Cycle 15/16 Calibration Plan

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William B. Sparks
Instruments Division, STScI

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Special Considerations for Cycle 15/16

- Cycle 15 calibration plan is to cover Cycles 15 and 16 up to SM4; 6 mo C16 assumed (Agreed by HSTMO, SPD, DO)
- WFPC2 must be closed out at the time of the Servicing Mission. Hence this represents the final opportunity to acquire calibration observations for that instrument. Biretta to present.
- Post- SM4 anticipate much reduced useage of NICMOS as primary IR instrument, hence develop augmented calibration plan. Noll/Pirzkal to present.
- Teams requested to consider calibrations generic to multiple instruments, such as faint standards, or which might cross instrument boundaries, e.g. NICMOS non-linearity.
- Are there any forward-looking calibrations needed for WFC3/COS or JWST at this stage?
- As always, teams asked to be prudent in use of both external and internal orbits.

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Usage by Instrument Cycle 15

Instruments	Mode	Requested Orbits	%	Approved	%	
ACS/HRC	Imaging	1813	9.2	543		
ACS/HRC	Spectroscopy	111	0.6	21		
ACS/SBC	Imaging	532	2.7	273		
ACS/SBC	Spectroscopy	237	1.2	66	55.1	
ACS/WFC	Imaging	9706	49.2	2249		
ACS/WFC	Spectroscopy	64	0.3	24		
FGS	POS	219	1.1	49		
FGS	TRANS	29	0.1	25	1.3	
NIC1	Imaging	459	2.3	186		
NIC2	Imaging	2002	10.1	727	24.2	
NIC3	Imaging	1995	10.1	485		
NIC3	Spectroscopy	168	0.9	48		
WFPC2	Imaging	2405	12.2	1073	18.6	
		19740*		5769*		

* Includes Coordinated Parallels

Imaging 96.0% Spectroscopy 2.7% FGS 1.3%

Excludes Pure Parallel and Snapshot programs

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Cycle 15 request overview: context in red below

	Nominal	External actual	Internal/par actual
ACS	144	68	1665
NICMOS	63	134	36
WFPC2	48	84	1380
Astrometry/focus	3	34	
FGS	N/A	14	
HST/JWST	N/A	4	
Outsourcing	N/A	9	
Total	262	**347+35=382** **(7%, 12mo 255)** **C14: 177** **C13: 164** **C12: 289** **C11: 407**	

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Overview

- Calibration proposals from
  - FGS (Nelan)
  - Telescope (Lallo)
  - ACS (Gilliland)
  - NICMOS (Pirzkal)
  - WFPC2 (Biretta)
  - JWST standards (Kriss)
  - Outsourced

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Calibration outsourcing programs

- 10839
- Dan Batcheldor
- The NICMOS Polarimetric Calibration 9 orbits
- 10943
- John Clarke
- Flat Field Calibration of ACS and STIS UV Images
- 10953
- David Finley
- Absolute Spectrophotometric Calibration to 1% from the FUV through the near-IR
- 10964
- Richard Massey
- Correcting effects of Charge Transfer Inefficiency in the ACS Wide Field Camera
- 10981
- Laurence Trafton
- Continuum and Monochromatic L-Flats for the ACS Ramp Filters

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Backup material follows

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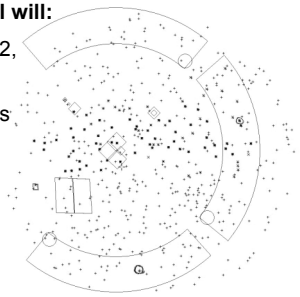
HST Focal Plane Calibration *(& ACS Absolute Scale)*

- **Will determine current values for the V2,V3 locations and orientations of the FGSs & SIs, to update calibrations for such. Secondarily, will support JWST calibration requirements by obtaining high accuracy determination of ACS/WFC absolute scale.**
  - uses 15 orbits (4 per FGS, 1 for ACS scale, and 2 for SIs)
  - observes a well-studied astrometric open cluster (M35) with positions of targets and guidestars known from ground to between 10 & 20 mas.
  - utilizes a subset of cluster members having relative positions known to <1 mas from FGS distortion calibrations over HST mission life.
  - will determine SI & FGS locations to < 30 mas & WFC absolute scale to ~ 1 part in 2.5×10^5
- **Improving & consistently maintaining the HST focal plane cal will:**
  - immediately realize the improved astrometry offered by GSC2, which would become the dominant error source
  - enable blind pointing accuracies beneficial to COS operations
  - increase repeatability of science pointings and reduce dependence on roll & dominant FGS.
  - calibrate trending positions of SIs and FGSs



FGS Cycle 15 Calibration Plan

ID	Proposal Title	Frequency	Estimated Time (orbits)		Scheduling Required	Resources Required (FTE)	Products	Accuracy Required	Notes
			"External"	"Internal"					
Routine Monitoring Programs									
01	Long Term Monitoring of FGS1r in Position Mode	~Every 2 months	6		Sep, Oct, Dec, 06, Sep, Oct, Dec, 07	0.05	Calibration & Alignment Parameters	<1 mas over FGS1r FOV	Observations of M35 from this proposal will maintain FGS1r's astrometric performance at the sub-mas level. Slow changes in distortion and scale are calibrated away.
02	Monitoring FGS1r's Interferometric Response as a Function of Spectral Color.	twice each target	8		mid-cycle	0.05	Update B-V Library of FGS1r Interferograms	S/N ~ 500	This test monitors the S-curve library of B-V standards needed to support the GO program for both the F5ND attenuator and the F583W filter. The data will **also** be used to calibrate/monitor critical items required for POS mode astrometrty (POS/TRANS bias, cross-filter, and lateral color effects.)
Special Calibration Programs									
	10% contingency reserve		1						
	TOTAL TIME (including all executions)		**15**			**0.1**			

ACS Cycle 14 Calibration Status

ID	Proposal Title	Frequency	Time (orbits)		Scheduling Required	Resources Required (FTE)	Products	Accuracy Required	Notes
			External	Internal					
Routine Monitoring Programs									
10729 ✓	CCD Daily Monitor	4/week	0	840	Periodic	0.4	Ref files		Cont. dark, bias creation
10730	External CTE Monitor	6 months	9	0	Spring 06	0.3	ISR	1%	Calibration of CTE losses
10732 ✓	Internal CTE Monitor	yearly	0	35	April 06	0.1	ISR	1%	Matches to ground testing
10733 ✓	CCD Hot Pixel Annealing	4 weeks	0	143		0.2	Ref		Includes monthly CTE
10736	UV Contamination Monitor	6 months	4	2		0.3	ISR,Ref	1%	SBC, HRC tracking
10737	CCD Stability Monitor	quarterly	13	0		0.6	ISR,Ref	1%	L-flat, Distortion, Photometry
10739	Internal Flat Fields	4 months	0	44		0.2	ISR,Ref	<1%	SBC components once
10738 ✓	Earth Flats	weekly	0	52		0.1	ISR,Ref	<1%	Tracks coronographic spot
10734 ✓	CCD Post-Flash Verification	yearly	0	4	May 2006	0.05	ISR		Tracks capability only
10740	Photo- Spectrophot Abs. Cal	yearly	7	0		0.3	ISR	<1%	Filter throughputs, QE
10735 ✓	SBC MAMA Recovery	as needed	0	4		0.01	TIR	N.A.	After irregular safing
Special Calibration Programs									
10741	Continuum L-Flats -- Ramps	1	3	0		0.4	ISR,Ref	1%	Basic cal of flats
10742	Ramp, Grism Wavelengths	1	4	0		0.3	ISR,Ref	2%	Responds to failed early cal
10731 ✓	UV, Narrow-band Red Leak	1	2	0		0.1	ISR	<10%	Responds to failed early cal
10743	Improved Wavelengths SBC Prism	1	2	2	Early	ST-ECF	ISR	<0.5 pixel	Two QSOs to cover 1400-1800A
10722	Geometric Dist. for SBC	1	6	4	Early	0.5	ISR,Ref	0.1, 0.5 pix	Basic cal of geometric dist.
10771 ✓	CTE & QE with Temperature	1	12	12	Early	0.3	ISR	1%	ASCS Support Test
Total Time (all executions)			**62**	**1142**		**4.2**			
With 10% added contingency orbits:			**67**	**1253**		**4.5**			All ext used July-Sept.

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ACS Cycle 15 Calibration Plan

PI	Proposal Title	Frequency	Time (orbits)		Scheduling Required	Resources Required (FTE)	Products	Accuracy Required	Notes
			External	Internal					
Routine Monitoring Programs									
Sirianni	CCD Daily Monitor	4/week	0	1240	Periodic	0.65	Ref files		Dark, bias creation
Chiaberge	External CTE Monitor	yearly	30	0	Feb 07, 08	0.75	ISR	1%	Calibration of CTE losses
Mutchler	Internal CTE Monitor	yearly	0	70	Nov 06, 07	0.25	ISR	1%	Matches to ground testing
Cox	CCD Hot Pixel Annealing	4 weeks	0	214		0.25	Ref		Includes monthly CTE
Gilliland	UV Contamination Monitor	6 months	4	3		0.2	ISR,Ref	1%	SBC, HRC tracking
Mack	CCD Stability Monitor	quarterly	21	0		0.9	ISR,Ref	1%	L-flat, Distortion, Photometry
Bohlin	Internal Flat Fields	yearly	0	32	Dec 06, 07	0.2	ISR,Ref	<1%	Track flat field changes
Bohlin	Earth Flats	weekly	0	78		0.15	ISR,Ref	<1%	Tracks coronographic spot
Cox	CCD Post-Flash Verification	yearly	0	8	Nov 06, 07	0.05	ISR		Tracks capability only
Bohlin	Photo- Spectrophot Abs. Cal	yearly	8	0		0.5	ISR	<1%	Filter throughputs, QE
Cox	SBC MAMA Recovery	as needed	0	4		0.01	TIR	N.A.	After irregular safing
Special Calibration Programs									
Proffitt	Color dependent SBC flats	1	2	2		0.1	ISR	5%	Saturn with dithering
Cox	SBC Darks (work with NICMOS)	1	0	12		0.1	ISR,Ref	10%	Determine dark with long visit
Walsh	Improved Sensitivity SBC Prisms	1	3	2		N/A	ISR,Ref	10%	Quantify QE beyond 2000 Å
Total Time (all executions)			**68**	**1665**		**4.1**			
With 10% added contingency orbits:			**75**	**1832**		**4.5**			

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HST Calibrations for JWST: Cycle 15 Proposal

- A-star spectrophotometric observations:
  - 4 more stars (4 orbits) doubles the sample size.
  - Current greatest uncertainty is extrapolating models to longer wavelengths for 2—5 μm NIRSpec calibration and 5—25 μ m MIRI calibration.
  - Additional stars will probe and reduce modeling-related errors.
- Request 4 orbits of NICMOS grism observations.

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