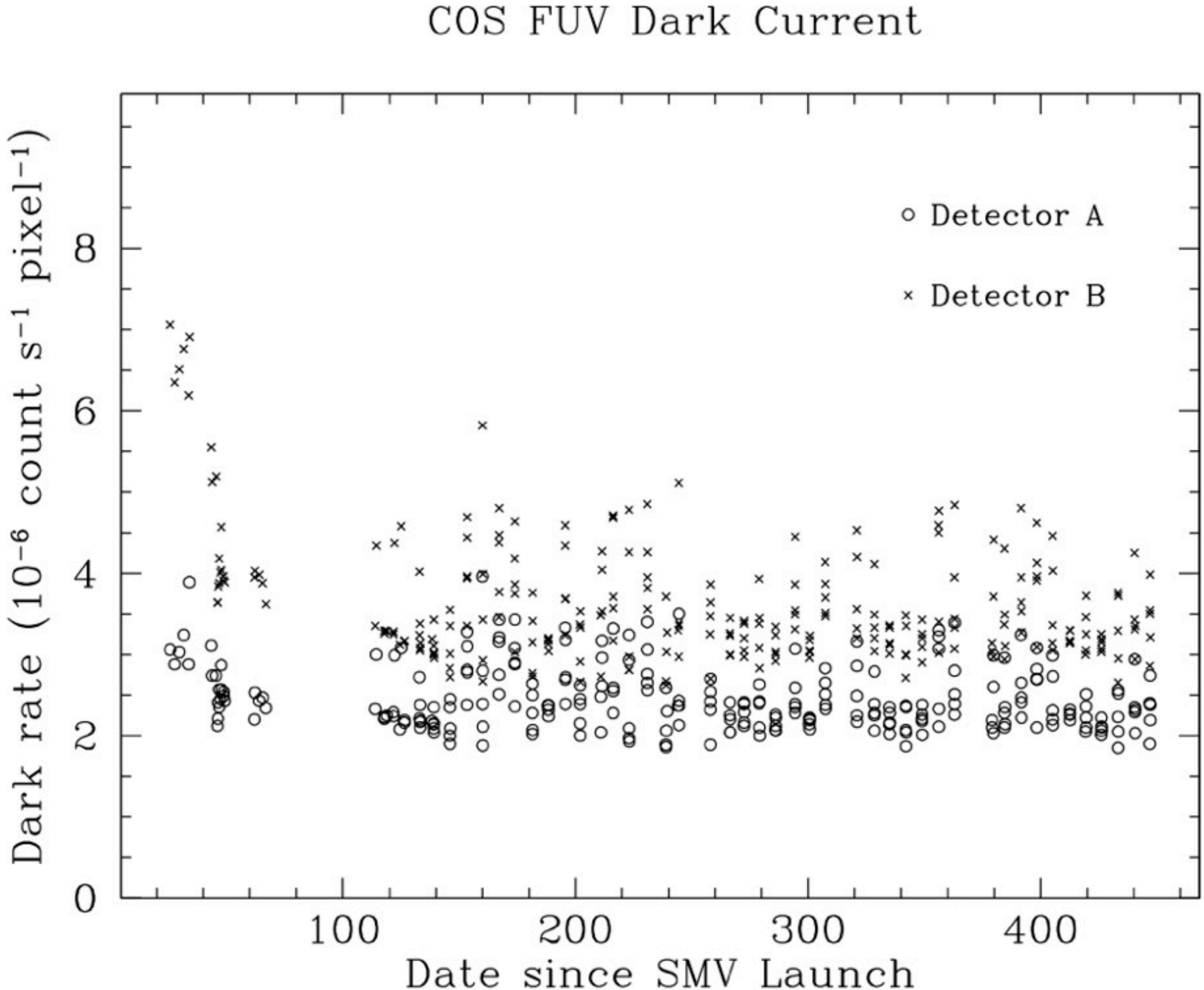
Purpose	This program monitors the offsets between the wavelength scale set by the internal wavecal versus that defined by absorption lines in external targets.
Description	This program monitors the offsets between the internal and external wavelength scales: this offset is referred to as "DELTA" in the wavelength dispersion reference file and corrects for the shift between the WCA and PSA in TV03 versus the shift between the WCA and PSA in orbit: (WCA-PSA)_TV03 - (WCA-PSA)_orbit. Analysis of TV data indicates that this DELTA is cenwave and FP-POS independent for a particular grating, but it is grating and stripe dependent. To verify and monitor this, this program observes some cenwaves at different FP-POS.
Fraction GO/GTO Programs Supported	8.1% of COS exposures use NUV gratings
Resources Required: Observations	3 external orbits
Resources Required: Analysis	3 FTE weeks
Products	
Accuracy Goals	uncertainties of the wavelength scales are given in Table 4 of COS ISR2010-05
Scheduling & Special Requirements	visits should be scheduled throughout the year, at roughly 4 month intervals.
Changes from Cycle 17	decrease from 18 orbits to 3; wavelength scale has proven to be stable.

NUV Detector Recovery After Anomalous Shutdown
P.I. Tom Wheeler

Purpose	This proposal is designed to permit the safe and orderly recovery of the COS/NUV MAMA detector after an anomalous shutdown. This is accomplished by using slower-than-normal MCP and PC high-voltage ramp-ups and diagnostics.
Description	Anomalous shutdowns can occur because of bright object violations, which trigger the Global Hardware Monitor or the Global oftware Monitor. Anomalous shutdowns can also occur because of MAMA hardware anomalies or failures. The cause of the shutdown should be thoroughly investigated and understood prior to recovery. Twenty-four hour wait intervals are required after each test for MCP gas desorption and data analysis. COS event flag 2 is used to prevent inadvertent MAMA usage.
Fraction GO/GTO Programs Supported	
Resources Required: Observations	This is a contingency proposal only.
Resources Required: Analysis	0.4 FTE weeks
Products	
Accuracy Goals	
Scheduling & Special Requirements	special commanding is required
Changes from Cycle 17	

FUV Detector Dark Monitor
P.I. Wei Zheng

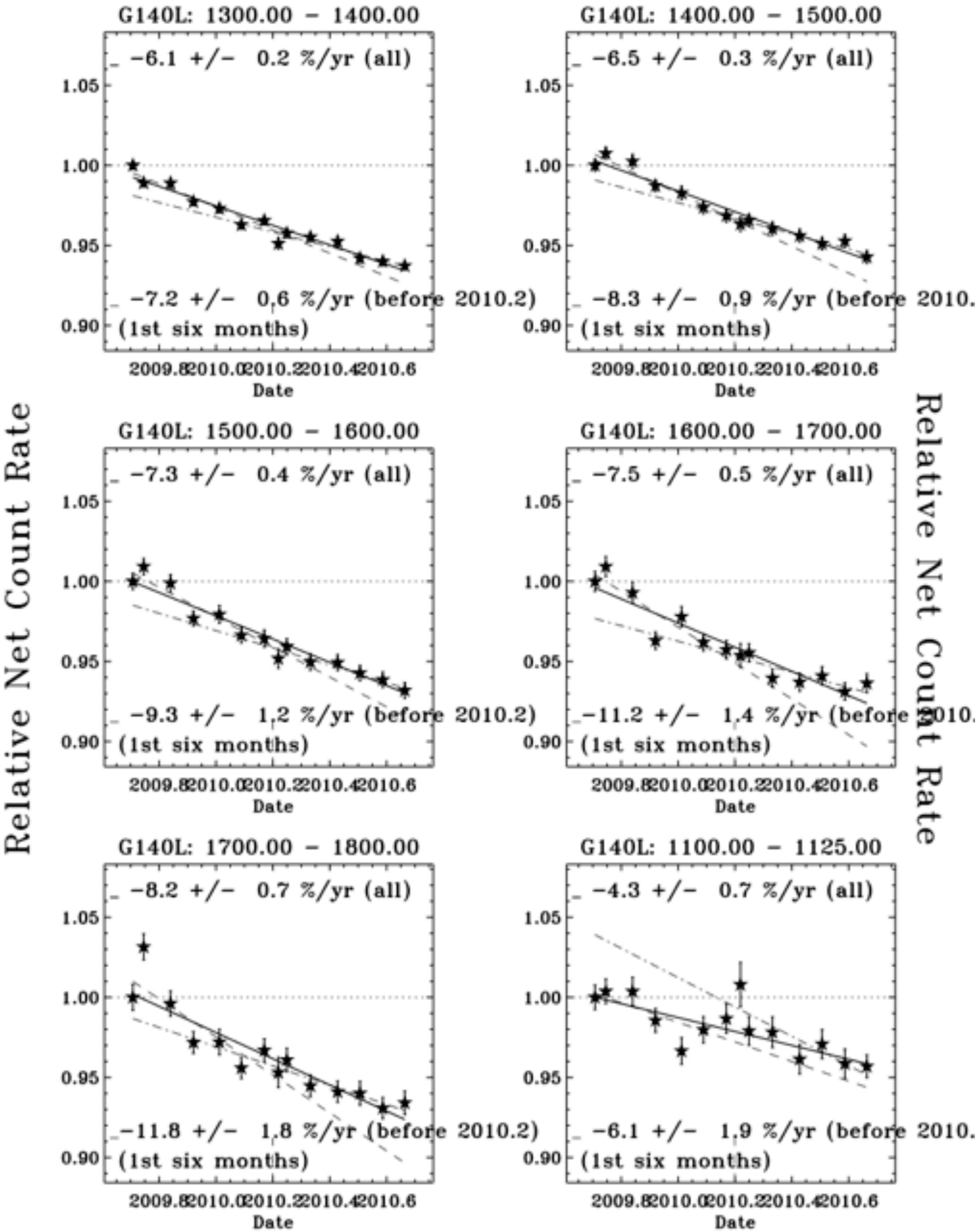
Purpose	Perform routine monitoring of FUV XDL detector dark rate. The main purpose is to look for evidence of a change in the dark rate, both to track on-orbit time dependence and to check for a detector problem developing.
Description	Monitor the FUV detector dark rate by taking TIME-TAG science exposures with no light on the detector. Five times a week a 22-min exposure is taken with the FUV detector with the shutter closed. The length of the exposures is chosen to make them fit in Earth occultations.
Fraction GO/GTO Programs Supported	75% of COS
Resources Required: Observations	130 internal orbits
Resources Required: Analysis	4 FTE weeks
Products	Dark rate reference files, ISR
Accuracy Goals	Obtain a few counts per exposure (for nominal case). Build up decent S/N over time.
Scheduling & Special Requirements	5 one orbit visits, executed every other week
Changes from Cycle 17	reduce frequency from 5 visits per week to 5 visits every other week.

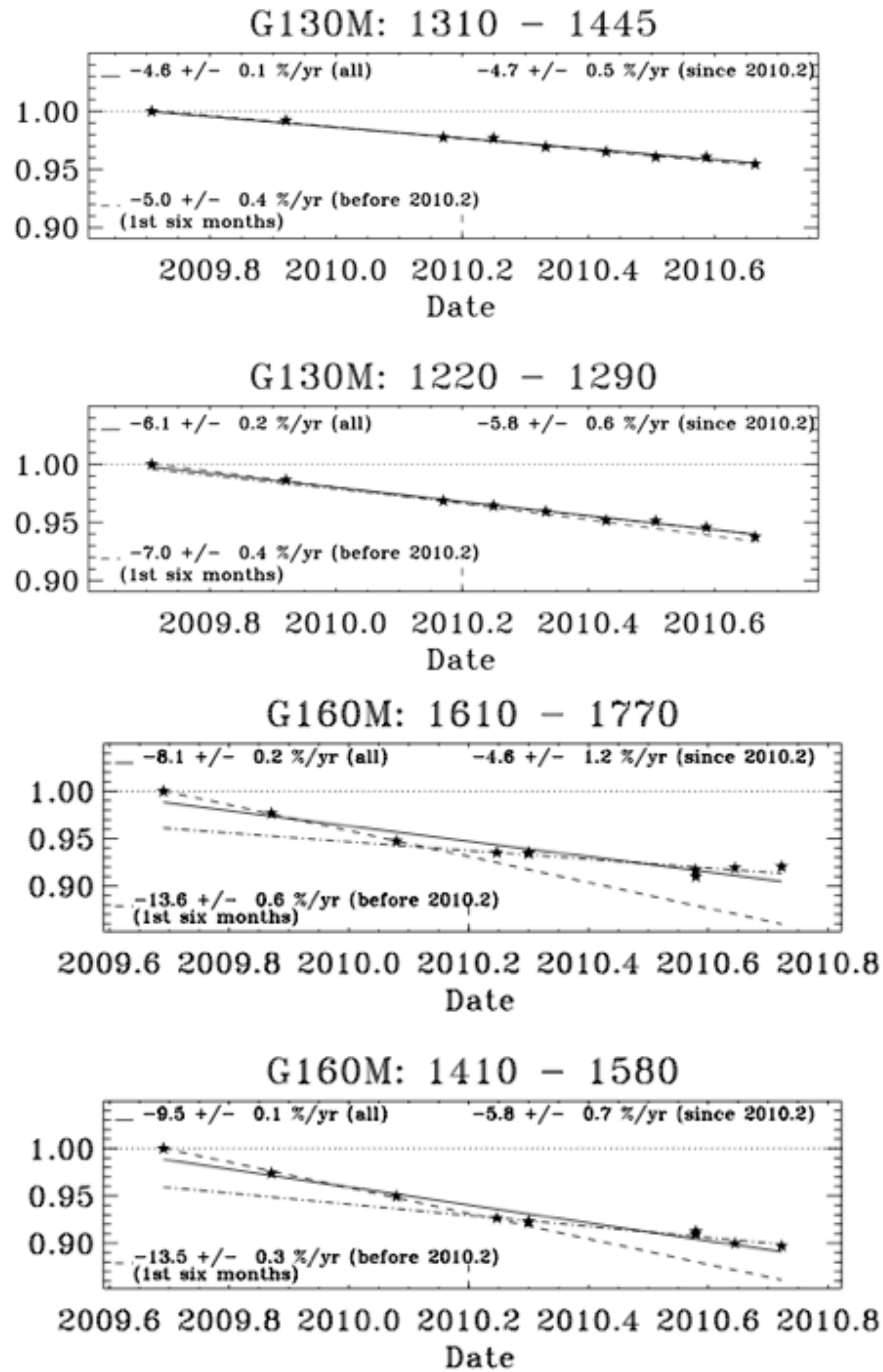

COS FUV Dark Current
Dark rate (10^{-6} count s^{-1} $pixel^{-1}$)
0
2
4
6
8
100
200
300
400
Date since SMV Launch
Detector A
Detector B

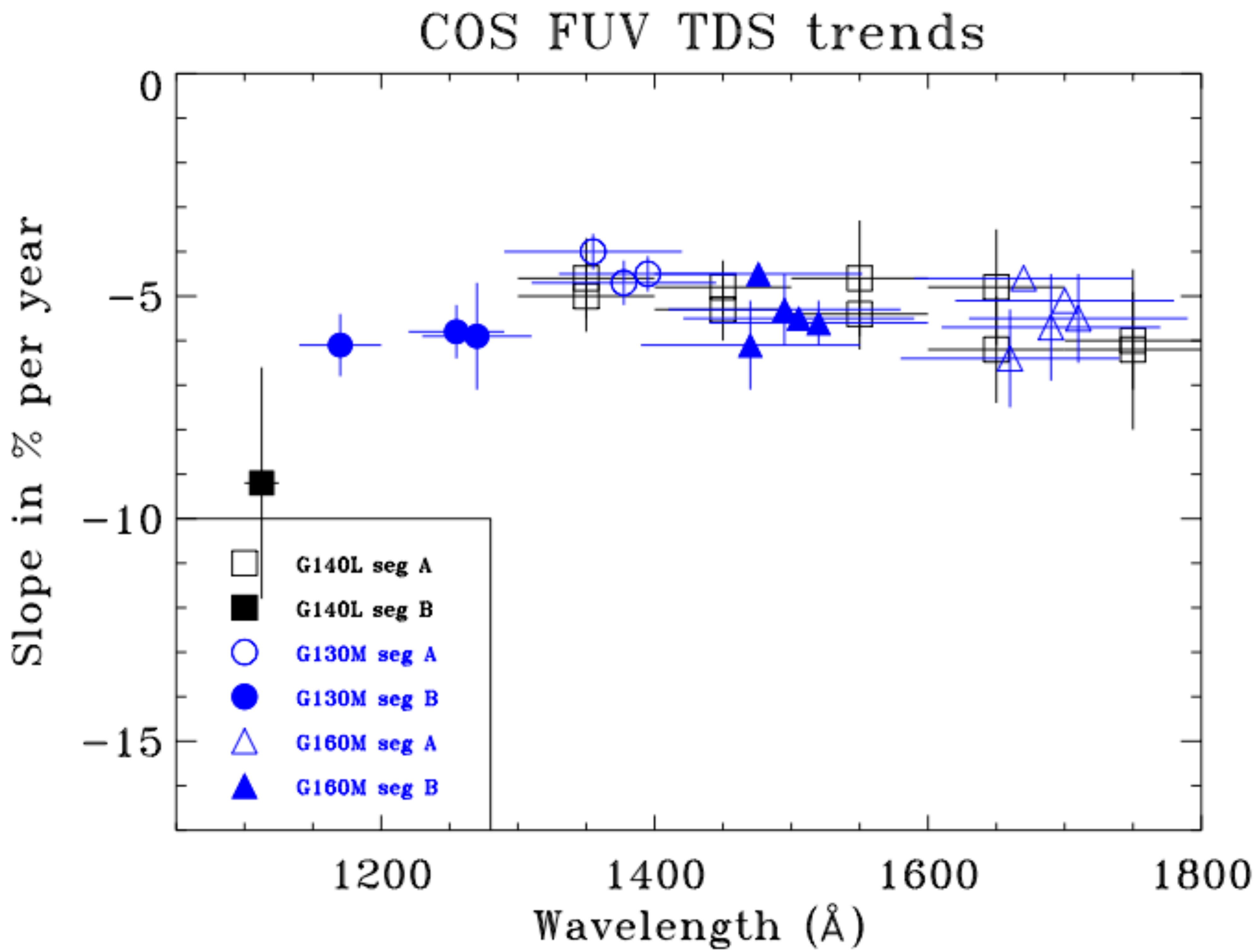
FUV Spectroscopic Sensitivity Monitor
P.I. Rachel Osten

Purpose	Monitor sensitivity of each FUV grating to detect any change due to contamination or other causes.
Description	Obtain exposures in all FUV gratings every month. This entails a two-orbit visit to cover 2 central wavelengths of G140L and 3 central wavelengths of G130M, and a one-orbit visit to cover 3 central wavelengths of G160M.
Fraction GO/GTO Programs Supported	90% of COS exposures are FUV gratings (by exposure time); this breaks down to 11% for G140L, 42% for G130M, and 37% for G160M.
Resources Required: Observations	34 external orbits
Resources Required: Analysis	6 FTE weeks
Products	ISR, Time-Dependent Sensitivity Reference File
Accuracy Goals	SNR of 30 per resel at the central wavelength
Scheduling & Special Requirements	monthly observations
Changes from Cycle 17	continuation of observing strategy at end of Cycle 17; quarterly visits of G160M to obtain two additional central wavelengths were dropped

recent FUV TDS results






COS FUV TDS trends
Slope in % per year
0
−5
−10
−15
1200
1400
1600
1800
Wavelength (Å)
G140L seg A
G140L seg B
G130M seg A
G130M seg B
G160M seg A
G160M seg B

FUV Internal/External Wavelength Scale Monitor
P.I. Cristina Oliveira

Purpose	This program monitors the offsets between the wavelength scale set by the internal wavecal versus that defined by absorption lines in external targets.
Description	This program monitors the offset between the internal and external wavelength scales: this offset is referred to as "DELTA" in the wavelength dispersion reference file and corrects for the shift between the WCA and PSA in TV03 versus the shift between the WCA a nd PSA in orbit : (WCA-PSA_)_TV03 - (WCA - PSA)_orbit. Analysis of TV data indicates that this DELTA (offset) is cenwave and FPPOS independent for a particular grating, but it is grating and stripe dependent. To verify and monitor this, this program observes some cenwaves
Fraction GO/GTO Programs Supported	90% (by time, of all COS observations)
Resources Required: Observations	6 external orbits
Resources Required: Analysis	3 FTE weeks
Products	
Accuracy Goals	Uncertainties of the wavelength scales are given in table 4 of COS ISR 2010-06
Scheduling & Special Requirements	visits should be scheduled at roughly 4 month intervals.
Changes from Cycle 17	decrease of frequency due to stability of wavelength scale

FUV Detector Recovery After Anomalous Shutdown
P.I. Tom Wheeler

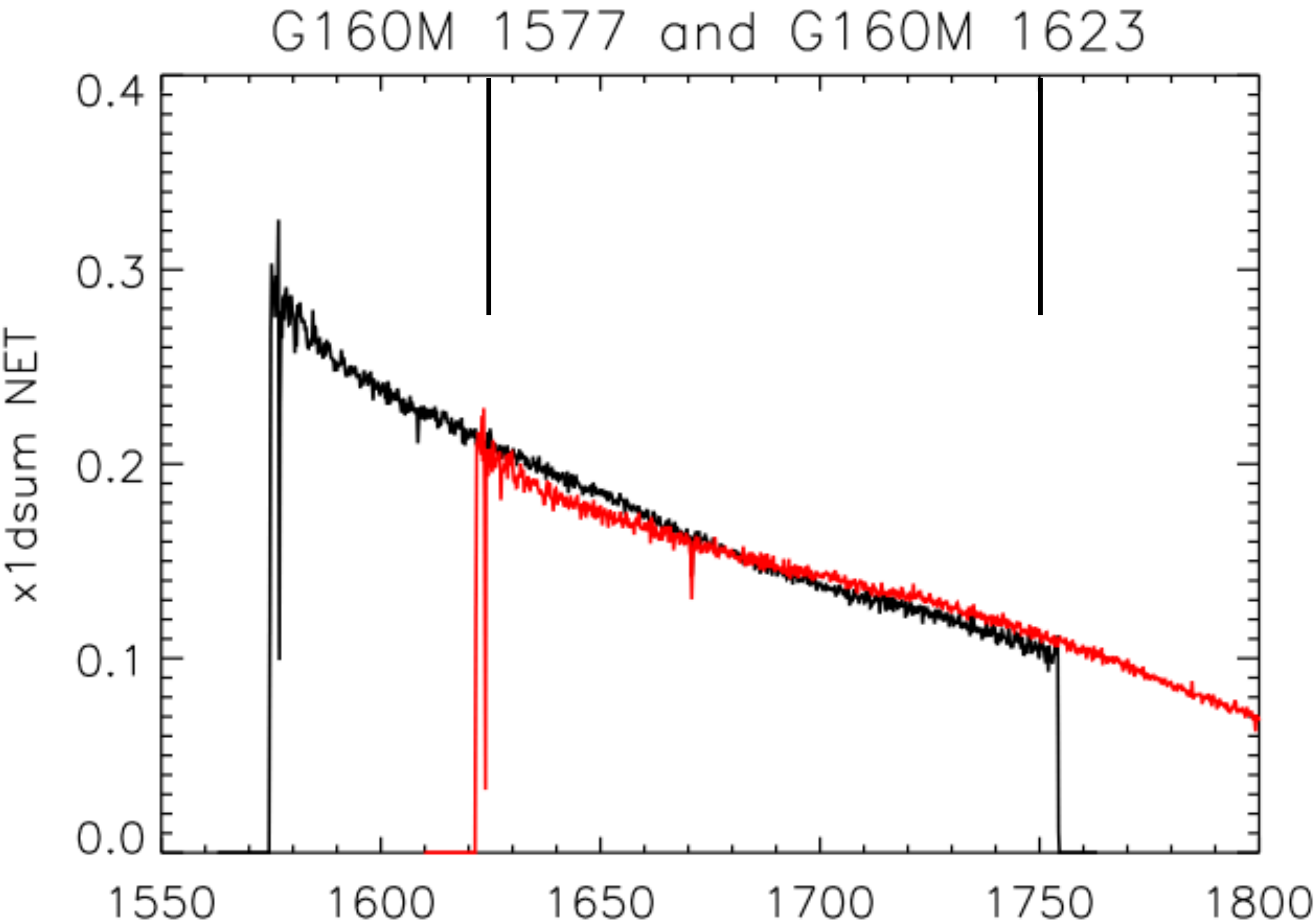
Purpose	This proposal is designed to permit the conservative, safe, and orderly recovery of the COS/FUV detector after an anomalous HV shutdown.
Description	Anomalous shutdowns can occur because of bright object violations, which trigger the Count Rate Protection Monitor or the Global Software Monitor. Anomalous shutdowns can also occur because of hardware anomalies or failures. The cause of the shutdown should be thoroughly investigated and understood prior to recovery. Wait intervals are required after each test for data analysis. COS event Flag 3 is used to prevent inadvertent FUV usage.
Fraction GO/GTO Programs Supported	
Resources Required: Observations	This is a contingency proposal only.
Resources Required: Analysis	0.4 FTE weeks
Products	
Accuracy Goals	
Scheduling & Special Requirements	special commanding is required
Changes from Cycle 17	

COS Observations of Geocoronal Lyman-alpha Emission
P.I. van Dixon

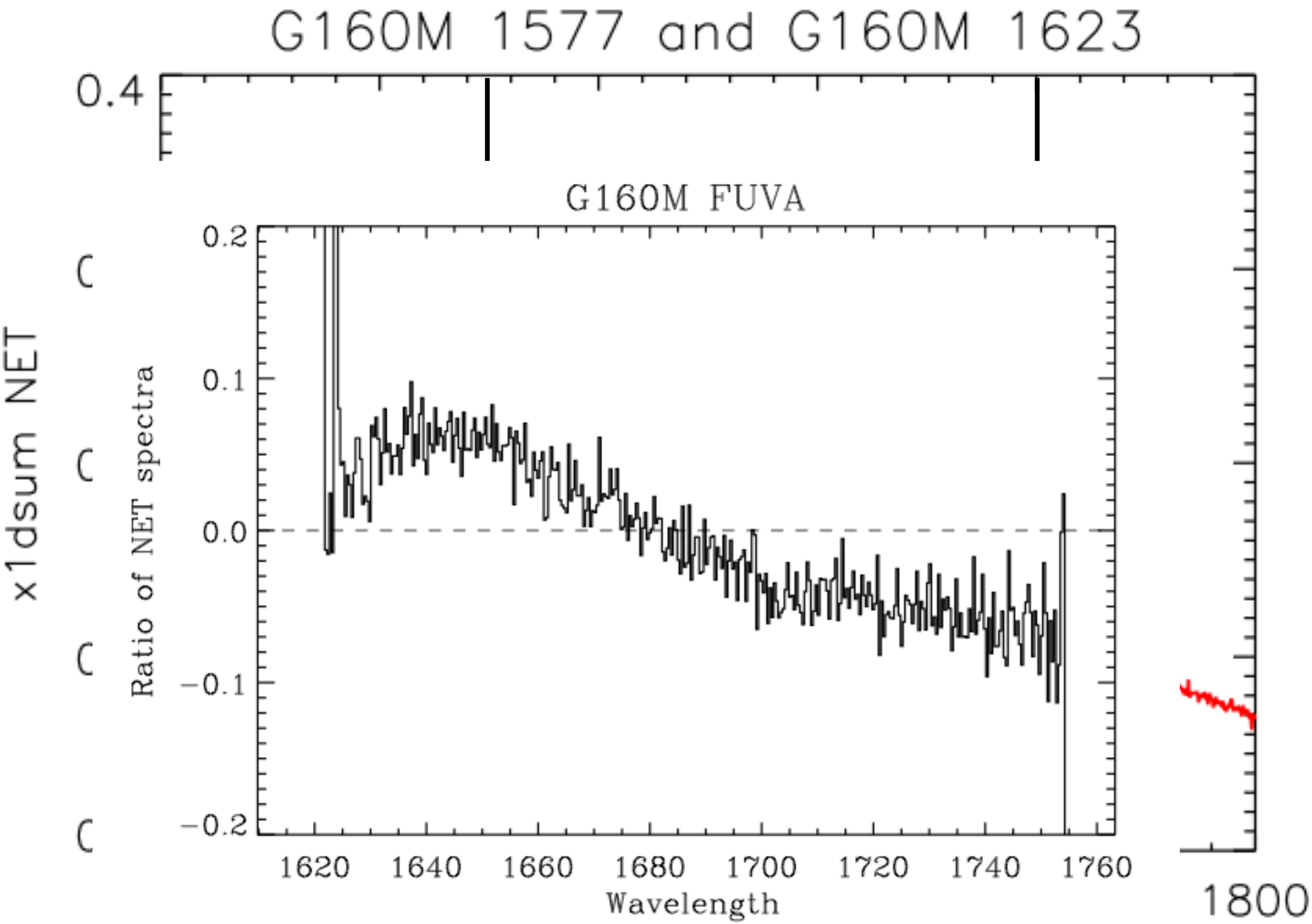
Purpose	To obtain G130M and G140L spectra of the geocoronal Lyman-alpha emission feature with S/N ratios sufficient to trace the line wings.
Description	We have received two requests from GOs for high-S/N observations of the geocoronal Lyman-alpha line profile observed with the G130M and G140L gratings. Such observations would allow users to model and subtract the line wings from their spectra. Observations to date provide insufficient airglow data to construct such profiles. We propose airglow observations totaling 10 ks with each grating. In Cycle 17, we obtained 3900 s with G130M and 5600 s with G140L, so need an additional 3 orbits with G130M and 2 orbits with G140L. The data will be archived, but must be reduced by the GOs themselves.
Fraction GO/GTO Programs Supported	2%; mostly faint targets for which the region around Lyman alpha is of interest.
Resources Required: Observations	5 parallel orbits
Resources Required: Analysis	0 FTE weeks
Products	none. Observers must reduce these data themselves.
Accuracy Goals	For G140L, SNR of 2 per pixel at 1200A; for G130M, SNR of 2 per pixel at 1213 A.
Scheduling & Special Requirements	observations can be obtained as parallels with STIS external calibration observations.
Changes from Cycle 17	obtaining additional exposures

FUV Sensitivity Characterization
P.I. Derck Massa

Purpose	Obtain high S/N G130M and G160M data to characterize how the sensitivity depends on CENWAVE settings and to establish an accurate flux calibration. These data will also allow us to monitor changes in the COS detector flat fields.
Description	COS FUV flux calibration observations of primary standards were obtained during SMOV, but a new set of observations are now needed to produce a high quality flux calibration. Specifically, as a consequence of the high S/N data obtained during Cycle 17, we now recognize that there can be 5-10%differences in the instrumental response at the same wavelength for spectra obtained at different CENWAVEs. While the exact origin of these differences is not yet understood (possibly from large scale flat field variations or small changes in the grating illumination), they must be accurately characterized to achieve an absolute flux calibration with a precision better than 5%. The CENWAVE differences were not appreciated in the SMOV data because uncertainties in the initial instrumental response lead to conservative brightness limits and poorly exposed spectra which, together with unexpectedly strong fixed pattern noise, masked the effect. To fully characterize the flux calibration, we require high S/N spectra at each CENWAVE setting at the same time. This, in turn, requires spectra with S/N greater than about 10 per pixel (or 25 per resolution element) at each of the 4 FP-POS settings so that a high S/N spectrum that is free of flat field effects can be derived. For the standard stars available, this will require 1 orbit per CENWAVE setting, or 10 orbits in all. Although we do have recent high S/N standard star data for 2 G160M CENWAVE settings, it would be best to obtain all of the flux calibration at the same epoch, since we know that the instrumental sensitivity is time dependent. Finally, although these data will have about half the counts of the flat field data, they will be adequate for us to examine the time dependence of the COS flat fields. This is very important since we have already detected differences between the flats derived from program 12086 and those derived from the SMOV data high S/N program 11494 obtained 11 months earlier.
Fraction GO/GTO Programs Supported	90% of COS observations are FUV
Resources Required: Observations	10 external orbits
Resources Required: Analysis	8 FTE weeks
Products	G130M, G160M flux calibration reference files
Accuracy Goals	1% over 2 A bands
Scheduling & Special Requirements	1 orbit per CENWAVE (all 4 FP-POS), for 5 CENWAVES of G130M and 5 CENWAVES of G160M
Changes from Cycle 17	new program



difference in count rates at similar wavelengths in different CENWAVES implies a difference in relative flux calibration of 5-10%

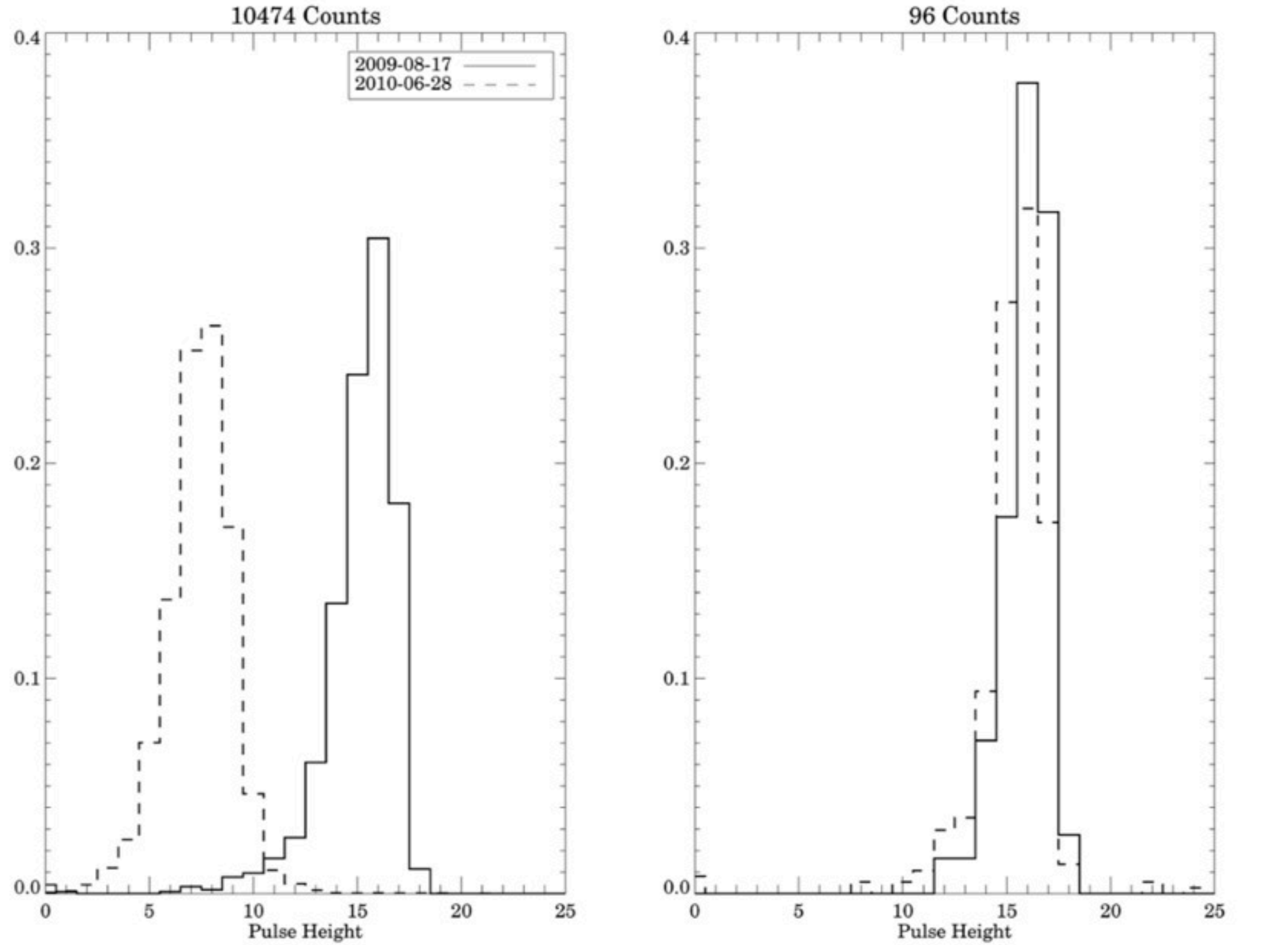


difference in count rates at similar wavelengths in different CENWAVES implies a difference in relative flux calibration of 5-10%

COS FUV Detector Gain Sag vs. High Voltage
P.I. Dave Sahnow

Purpose	To measure the characteristics of the detector after raising the high voltage on the FUV detector to their initial on-orbit command levels of 178 and 175 for Segments A and B.
Description	The initial COS on-orbit gain was substantially higher than that seen during ground testing. It is now suspected that this was due to some kind of contamination during or near launch that led to gas being adsorbed into the micro-channel plates. To remove artifacts induced by the higher gain, the MCP voltages were lowered to command levels of 169 and 167 (segments A and B, resp.) from the ground levels of 178 and 175. Since then the gain at the most exposed regions has declined more rapidly than was expected. This may indicate that the condition of the MCP has been restored to the conditions expected at launch. A test at both the current (command levels 169 and 167) and original (178 and 175) voltage settings will collect an orbit each of very high S/N G160M observations, using all 4 FP-POS positions. In this way, we can see if changing the voltage will extend the lifetime of the most heavily used parts of the detector.
Fraction GO/GTO Programs Supported	90% of COS observations use the FUV detector
Resources Required: Observations	1 external orbit at original voltage setting, 1 external orbit at current voltage setting, 5 internal darks
Resources Required: Analysis	2 FTE weeks
Products	decision on change of voltage or lifetime position
Accuracy Goals	1% over 2 A bands
Scheduling & Special Requirements	an observation early in Cycle 18 is requested; real-time commanding to change the voltages is required
Changes from Cycle 17	new program; implications for further observations depending on the outcome

pulse height distributions have shifted over the course of Cycle 17



gain has dropped in regions subjected to heavy illumination by Lyman-alpha