Cycle 23 COS Calibration Plan

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Cycle 23 Instrument Usage Statistics Based on Approved Programs

- COS orbits comprise ~18% of all GO prime orbits in Cycle 23

Instruments	GO Prime Orbits Usage	GO SNAP Orbit Usage
ACS	15.7%	11.7%
COS	18.0%	7.3%
STIS	14.3%	6.7%
WFC3	52.0%	74.3%
FGS	<0.01%	0.0%

COS Cycle 23 Usage Statistics Based on Phase II Submissions

- 1.5% of the total COS prime observing time consists of *acquisition exposures (1.3% NUV + 0.2% FUV)*
- 98.5% of the total COS prime observing time consists of *science* exposures

Configuration/Mode	**Prime Usage** (COS science exposures)	**SNAP Usage** (COS science exposures)
FUV / Spectroscopy	84.3%	100%
NUV / Imaging	<0.1%	0.0%
NUV / Spectroscopy	15.7%	---

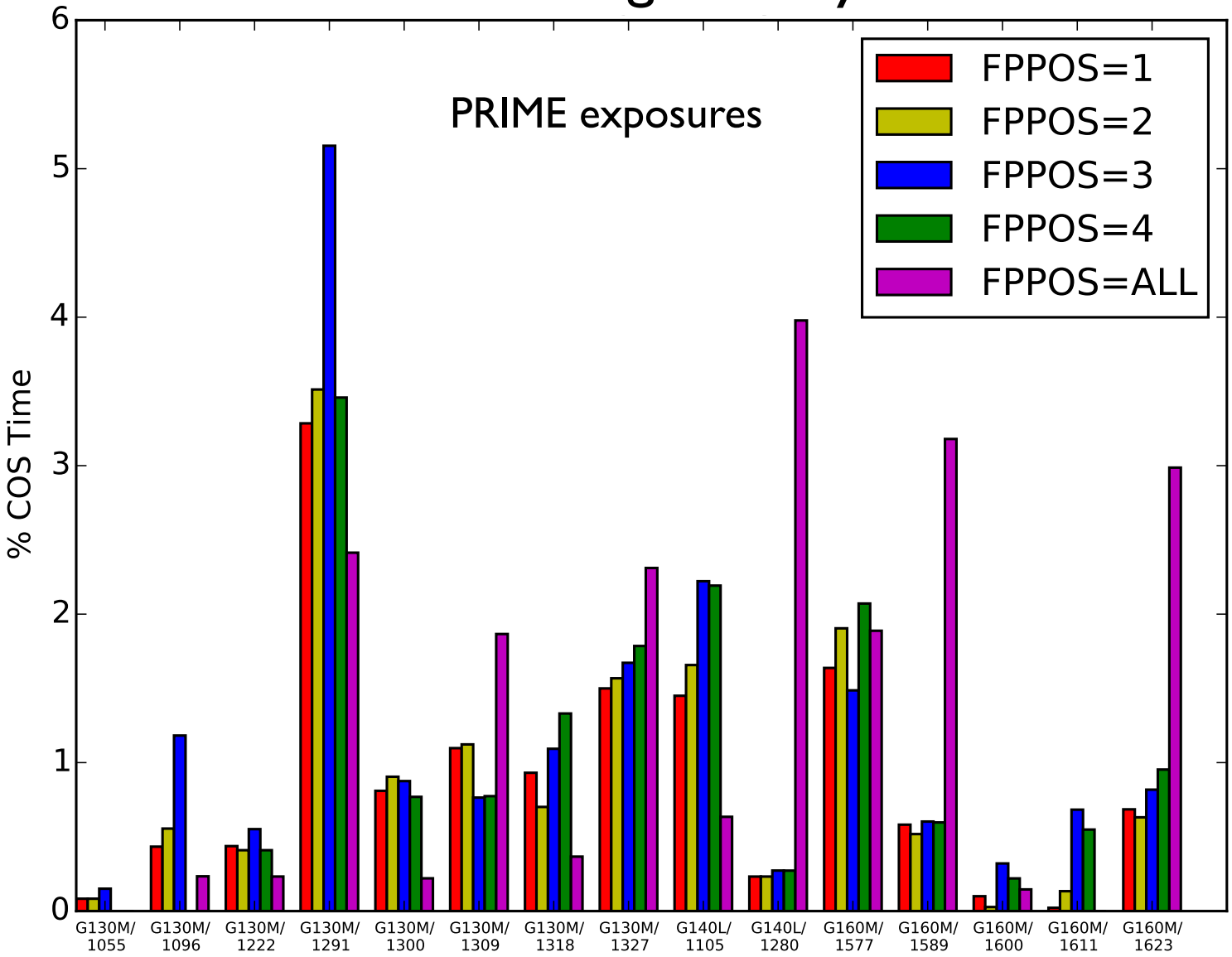
COS Cycle 23 Usage Statistics based on Phase II Submissions

Total SCIENCE exposures Breakdown by Mode and Grating

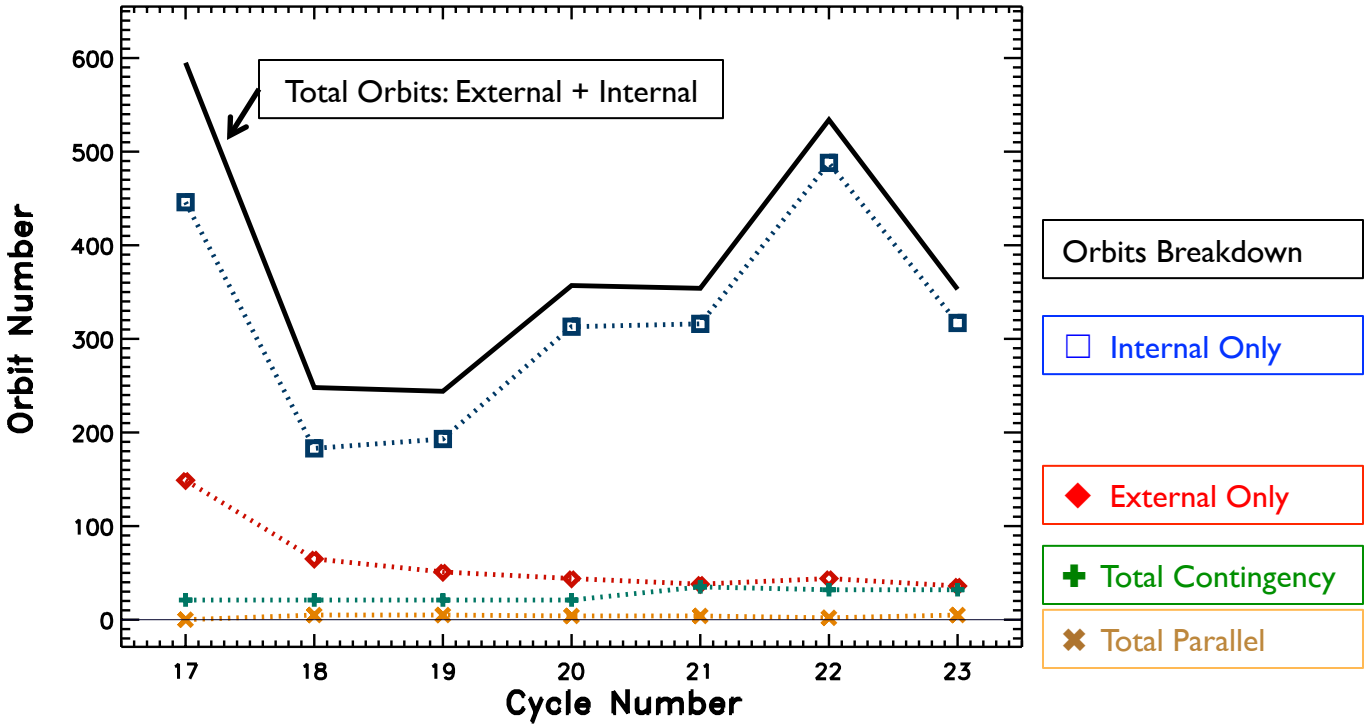
Configuration	Grating	Percentage of COS Prime Science Exposures		Percentage of COS SNAP Science Exposures	
		C22 (%)	**C23 (%)**	C22 (%)	**C23 (%)**
COS/FUV	**G140L**	13.5	**15.4**	31.1	**--**
(C23: 84.3% prime)	**G130M**	42.5	**45.7***	68.9	**100**
	G160M	27.6	**23.2**	---	**--**
COS/NUV	**G230L**	1.5	**---**	---	**--**
(C23: 15.7% prime)	**G185M**	8.0	**4.4**	---	**--**
	G225M	7.1	**11.3**	---	**--**
	G285M	---	**---**	---	**--**
	MIRROR A/B	0.1	**<0.1**	5.3	**--**

*10.5 % of total G130M observing time goes to exposures in the "Blue Modes" : increase of 3.5% compared to C22 - Blue Mode distribution:1222 (42.8%), 1055 (6.7%), 1096 (50.5%): increase of 1096 usage compared to C22 (1222 was most used last cycle).

FP-POS Usage for Cycle 23



Overview of COS Calibration Programs with Time



External Orbit Requests are < 40 in an continuous effort to *streamline* the calibration programs and to preserve the lifetime of the COS FUV detectors while providing high quality science data. Cycle 22 external orbit increase was related to LP3 move and operations and to a special program; these are not required for C23.

Internal Orbit Requests are < 320 and have *decreased primarily* due to a decreased cadence for the FUV dark monitor in Cycle 23. In Cycle 22, an additional *170 internal orbits were requested to monitor the darks at the 2 operational HV after move to LP3. Based on the Cycle 23 usage, these additional orbits are not required this cycle.*

Overview of COS Calibration Programs Approved with Time

	# of Programs	External Orbits	Internal Orbits	Parallel Orbits	Total Orbits
Cycle 17	20	149	446	0	595+(21)
Cycle 18	11	65	183	5	248+(21)+5
Cycle 19	10	51	193	5	244+(21)+5
Cycle 20	11	44	313+(21)	4	357+(21)+4
Cycle 21	14	38+(14)	316+(21)	4	354+(35)+4
Cycle 22	13	44+(11)	488+(21)	2	534+(32)+2
Cycle 23	12	34+(11)	317+(21)+(2*)	4	351+(32)+(2*)+4

*related to HV change – () mark contingency orbits

External Orbit Requests are < 40 in an continuous effort to streamline the calibration programs and to preserve the lifetime of the COS FUV detectors while providing high quality science data. Cycle 22 external orbit increase was related to LP3 move and operations and to a special program; these are not required for C23.

Internal Orbit Requests are < 320 and have *decreased primarily* due to a decreased cadence for the FUV dark monitor in Cycle 23. In Cycle 22, an additional *170 internal orbits were requested to monitor the darks at the 2 operational HV after move to LP3. Based on the Cycle 23 usage, these additional orbits are not required this cycle.*

COS Cycle 23 Calibration and Monitoring Approved Orbits

Title	External	Internal	Frequency (orbits x repeats)	Cycle 22 Allocation
FUV Monitors				
FUV Spectroscopic Sensitivity Monitor	**23 (10)**		3x6 + 1x5	**26 (10)**
FUV Detector Dark Monitor		**260**	5x52	**430**
FUV Internal/External Wavelength Scale Monitor◆	**3**		3x1	**1**
Pure Parallel Observations of Geocoronal Ly α	**4†**		See STIS	**2†**
FUV Gain Maps after HV changes◆		**4+(2*)**	Before and After HV/LP change	**5+(3*)**
NUV Monitors				
COS Target Acquisition Monitor◆	**2+(1)**		1x1	**2+(1)**
NUV Spectroscopic Sensitivity Monitor	**4**		1x2/(L + M)	**6**
NUV Detector Dark Monitor		**52**	2 x26	**52**
NUV Internal/External Wavelength Scale Monitor◆	**2**		1x2	**3**
NUV MAMA Fold Distribution		**1**	1x1	**1**
Contingency programs				
FUV Detector Recovery After Anomalous Shutdown		**(17)**		**(17)**
NUV Detector Recovery After Anomalous Shutdown		**(4)**		**(4)**
Total Cycle 23 Request	**34+(11)+4†**	**317+(21)+(2*)**		**Ext: 44+(11)+2† Int: 488+(21)+(3*)**

† External parallel orbits allocated with a STIS program.

*** Per HV change**

() Contingency orbits not included in Cycle 23 request.

Blue: changes from last cycle

◆ PI involved in Wavelength Calibration Working Group & Phase II submission can be postposed to later in the year.
For COS Side 2 programs see next slide

COS Side 2 Programs

- Programs are carried along each cycle's calibration plan (keeping the same ID) so that the impact of any changes to operating conditions (e.g., gyros) can be evaluated and modifications to the programs implemented as needed.

- No changes needed to these programs at this time

- **Engineering programs** (22 Internal orbits)
  - 13187 - COS Side 2 Dump Test and Verification of COS Memory Loads
  - 13188 - COS Side 2 Science Data Buffer Check/Self-Tests for CS Buffer RAM and DIB RAM
    13189 - COS Side 2 NUV Detector Recovery After MEB Side Switch
  - 13190 - COS Side 2 FUV Detector Recovery After MEB Side Switch
  - 13191 - COS Side 2 NUV MAMA Fold Test

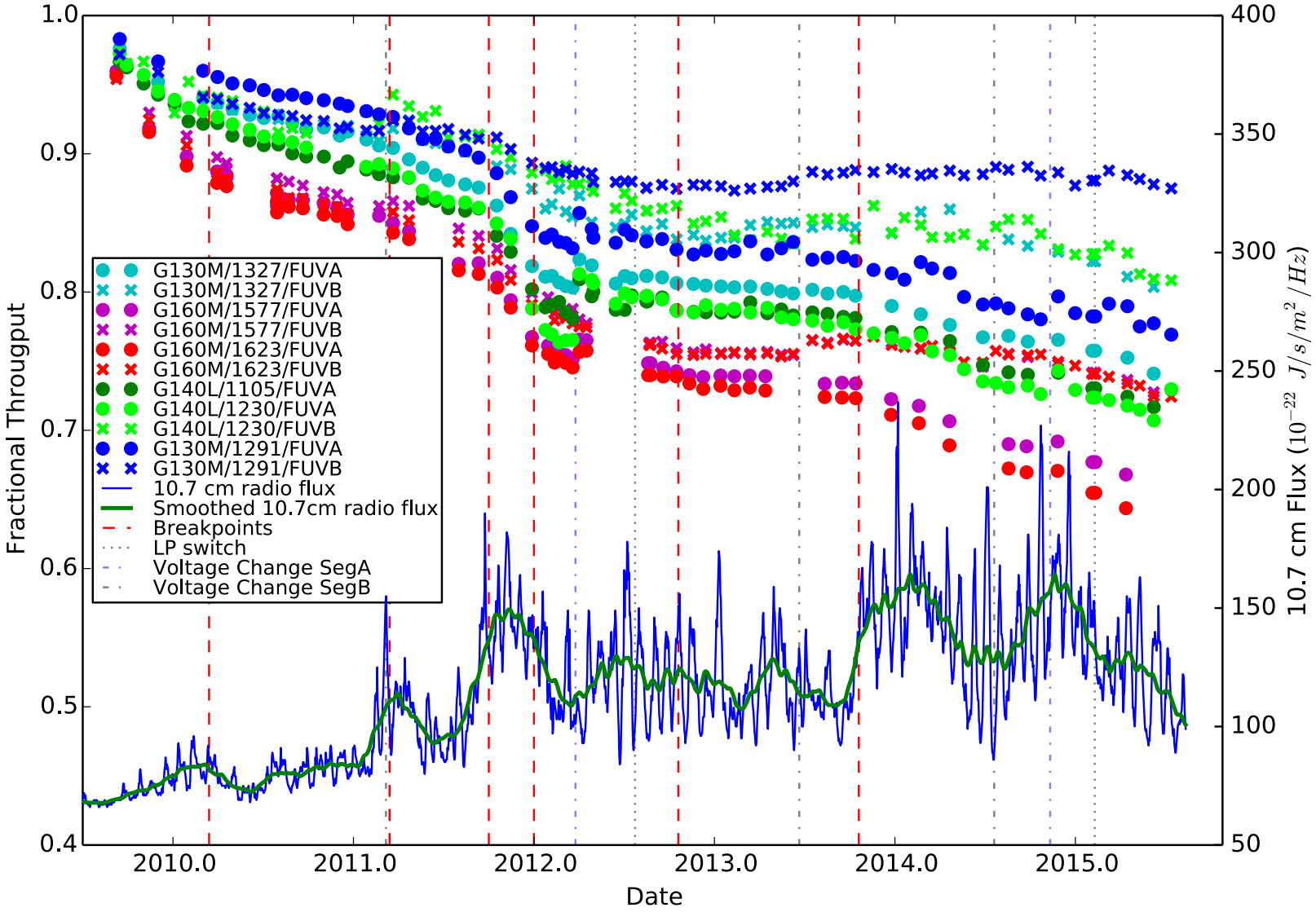
- **Science programs** (7 Internal + 3 External orbits)
  - 13192 - COS Side 2 Initial NUV Checkout
  - 13193 - COS Side 2 Initial FUV Checkout
  - 13194 - COS Side 2 Internal NUV Wavelength Verification
  - 13195 - COS Side 2 Internal FUV Wavelength Verification

FUV Monitors

COS FUV Spectroscopic Sensitivity Monitor
PI: Gisella de Rosa

Purpose	Monitor the sensitivity of each FUV grating mode to detect any change due to contamination or other causes. The FUV gratings are the most heavily used modes on COS and have also experienced several changes in the time-dependent spectroscopic sensitivity since launch. These trends are grating, segment, and wavelength dependent.
Description	To track the TDS as a function of wavelength we obtain exposures with all FUV gratings every month. There are 2 types of monitoring sequences which occur on alternating months. (i) Full monitoring sequence every other month (except May – Jul when GD71 is unavailable): 3 orbits in 2 visits. The 1 orbit visit (GD71) covers the G130M/1096/FUVB, G160M/1577/FUVA, and G160M/1623/FUVA modes. The 2 orbit visit (WD0308) covers G130M/1222, G130M/1291, G130M/1327, G130M/1055/FUVA, G160M/1577/FUVB, G160M/1623/FUVB, G140L/1105, G140L/1280 modes. These comprise the reddest and bluest central wavelengths of each grating with additional coverage of the G130M blue modes. (ii) Reduced monitoring sequence in alternating months: 1 orbit visit (WD0308) to monitor the complete wavelength range of the standard modes using one central wavelength per grating. The modes covered are G130M/1291, G160M/1623, and G140L/1280.
Fraction GO/GTO Programs Supported	84% of COS exposure time
Resources Required: Observations	23 external orbits + (10 contingency external orbits needed if changes in trends are seen during cycle)
Resources Required: Analysis	10 FTE weeks
Products	Time-Dependent Sensitivity reference file as necessary, update to ETC throughputs, the COS monitoring webpages, and a summary in the end of cycle ISR
Accuracy Goals	- SNR of 15 per resel at wavelength of least sensitivity for the standard modes, SNR of 25 per resel at wavelength of most sensitivity for the blue modes. For the blue modes, this will ensure S/N > 15 for λ> 1030 Å for 1096/FUVB, λ>1130 Å for 1055/FUVA and 1222/FUVB - TDS calibration better than 2% for standard modes and 10% for blue modes
Scheduling & Special Requirements	• Reduced monitoring sequence should occur every 2 months starting in November 2015 • Complete monitoring sequence should occur every 2 months starting in December 2015 • The FUVA turn-off of the GD71 visit should be hidden in the GS-ACQ • GD71 is unschedulable May – July 2016
Changes from Cycle 22	Reduced by 3 external orbits as LP3 reconnection is not required.

COS TDS FUV Trends



Increased FUVB (< 3%) and FUVA slopes (< 7%) since 2013.8

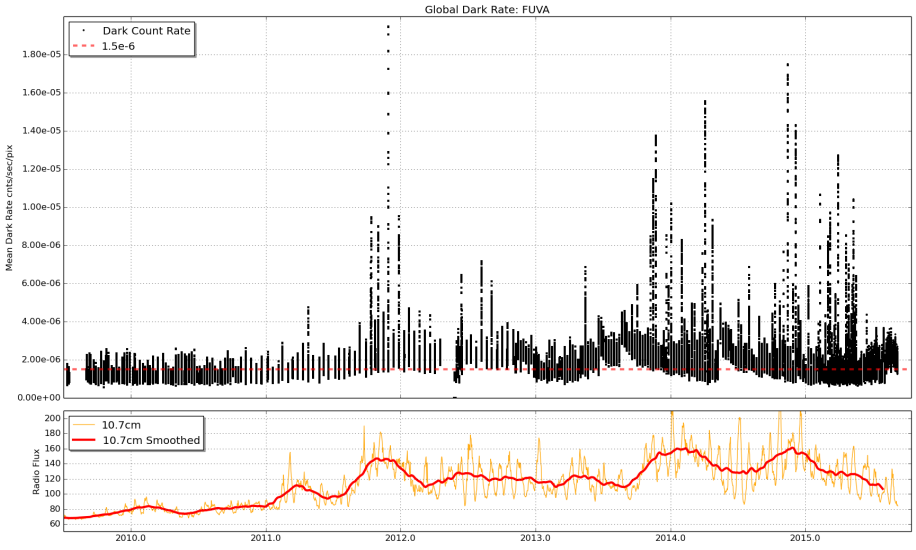
COS FUV Detector Dark Monitor
PI: Justin Ely

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 developing detector problem.
Description	Monitor the FUV detector dark rate by taking TIME-TAG science exposures with no light on the detector. Five times every 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. All orbits < 1800s.
Fraction GO/GTO Programs Supported	84% of COS total exposure time
Resources Required: Observations	260 internal orbits. All orbits < 1800s.
Resources Required: Analysis	4 FTE weeks
Products	Provide ETC and IHB dark rate estimates, along with weekly monitoring for changes and a summary in the end of cycle ISR. Update monitor and COS webpages. As allowed by resources and necessitated by data quality: improve dark subtraction method and update bad-pixel tables.
Accuracy Goals	Obtain enough counts to track 1% level changes on timescales of ~1-3 months.
Scheduling & Special Requirements	5x / week at nominal HV during Earth occultation.
Changes from Cycle 22	Reduced total request by 170 orbits. The need to monitor dark rate at 2 operation voltages is not required in Cy23 based on this cycle usage.

COS FUV Dark Rate Trends

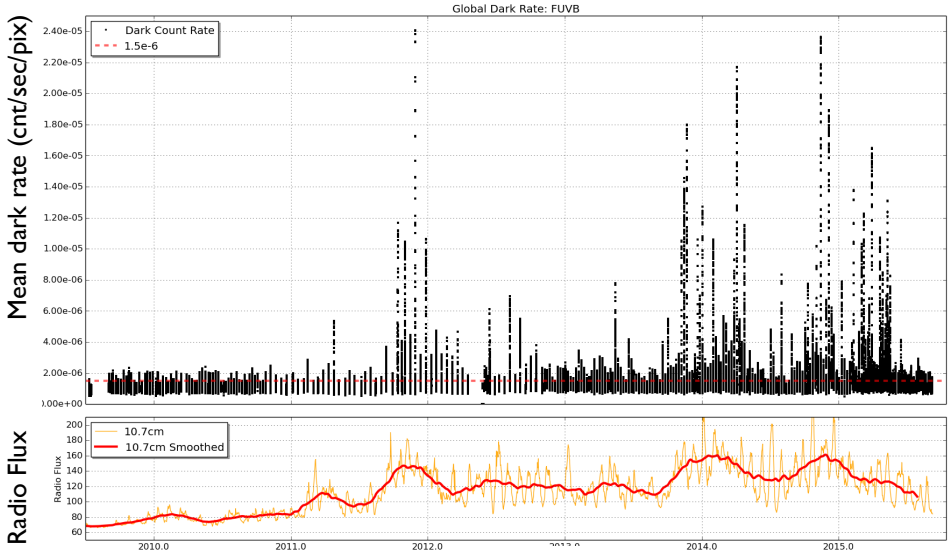
Temporal variability of the dark level

FUVA



Temporal variability of the dark level

FUVB



COS FUV dark rate monitoring:

- Dark rate trends are constant overall
- Fewer dark-rate spikes as the radio flux from the Sun decreases (decreased solar activity)
- Baseline jump on FUVA similar in magnitude to events seen in the past.

COS FUV Internal to External Wavelength Scale Monitor
PI: Paule Sonnentrucker

Purpose	This program monitors the offsets between the wavelength scale set by the internal wavecal versus that defined by absorption lines in external target AV75 obtained through the PSA.
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 and PSA in orbit : (WCA-PSA)_TV03 - (WCA-PSA)_orbit. Analysis of TV data indicates that this DELTA (offset) is cenwave and FP-POS independent for a particular grating, but it is grating dependent. To verify and monitor this dependency, this program observes the G130M/1096-1222-1291-1327, G160M/1577-1623 and G140L/1105-1280 cenwaves at different FP-POS. The Cycle 21 structure is restored starting in Cycle 23.
Fraction GO/GTO Programs Supported	84% of COS total exposure time.
Resources Required: Observations	3 external orbits. Schedulability set to 30% to fit all observations within requested orbits.
Resources Required: Analysis	4 FTE weeks
Products	Update of wavelength dispersion reference file if necessary, ISR, and a summary in the end of cycle ISR.
Accuracy Goals	G140L 150km/s, 7.5-12.5 pixels G130M 15km/s, 5.7-7.5 pixels G160M 15km/s, 5.8-7.2 pixels
Scheduling & Special Requirements	These observations are taken once per cycle. ORIENT is set to avoid bright field targets.. External target used is AV75 (target used since Cy 20).
Changes from Cycle 22	Restore full monitoring program for a total of 3 external orbits as in cycles prior to Cycle 22.

COS Pure Parallel Observations of Geocoronal Lyman-α Emission
PI: Sean Lockwood

Purpose	To obtain COS G130M spectra of geocoronal Lyman-α and other airglow emission lines with S/N ratios sufficient to trace the line wings of Lyman-α
Description	Obtain parallel airglow spectra with COS/FUV to characterize the profile of airglow lines. Visible in G130M/1291: H I 1215.67; O I 1302.2, 1304.9, 1306.0, 1355.6, 1358.5; N I 1199.5-1200.7
Fraction GO/GTO Programs Supported	43% (G130M observations)
Resources Required: Observations	4 external parallel orbits (in parallel with STIS MAMA TDS and focus monitor) in Cy 23 ~0.75% of lifetime at brightest Ly-α pixel for each FP-POS (2 FP-POS used) in Cy 23
Resources Required: Analysis	1 FTE week
Products	Update of the website listing airglow datasets. Observers must reduce these data themselves. Summary in end of cycle ISR
Accuracy Goals	SN = 1.5 per pixel at 1213 A
Scheduling & Special Requirements	Parallel with STIS MAMA TDS monitor. Roll angle must be chosen to avoid objects in the COS PSA or BOA apertures.
Changes from Cycle 22	Requirements have been achieved (10,000s) for 1105A, 1291A, and 1327A at LP2. In Cy23, we will continue accumulating data for 1291A (most used cenwave) and 1327A at LP3. We plan to continue in future cycles to reach S/N requirement and monitor other cenwave (as was done at LP2).

COS FUV Detector Gain Maps
PI: David Sahnow

Purpose	Obtain gain maps of the FUV detector either before and after changes to the nominal high voltage levels, or during the cycle based on detector usage. These data will be used to check that the expected modal gain is achieved for HV changes, and to track the dependence of modal gain as a function of time.
Description	Use the deuterium lamp to illuminate the appropriate LP2 or LP3 region of the COS FUV detector at the following times: • LP3 standard modes: Immediately before and after the Segment B HV is increased (2 orbits) • LP3 G130M/1222: Snapshot of gain map to monitor the change since moved to LP3 (1 orbit) • LP2 Blue Modes: Snapshot of gain map to monitor the change since moved to LP3 (1 orbit) • Contingency for LP3 G130M/1222: After any change to the HV for this mode (1 orbit) • Contingency for LP2 Blue Modes: After any change to the HV for this mode (1 orbit)
Fraction GO/GTO Programs Supported	84%
Resources Required: Observations	4 internal orbits 2 internal contingency orbits
Resources Required: Analysis	1 FTE. Existing CCI / gain map procedures will be used to process these data part of normal gain monitoring.
Products	Gain map files. These will be used to update the GSAGTAB (and possibly the BPIXTAB), and also improve the models of gain vs. HV and gain vs. exposure.
Accuracy Goals	0.1 pulse height bin
Scheduling & Special Requirements	Immediately before and immediately after any HV change, and no earlier than Feb 2016.
Changes from Cycle 22	Reduced by 1 external and 1 internal orbits. No Lifetime Position change this cycle

NUV Monitors

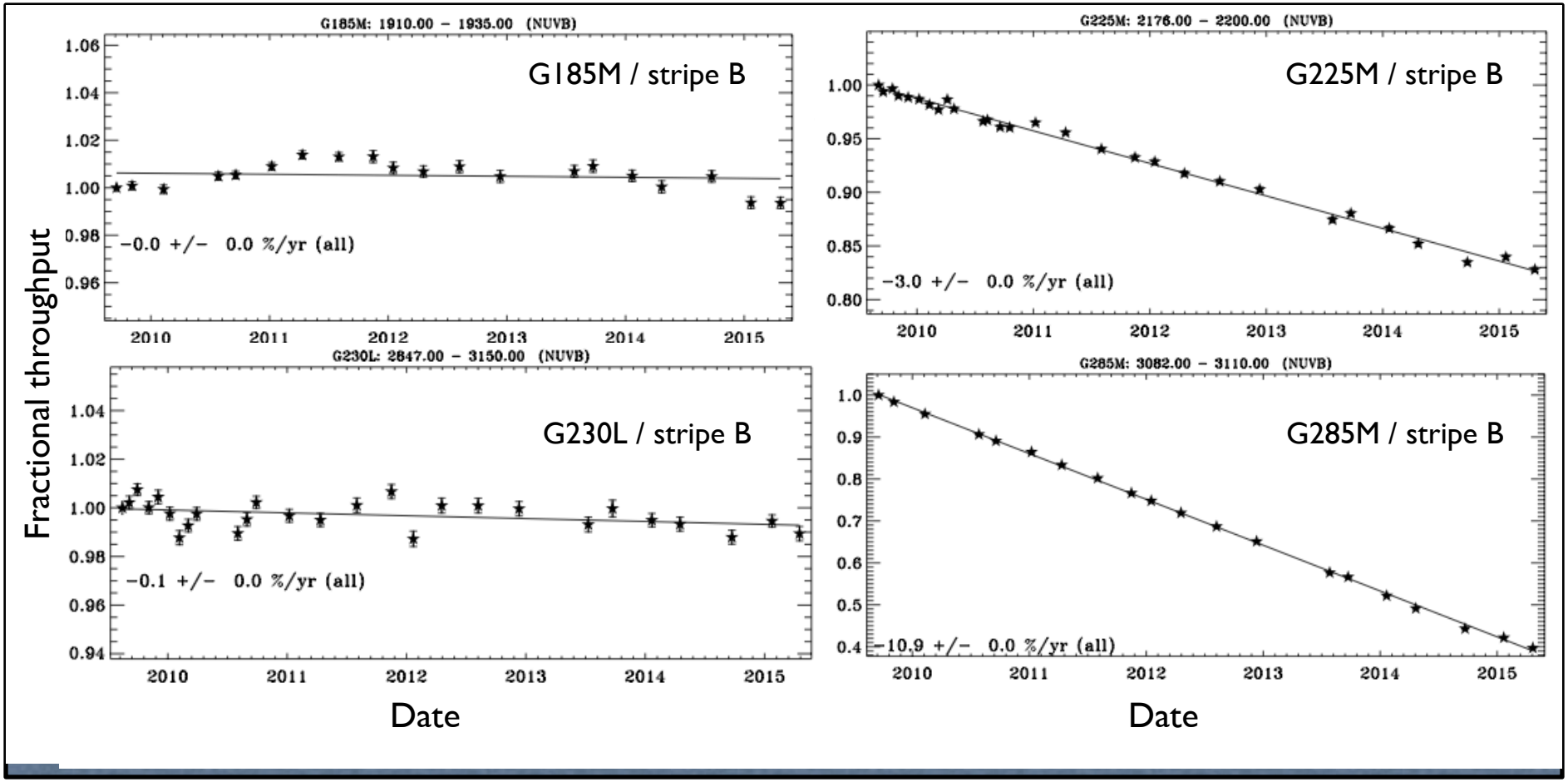
COS Imaging Target Acq & Spectroscopic WCA-PSA Offset Verification
PI: Steven Penton

Purpose	Measure/monitor the WCA-to-PSA/BOA offsets used for imaging target acquisition (TA), and WCA-to-PSA for spectroscopic TAs
Description	There are 4 NUV ACQ/IMAGE mechanism combinations: 2 science apertures (SAs: PSA & BOA) x 2 mirror modes (MIRRORA & MIRRORB). During SMOV, the WCA-to-PSA+MIRRORA offset was determined by an aperture scan; the other WCA-to-SA offsets were bootstrapped from this offset. Changes in the PSA+MIRRORA-to-PSA+MIRRORB offset are monitored in the Focal Plane Calibration program (SI-FGS Alignment; 14035 for C22). All other spectroscopic WCA-PSA offsets, all WCA-SA imaging offsets, and co-alignment for all ACQ/IMAGE modes are monitored by the present program. It obtains PSA spectra of the targets with all gratings to track any changes in the spectroscopic WCA-to-PSA offsets.
Fraction GO/GTO Programs Supported	100% of COS total exposure time (all COS exposures depend on WCA-SA offsets)
Resources Required: Observations	2 external one-orbit visits + 1 external orbit contingency visit. The PSA+MIRRORA and PSA+MIRRORB co-alignment is periodically tested in the SIAF file verifications of HST program 14035. If this program has not been run with the current SIAF file, a contingency visit would be needed to measure the PSA+MIRRORA-to-PSA+MIRRORB offset
Resources Required: Analysis	2 FTE weeks for analysis, and verifying WCA-to-SA offsets. Should changes be warranted to existing offsets, additional effort will be needed, as this requires changes to the COS flight software (FSW).
Products	Updated NUV imaging WCA-to-SA offsets, NUV & FUV Spectroscopic WCA-to-PSA offsets and summary in the end of cycle ISR.
Accuracy Goals	Imaging WCA-to-SA offsets need to be known to better than 0.5 NUV pixels in both dispersion and cross-dispersion (XD). Spectroscopic WCA-to-PSA offsets to 0.5 XD pixel.
Scheduling & Special Requirements	Should be executed annually and after each COS SIAF adjustment.
Changes from Cycle 22	No major change. Minor tweaks to order exposures and increase observing efficiency. High priority FUV WCA-to-PSA offsets moved from BOA+MIRRORB visit to BOA+MIRRORA visit, as BOA+MIRRORA ACQ/IMAGES are slightly more accurate than BOA+MIRRORB ACQ/IMAGEs (due to overlap of MIRRORB images.)

COS NUV Spectroscopic Sensitivity Monitor
PI: Jo Taylor

Purpose	Monitor sensitivity of each NUV grating mode to detect any change due to contamination or other causes. The NUV gratings on COS degrade with a rate that has been steady since the start of on-orbit operations, with the bare-Aluminum grating degrading at a faster rate (~3 and 11%/yr) than the MgF_2 coated gratings (~0%/yr). Additionally, track the time dependence of the sensitivity as a function of wavelength.
Description	Obtain exposures in all NUV gratings – G230L (target: WD1057+719), G185M, G225M, and G285M (target: G191B2B) – 2 times a year. We will monitor the following modes: G230L/2635, G230L/2950, G185M/1786, G185M/1921, G225M/2186, G285M/2617, and G285M/3094. These central wavelengths constitute the reddest and bluest central wavelengths containing only first order light with the exception of the G225M. In Cycle 23, we continue monitoring these specific cenwaves to verify that the overall trends remain unchanged.
Fraction GO/GTO Programs Supported	15% of COS exposure time
Resources Required: Observations	4 external orbits with 2 visits of 2 orbits each.
Resources Required: Analysis	5 FTE weeks
Products	Time-Dependent Sensitivity Reference File and a summary in the end of cycle ISR. As permitted by resources and data quality: add wavelength dependence to TDS reference files
Accuracy Goals	Characterize evolution of TDS within 2% .
Scheduling & Special Requirements	Observe at 6 month intervals.
Changes from Cycle 22	No changes.

COS NUV TDS Trends



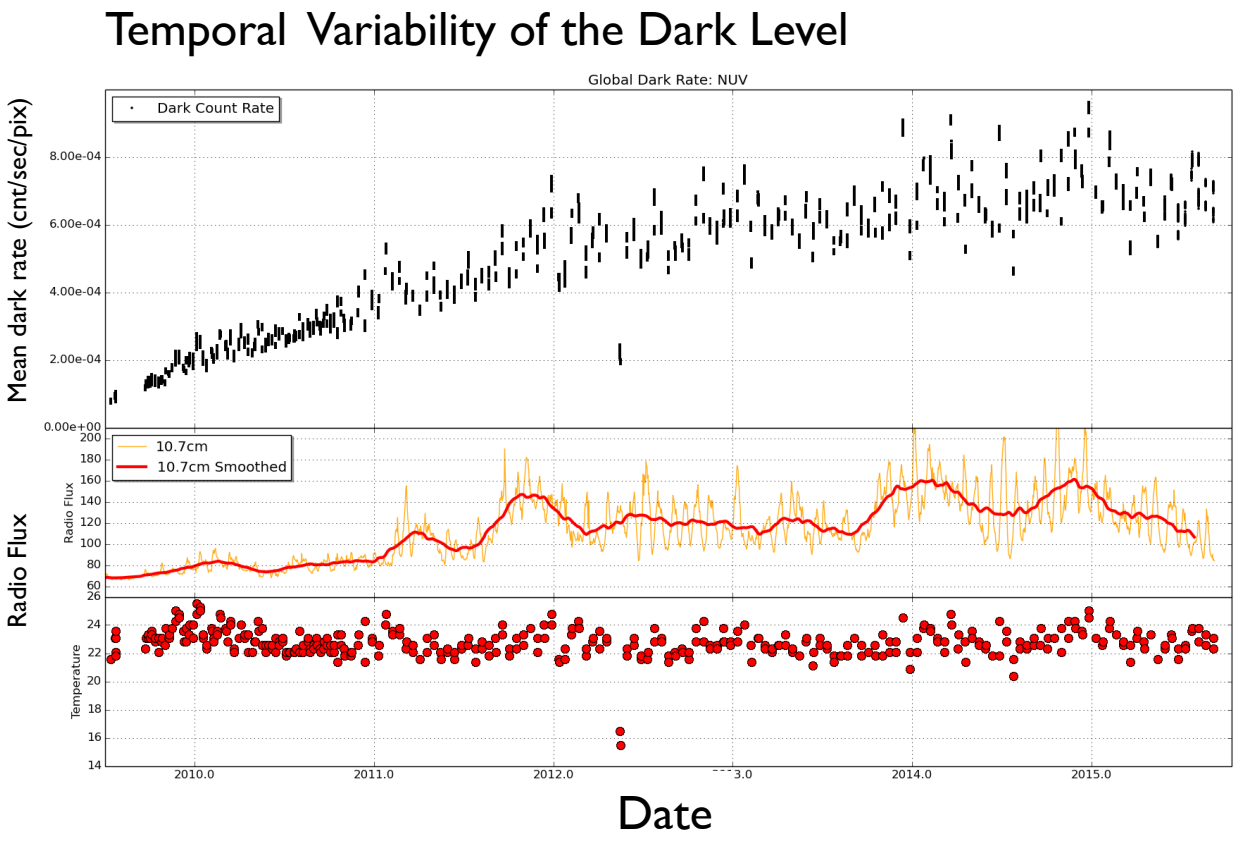
NUV TDS monitoring:

- Wavelength independent but grating dependent
- Stable and linear since SM4

COS NUV Detector Dark Monitor
PI: Justin Ely

Purpose	Perform routine monitoring of the MAMA detector dark current. 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 developing detector problem.
Description	Monitor the NUV detector dark rate by taking TIME-TAG science exposures without illuminating the detector. Twice every other 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 occultation. All orbits < 1800s.
Fraction GO/GTO Programs Supported	15% of COS total exposure time.
Resources Required: Observations	52 internal orbits. All orbits < 1800s.
Resources Required: Analysis	4 FTE weeks
Products	Provide ETC and IHB dark rate estimates, along with weekly monitoring for changes and a summary in the end of cycle ISR. As allowed by resources and necessitated by data quality: update bad-pixel tables. Update monitor webpage
Accuracy Goals	30%
Scheduling & Special Requirements	Twice every other week, in Earth occultation
Changes from Cycle 22	No changes.

COS NUV Dark Trends



COS NUV dark monitoring:

- Dark rate trend shows approximately linear increase with time, flattening since ~2012
- Dark rate variability decreases as the radio flux from the Sun decreases (decreased solar activity)

COS NUV Internal to External Wavelength Scale Monitor
PI: Paule Sonnentrucker

Purpose	This program monitors the offsets between the wavelength scale set by the internal wavecal versus that defined by absorption lines in external target HD6655 obtained with the PSA.
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 dependency, this program observes some cenwaves at different FP-POS. Failure Investigation for V02 of C21 and C22 program revealed chronic issues with GS in this field of view and demonstrated that verification can be done with 2 epochs alone.
Fraction GO/GTO Programs Supported	15 % of COS total exposure time.
Resources Required: Observations	2 external orbits with 2 visits of 1 orbit each
Resources Required: Analysis	3 FTE weeks
Products	Update to wavelength dispersion reference file as needed, ISR, and a summary in the end of cycle ISR.
Accuracy Goals	G230L 175km/s, 2.0-3.7 pixels G185M 15km/s, 1.7-2.4 pixels G225M 15km/s, 2.3-3.2 pixels G285M 15km/s, 2.3-3.5 pixels
Scheduling & Special Requirements	2 external orbit every 6 months. BETWEEN are added to take data within 2 visibility periods with known, good GS.
Changes from Cycle 22	Reduced by 1 external orbit. Optimized TA strategy to mitigate GS issues in the field since accurate target centering is critical to this program. Verification can be performed with 2 external visits alone.

COS NUV MAMA Fold Distribution
PI: Thomas Wheeler

Purpose	The fold analysis provides a measurement of the distribution of charge cloud sizes incident upon the anode providing some measure of changes in the pulse-height distribution of the MCP and, therefore, MCP gain.
Description	While globally 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.
Fraction GO/GTO Programs Supported	~50% of COS (includes COS/FUV programs with NUV TA acquisitions)
Resources Required: Observations	1 internal orbit
Resources Required: Analysis	0.5 FTE day.
Products	The results are sent to the COS Team and V. Argabright (Ball Aerospace)
Accuracy Goals	5% accuracy on the peak position of the fold distribution
Scheduling & Special Requirements	This proposal is executed annually.
Changes from Cycle 22	No change.

Contingency Programs

COS FUV Detector Recovery after Anomalous Shutdown
PI: Thomas Wheeler

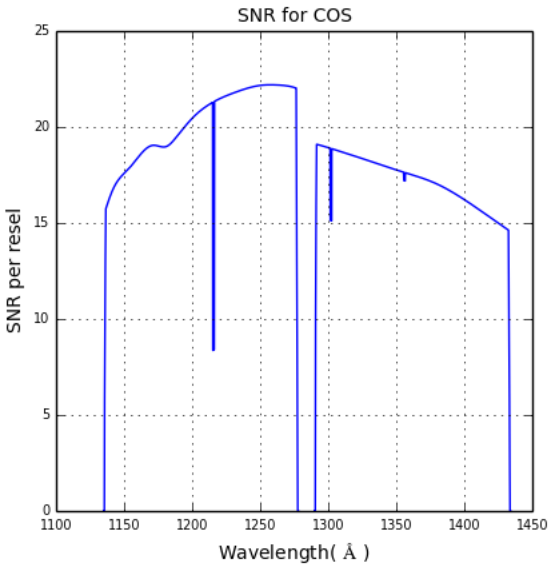
Purpose	The safe and orderly turn-on and ramping-up the COS FUV high voltage in a conservative manner after a HV anomalous shutdown.
Description	Day 01 activities, visits 01-07, contain both QE grid off and on HV ramping to HVLow (100/100) with diagnostics (DCE dumps) and darks to exclude QE grid involvement in the shutdown. Subsequent to day 01, all HV rampings, diagnostics and darks will be with the QE grid on. The HV commanded values for the subsequent days are: 154/151, 160/157, 167,163, etc. until the desired HV is obtained.
Fraction GO/GTO Programs Supported	84% of COS exposure time
Resources Required: Observations	17 internal orbits
Resources Required: Analysis	If activated, 0.5 FTE day per test.
Products	After thorough data analysis for each test day, a Go/No-Go to proceed will be given.
Accuracy Goals	
Scheduling & Special Requirements	This is a contingency proposal activated only in the event of an anomalous shutdown.
Changes from Cycle 22	No changes.

COS NUV Detector Recovery after Anomalous Shutdown
PI: Thomas Wheeler

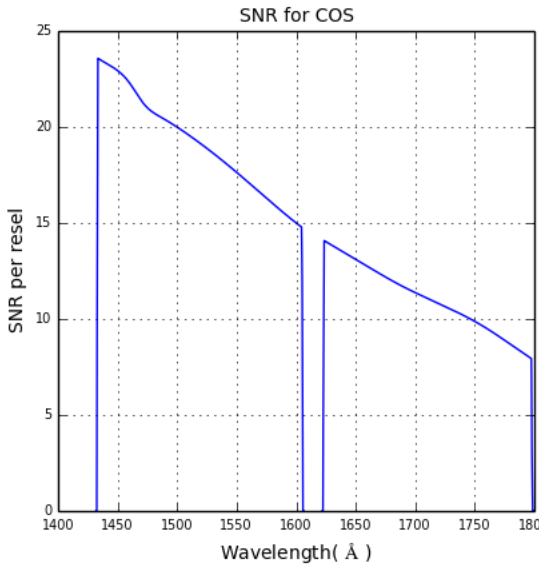
Purpose	The safe and orderly recovery of the NUV-MAMA detector after an anomalous shutdown.
Description	The recovery procedure consists of four separate tests (i.e. visits) to check the MAMA's health after an anomalous shutdown. Each must be successfully completed before proceeding onto the next. They are: (1) signal processing electronics check, (2) slow, intermediate voltage high-voltage ramp-up, (3) ramp-up to full operating voltage, and (4) fold analysis test.
Fraction GO/GTO Programs Supported	17% of COS exposure time
Resources Required: Observations	4 internal orbits
Resources Required: Analysis	If activated, 0.5 FTE day per visit.
Products	For tests 1-3, only a Go/No-Go to proceed will be given. For test 4, the results will be sent to the COS/STIS Team and V. Argabright.
Accuracy Goals	
Scheduling & Special Requirements	This is a contingency proposal activated only in the event of an anomalous shutdown.
Changes from Cycle 22	No changes.

Back-up Slides

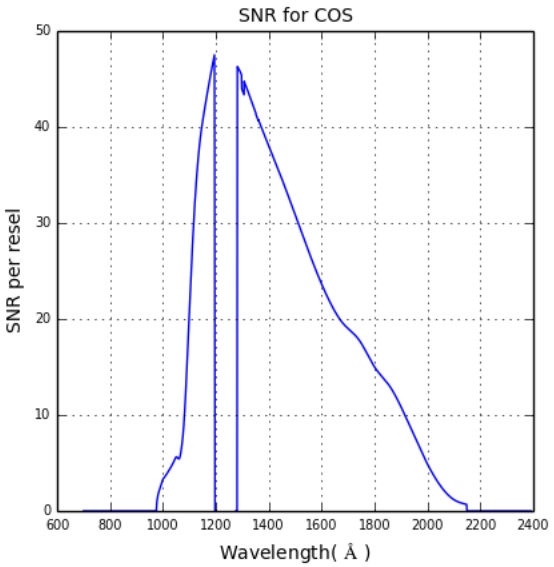
FUV TDS Monitor Program S/N Requirements



G130M/1291 S/N
(COS.sp.395841)



G160M/1623 S/N
(COS.sp.395848)



G140L/1280 S/N
(COS.sp.395854)

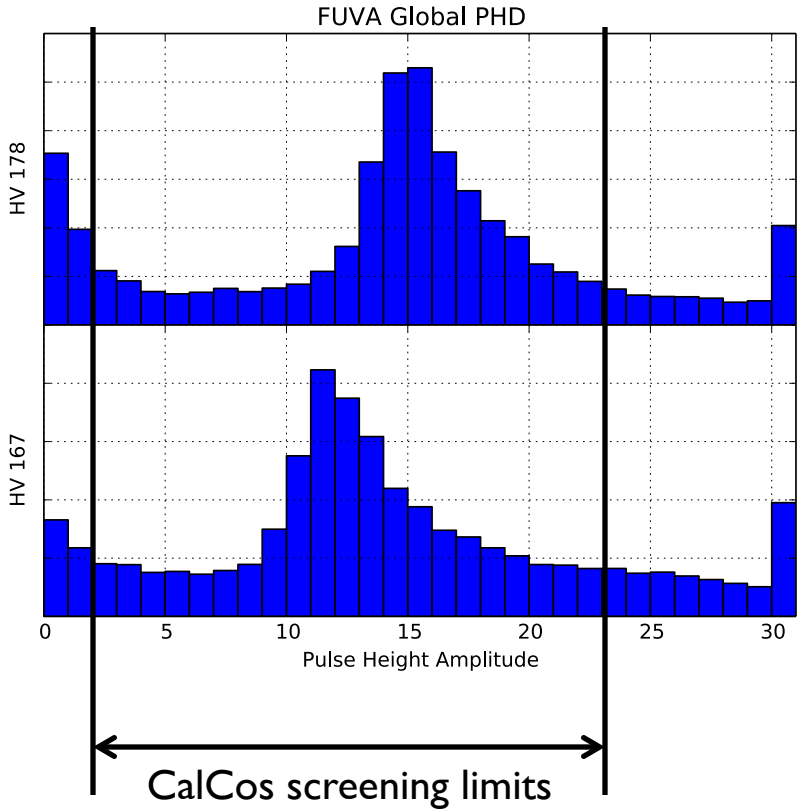
COS FUV Dark Monitoring Strategy

- COS FUV background subtraction performed by pipeline, using regions adjacent to spectrum to estimate dark rate
- As gain sags in region where spectrum falls, background in regions adjacent to spectrum is not accurate representation of dark rate under spectrum
- Not an issue for bright sources, but impacts background limited observations
- Community working in the background-limited regime uses COS darks to build master dark and use it to optimize background subtraction from their data. In order to reach an accuracy of 1%, 3 months of darks are needed at a rate of 5 darks per week => master darks build with only 3 months of data do not allow 1% accuracy to be reached as gain changes on larger time scales

COS FUV Dark Monitoring Strategy (continued)

- 5x/week cadence cumulated over 2-3 months allows one to reach 1% accuracy on dark level as a function of detector location
- Actively requested by community to enable background limited science optimization
- Pulse Hight Distribution (PHD) and (likely) 2D structure impacted by HV change → need to monitor Darks at 2 different HV (standard modes & G130M/1222)

Impact of HV change on Dark PHD



Temporal variability of the Dark level