

Hubble Science Operations Status

Rodger Doxsey
18 November 2004

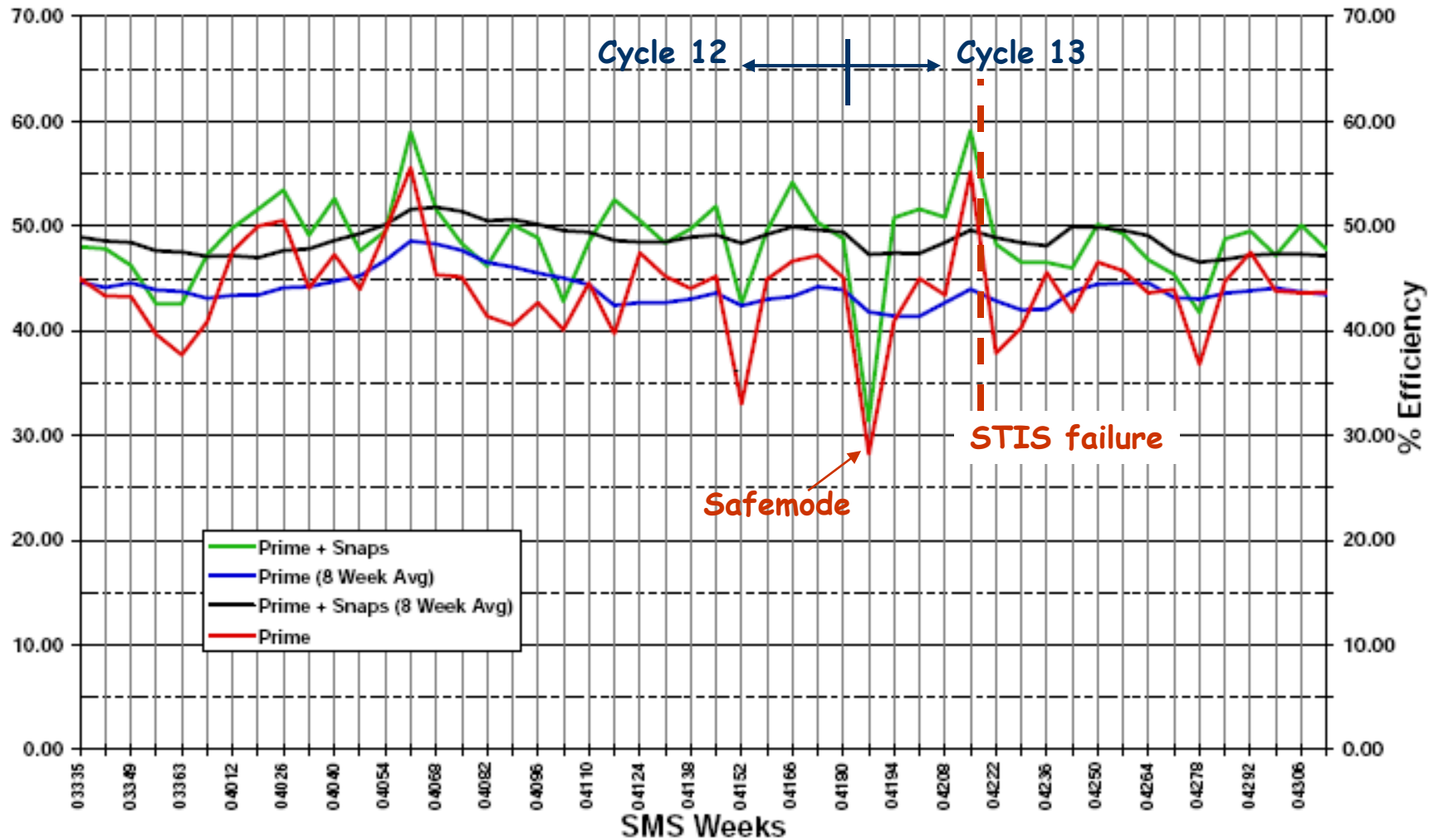
Topics

- Status of Cycle 12/13 Observing Programs
- Data Processing System status
- HST Lifetime enhancements
 - ◆ Two Gyro Development status
 - ◆ Others
- Instrument status
 - ◆ WFC3
 - ◆ COS
 - ◆ ACS/WFPC2
 - ◆ NICMOS
- STIS Close-out planning (Paul Goudfrooij)

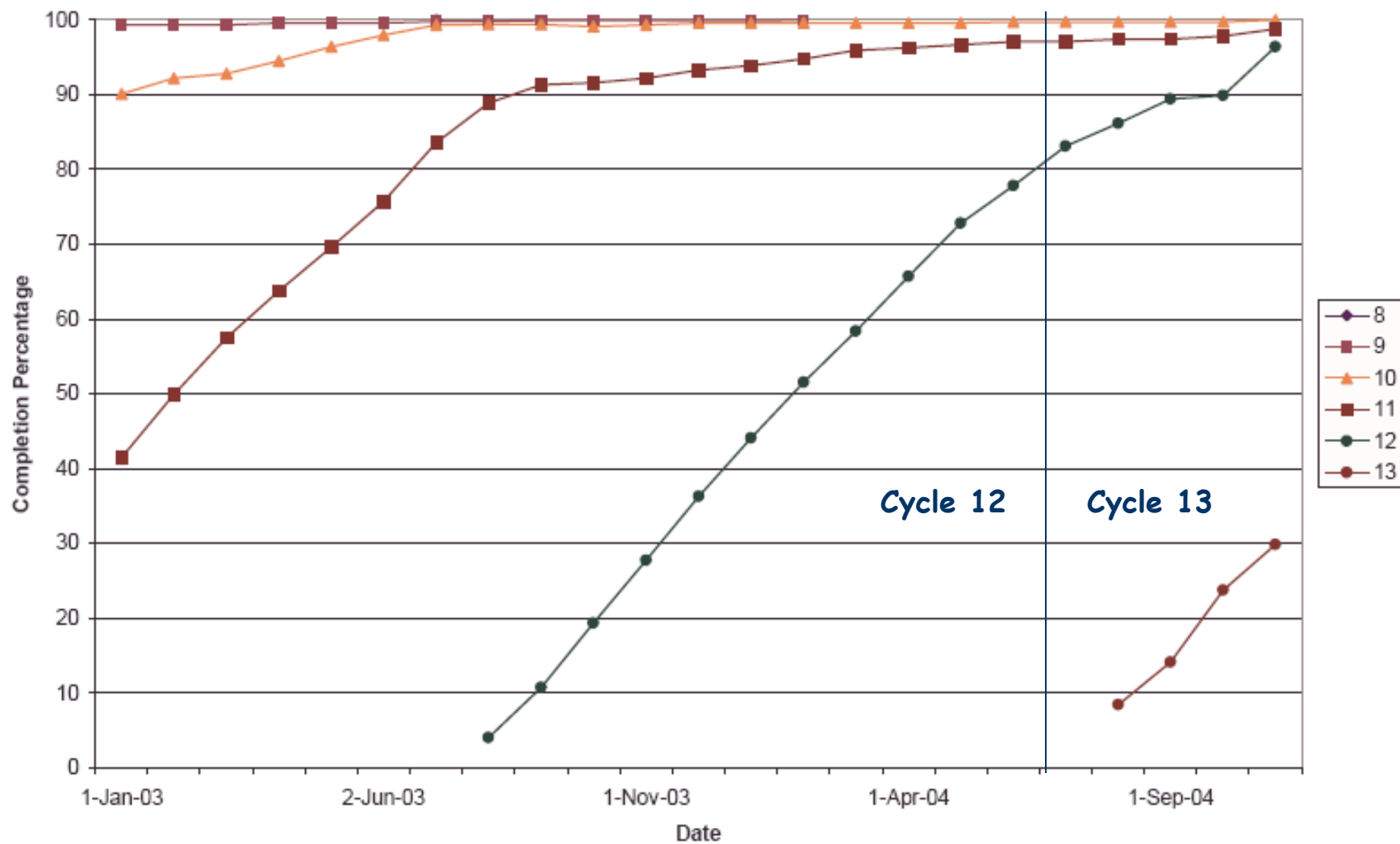
Status of Cycle 12/13 Observing Programs

Spacecraft Time Scheduling Efficiency

SMS 03335-04313 (as of 11/03/04)



Active Cycle GO Completion



Status of replacement programs

- Expecting Phase II's for 25 replacement submissions for previously accepted STIS programs
 - ◆ 22 have been received and are being processed
- Expecting 45 Phase II's for replacement programs
 - ◆ All 45 have been received and are being processed
 - ◆ A few orbits have already been executed
- Long Range Plan for Cycle 13 being re-developed incorporating replacement programs
 - ◆ Going well, should be done by end of November

Cycle 13 Large/Treasury Programs

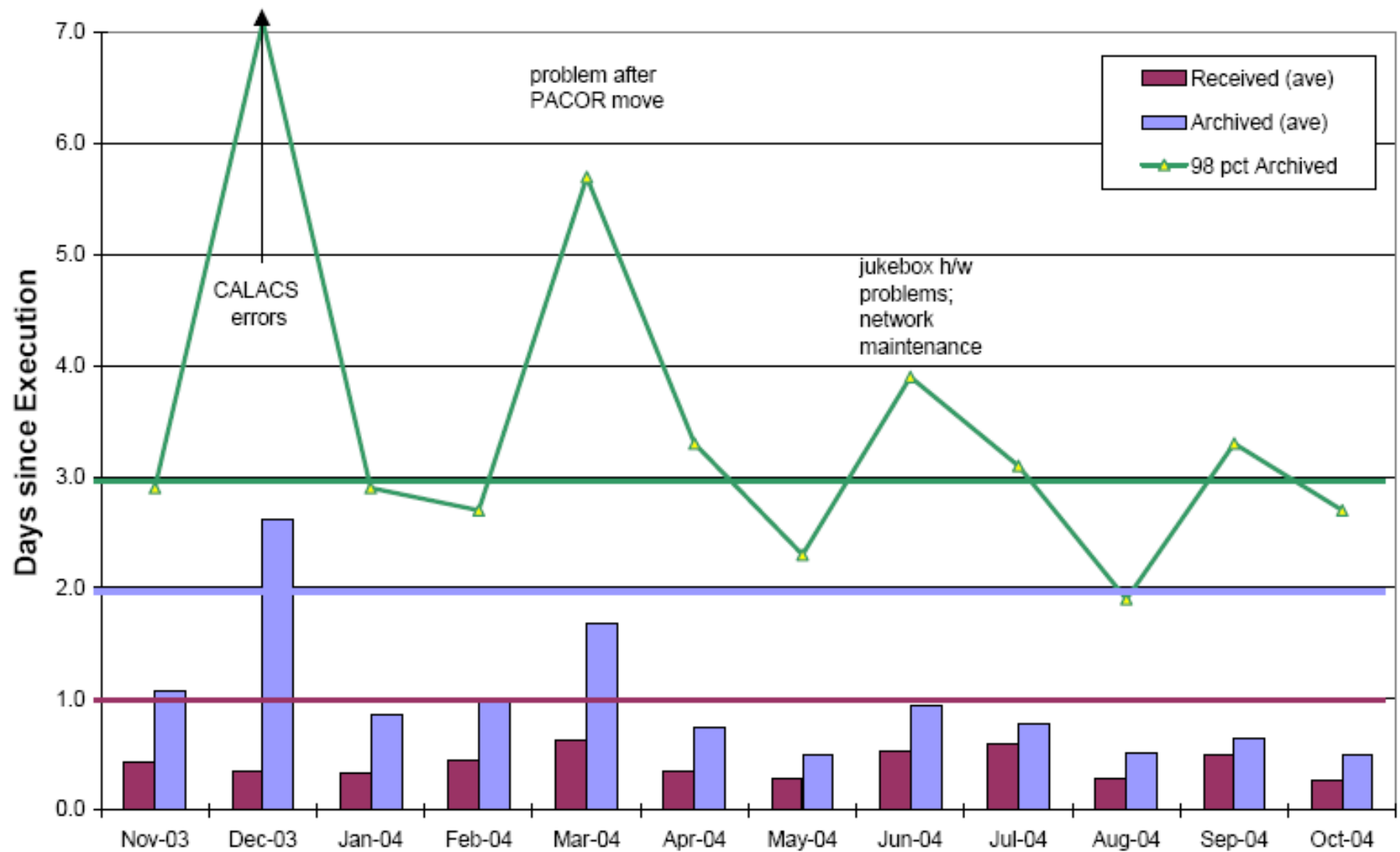
Proposal	Title	PI	Executed orbits	Allocated orbits	Comments
10092	COSMOS	Scoville	152	320	Cycle 12 TAC
10134	Groth Strip	Davis	80	126	
10135	GRBs	Kulkarni	20	55	
10176	Corona. Survey	Song	53	116	
10182	Type 1a SNs	Filippenko	42	152	
10189	PANS ToO	Reiss	43	105	
10339	PANS North	Reiss	15	90	
10340	PANS South	Reiss	51	75	
10226	NICMOS Grism	Malkan	68	280	parallel
10246	Orion Nebula	Robberto	36	104	
10265	Andromeda	Brown	54	107	
10403	UV UDF	Teplitz	0	62	supplemental
10424	NGC6397	Richer	0	126	supplemental
10429	Shapley SC	Blakeslee	0	114	supplemental

Data Processing Systems Status

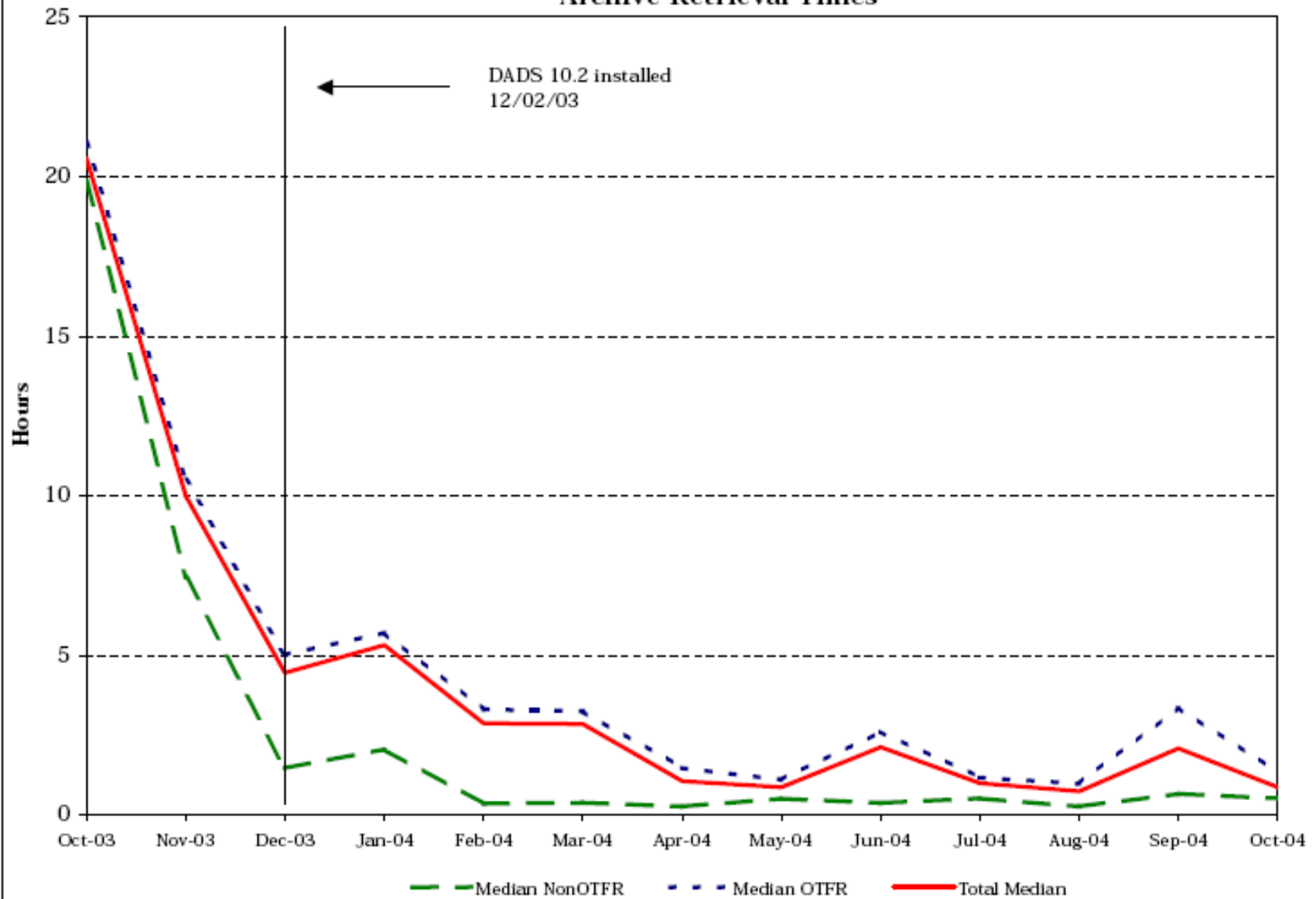
Recent Data Processing System Improvements

- New Archive Ingest system installed June 2
 - ◆ Removes artificial boundary between OPUS pipeline and Archive
 - ◆ Removes VMS systems from input side of the Archive
- Upgraded to 64 bit compiler on June 21
- Tuned the EMC disk system over the summer
- Multidrizzle installed in ACS pipeline Sept. 22
 - ◆ Extra compute load is well within system capacity

Availability of HST Science Data



Archive Retrieval Times



HST Lifetime Enhancements

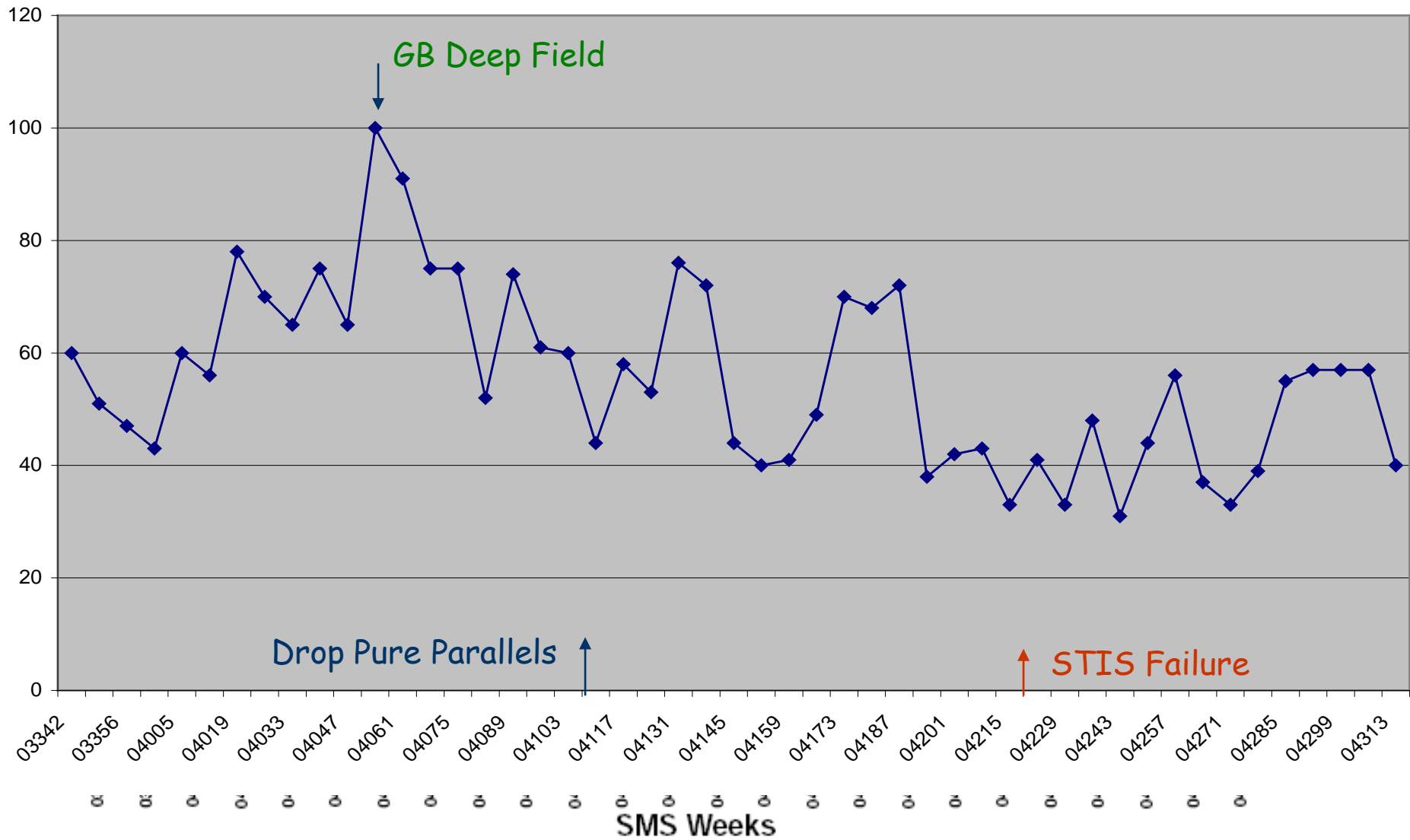
Support for Two Gyro Mode

- Short-term Scheduling systems updated for basic capabilities (Phase A)
 - ◆ Readiness review held November 5
 - ◆ Systems will be used for flight test in February
- Long-term Scheduling systems being updated to support full use of Two Gyro mode in Cycle 14
 - ◆ APT (Two gyro proposal processing)
 - ◆ SPIKE (for Long Range Plan)
- Two Gyro Handbook and Website up and running

Other Lifetime extension activities

- Transmitter utilization
 - ◆ Dropped default pure parallels in April
 - ◆ Replacing STIS with ACS will increase data volume
- ACS side switch preparations
 - ◆ Lessons from STIS power supply failure
 - ◆ Be ready for a quick switch to Side 2, when needed
- NICMOS/NCS power utilization
 - ◆ Investigating possibility of reducing nighttime load on batteries
- Collaborating with systems management and engineering staff at GSFC on many others

Transmitter cycles



Instrument Status

WFC3

- WFC3 successfully underwent thermal vacuum testing and calibration
 - ◆ Major milestone for WFC3 IPT
- WFC3 SOC met last week
 - ◆ Robotic servicing presentation well received
 - ◆ Concurrence with Science IPT priorities
 - ◆ Written report expected in a few weeks
- Planning on modifications to WFC3 for robotic servicing underway
 - ◆ Largest impact is adding gyros to WFC3
 - ◆ Looking at other changes to simplify robotic installation tasks

Thermal Vac Test Configuration

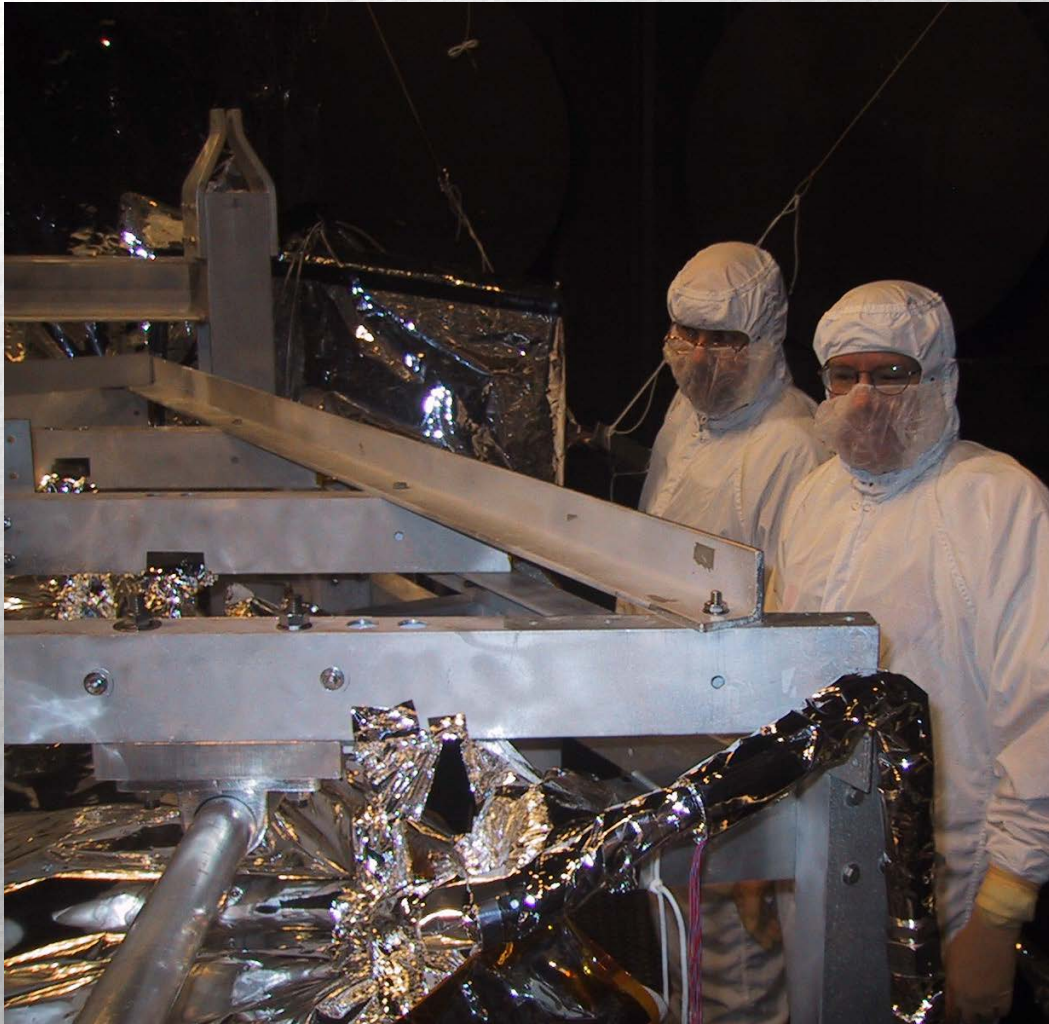
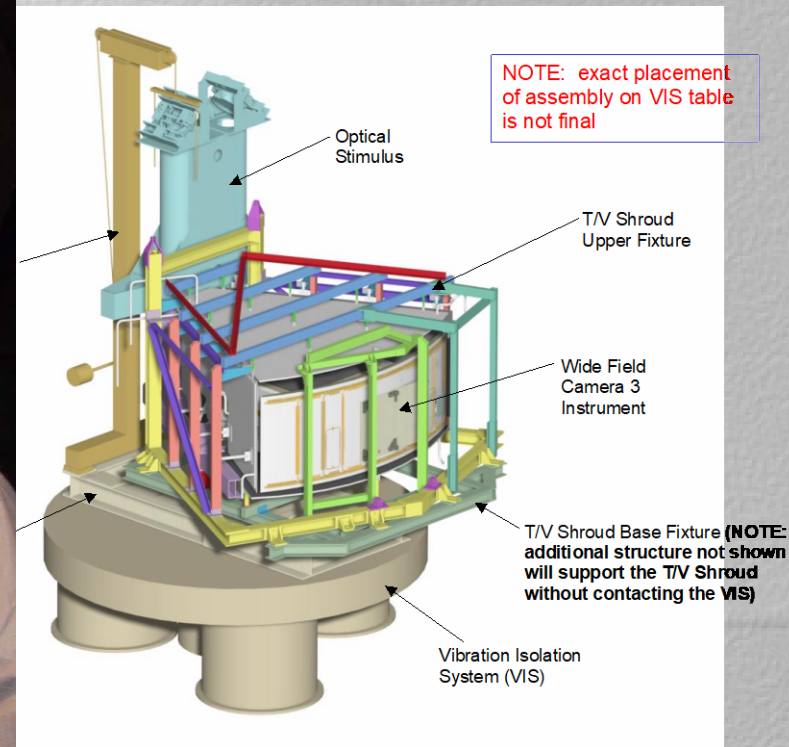


Photo by John MacKenty



Randy Kimble and
Howard Bushouse during
final instrument
inspection



Operations Support:

Mike Robinson
Tom Wheeler

- 24/7 STScI Support for Test execution and Quicklook analysis.

Scientists:

- ◆ John MacKenty
- ◆ Howard Bushouse (ICAL lead)
- ◆ Neill Reid (ICAL Project Scientist)
- ◆ Sylvia Baggett
- ◆ Wayne Baggett
- ◆ Tom Brown
- ◆ George Hartig
- ◆ Olivia Lupie
- ◆ Massimo Robberto

QuickLook Operators:

- ◆ Rosa Diaz-Miller
- ◆ Inge Heyer
- ◆ Bryan Hilbert
- ◆ Jessica Kim
- ◆ Marin Richardson
- ◆ Jeff Stys
- ◆ Misty Cracraft*
- ◆ Helene McLaughlin*
- ◆ Kevin Lindsay* (* new Hires)

WFC3 Thermal Vacuum Test #1

- WFC3 successfully completed its first System Level Thermal Vacuum test
 - ◆ Test ran from late August until ~10/18 (plan was 10/6)
 - ◆ Test focused on characterization of:
 - ◆ Optical performance and stability
 - ◆ Science performance of Infrared Channel (first real look at this)
 - ◆ Thermal performance of WFC3 (subject to gravity effects on heat pipes)
 - ◆ Test obtained
 - ◆ ~14,000 images (datasets)
 - ◆ Thermal and power profile information
- We have demonstrated that both the WFC3 Instrument and Team are functioning well

Positive Accomplishments

- WFC3 operations in realistic environment demonstrated
 - ◆ Instrument ops and flight software were excellent
 - ◆ Power margins are good
 - ◆ Thermal performance generally as expected
 - ◆ Good margin (3 degrees) on IR detector temperature
 - ◆ To limits of testing in gravity, heat pipes performing well
 - ◆ UVIS channel nominal performance (mostly same as ambient)
 - ◆ IR channel's first operation
 - ◆ Backgrounds better than expected from subsystem tests
 - Meet specs except perhaps at longest wavelengths (G141, F160W)
 - ◆ Image quality at or near specification
 - ◆ Filter ghosts/artifacts within specification
 - ◆ Detector noise and dark current as expected

Issues Uncovered

- Confirmed per-existing issues:
 - ◆ UVIS filter ghosts and CCD cross-talk unchanged from ambient test
- New science issues:
 - ◆ IR detector cross-talk
 - ◆ IR grisms badly out-of-focus (understood as 90deg rotation)
 - ◆ G141 and F160W have higher than expected backgrounds
 - ◆ G141 needs a red blocker
 - ◆ IR channel throughput analysis uncertain (15% deficit)
 - ◆ IR detector thermal control outside of specification (variation)
 - ◆ IR detector alignment transfer to instrument unsatisfactory
 - ◆ Image drift during thermal slews
 - ◆ Better than ACS before repair
 - ◆ Not to spec and perhaps not to current ACS level
 - ◆ Features in flat fields in F218W have grown (filter related)
 - ◆ Calibration system illumination patterns unacceptable (UVIS and IR)

WFC3 Path Forward

- WFC3 removed from SES chamber
 - ◆ Completed residual work on CASTLE alignment testing
 - ◆ Ambient check on alignments after WFC3 and CASTLE return to cleanroom
- Working schedule for compatibility with Robot Mission
 - ◆ Significant work to fix open liens (e.g. electronics redundancy)
 - ◆ On-going efforts to build improved filters for UVIS
 - ◆ Exploring replacement IR detector (2 prototypes delivered)
 - ◆ Radiation testing at UC Davis in December
 - ◆ Schedule driver is probably HST gyros (June 2006)
 - ◆ System Level Thermal Vacuum Test #2 in October 2006

COS SI Testing and Delivery

- SI formally delivered to HSTP in May
 - ◆ Alignment and NUV throughput testing pre- and post-ship
 - ◆ No effective alignment changes
 - ◆ Stored in clean room at GSFC
 - ◆ GSFC assumes responsibility for semi-annual functional testing after delivery
 - ◆ Next round of testing: late Nov 2004
 - ◆ All throughput data archived at STScI



STScI Support for COS

- Thermal-Vac Data Processing – Closed out topics from testing
 - ◆ Re-ingested T-V data with updated keywords
 - ◆ Initial Verification of CALCOS functionality for flatfielding, spectrum extraction, spectrum combination
 - ◆ Keyword dictionary prepared
- Documenting (TIR/ISRs) various situations
 - ◆ Cumulative Exposure Image (FUV/NUV) and Pulse-height map (FUV)
 - ◆ High Voltage transients in FUV detector and operational responses
 - ◆ FASTEX Standards Paper
- Deferred all SMGT, SMOV4, User Support effort
- Optic Select Mechanism drift will require re-work
 - ◆ Both thermal and mechanical components are present
 - ◆ No hardware amelioration planned
 - ◆ Must be corrected operationally to achieve design resolution in many cases

ACS Status

- All modes continue to operate well
- MultiDrizzle implemented in ACS pipeline
 - ◆ Works on associated data (exposures in a visit created with a recommended pattern or CR-SPLIT)
 - ◆ Produces cosmic-ray cleaned, combined, geometrically corrected output image
- New STSDAS standalone release planned for Nov 2004 (will work also for e.g. WFPC2)
- Further improvements planned for 2005
 - ◆ e.g., ability to automatically register images

ACS User Support

- Support provided for planning of 70 proposals:
 - ◆ 24 proposals switched from STIS
 - ◆ 11 use SBC
 - ◆ 15 use ACS prisms
 - ◆ 2 use ACS grism
 - ◆ 1 uses WFPC2
 - ◆ 39 newly accepted
 - ◆ 7 proposals accepted through Chandra TAC
- ACS SBC (FUV) and spectroscopic modes (grism/prisms) can take over some of the science from STIS
 - ◆ Will require some additional calibration

ACS Calibration

- Polarimetric Modes Characterized
 - ◆ I. Introduction and status (ISR 04-09; Biretta et al.)
 - ◆ II. The POLV filter angles (ISR 04-10; Biretta et al.)
 - ◆ III. Astrometry of polarized stars (ISR 04-11; Kozhurina-Platais et al.)
- SBC dark rate measured
 - ◆ ISR 04-14 (Cox)
- Amplifier Cross-Talk Characterized
 - ◆ I. Description of the effect (ISR 04-12; Giavalisco)
 - ◆ II. Using GAIN=2 to minimize the effect (ISR 04-13; Giavalisco)
- Geometric Distortion on HRC calibrated to 0.01 pixel
 - ◆ ISR 04-15 (Anderson & King)
- Coronagraphic Flatfield Methodology improved
 - ◆ ISR 04-16 (Krist et al)

WFPC2 Support & Calibration

- WFPC2 continues to be supported primarily through routine calibrations (dark, bias, UV contamination, ...) and user support
- New Instrument Handbook released for Cycle 14
- Accuracy of Photometric Zeropoints was studied
 - ◆ ISR 04-01: Heyer et al.
- Calibration plan for Cycle 13 prepared and being executed
- Time-varying geometric distortion solutions were delivered as reference files for use with MultiDrizzle

NICMOS Status

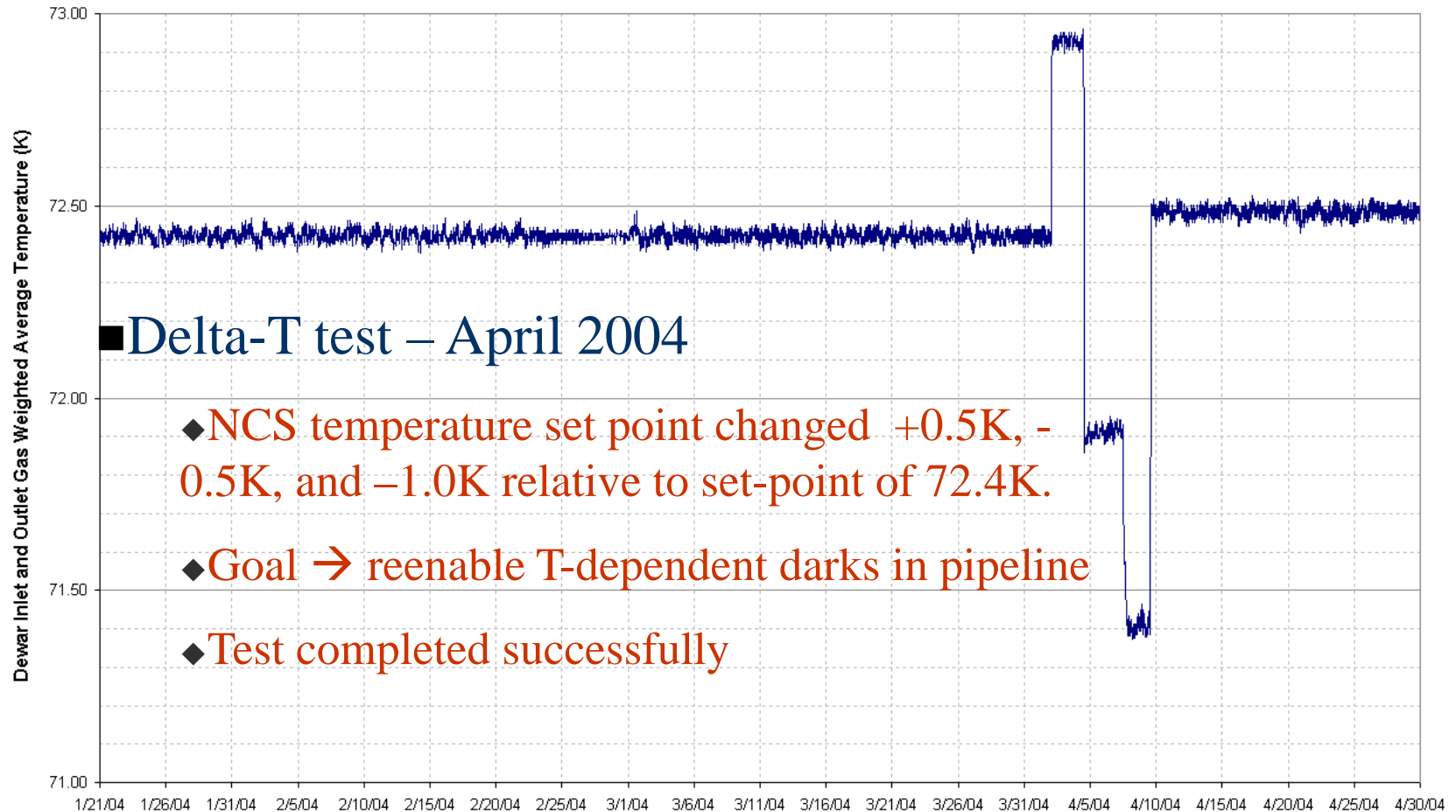
- NICMOS Ultra-Deep Field data products released
 - ◆ Identification of possible $z \sim 7$ source(s)
- Cycle 13 Calibration plans
 - ◆ Significant reduction in monitoring programs due to stability of NICMOS
 - ◆ Calibration/Science ratio reduced to less than 3% for NICMOS



NICMOS – Calibration

NICMOS Cryocooler Control Temperature

$MNRNCOLT * 0.4765625 + MNRNCILT * 0.5234375$



■ Delta-T test – April 2004

- ◆ NCS temperature set point changed +0.5K, -0.5K, and -1.0K relative to set-point of 72.4K.
- ◆ Goal → reenale T-dependent darks in pipeline
- ◆ Test completed successfully

NICMOS – User Support

- Cycle 13 (including STIS supplement)
 - ◆ 49 proposals accepted for cycle 13 use NICMOS
 - Prime science – 926 orbits
 - Parallels – 684 orbits
 - Snapshot – 146 orbits
 - ◆ Coronagraph will be heavily used – 195 orbits
 - ◆ Polarimetry – 45 orbits
 - ◆ Grism spectroscopy – 500 orbits (parallel)