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)

Cycle 12 → Cycle 13

Safemode
STIS failure
Active Cycle GO Completion

Completion Percentage

Date

Cycle 12

Cycle 13
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

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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

- Received (ave)
- Archived (ave)
- 98 pct Archived

Days since Execution

- CALACS errors
- Problem after PACOR move
- Jukebox h/w problems; network maintenance
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

GB Deep Field

Drop Pure Parallels

STIS Failure
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

Randy Kimble and Howard Bushouse during final instrument inspection

Photo by John MacKenty
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)

Operations Support:
Mike Robinson
Tom Wheeler
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

**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 → reenable 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)