Promises huge science gains for the community

- Two powerful new science instruments, COS & WFC3.
- Repairs to STIS & ACS
- Refurbished FGS
- Engineering improvements

If all goes to plan, Hubble will be at the peak of its power.

At STScI, we have plans well in-hand as we prepare for this exciting observing Cycle.
I will describe: Tests of our post-SM4 scheduling system; Preps for SM4 SI verification (SMOV4); training of staff for WFC3, COS & STIS; computing infrastructure upgrades; and GO preparations for Cycle 17.
ATLANTIS - the primary research vessel for Woods Hole Oceanographic Institute, from 1930 to 1966
GO schedule

Schedule:

- Cycle 17 CP release - 3 Dec 2007
  - includes CP, Primer, Handbooks, webs, GTO targets
- APT Phase I release January 7
- AAS meeting January 2008, includes HST Special Session on 1/8/08
- Deadline - 7 March 2008
- TAC meets - 12 - 16 May
- Notification Letters to GOs - 23 May
- Phase II GO and GTO deadline - 3 July
- LAUNCH - August 7
- SMOV - starts soon thereafter
- Cycle 17 observations by ~ November

SM4 Design Reference Mission

Purpose: demonstrate that the ground system functions on a representative sample of post-SM4 HST proposals in 3-Gyro mode

- 830 external orbits, from WFC3, ACS, NICMOS, STIS, COS and FGS
- Proposal creation & implementation
- Long Range Plan generation
- Weekly science schedule generation
- SMS generation
- Restricted to 07.260-07.330 – most visits schedulable over full time frame.
- Scheduled SNAPS and Parallels using normal process.
- Selected guide stars.
SM4 DRM Scheduling results

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<th>WF3</th>
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- Eight-week average: 83 orbits, 45.7% efficiency
- Recent (Cycle 12/13) 3-gyro average: 81 orbits, 48% efficiency
- Efficiency difference due to use of SAA-hiders during test period
SMOV 4

- A Servicing Mission Orbital Verification (SMOV) program is associated with each servicing mission, with goals
  - Timely recommissioning of the Observatory for science operations
    - Commission newly installed science instruments
    - Recommission existing science instruments
  - Re-commission Observatory systems for normal operations
  - Validation of other on-orbit replacements & installations
  - Early Release Observations
    - Demonstrate upgraded science capabilities to astronomical community and general public

- Example of the testing in SMOV, for Wide Field Camera 3
  - Engineering Verification
    - Boot, hold, operate, observe; On-board computer memory check; Operate science data buffer; Move mechanisms; Operate calibration lamps; Aliveness of detectors, cooling
  - Optical verification
    - Measure image quality; Pointing stability; Image ghosts and extended wings
  - Calibration
    - Plate scale, orientation, geometric distortion; Dark rate, read noise and CTE; Behavior through SAA monitored; Sensitivity vs wavelength; Flat field uniformity
SMOV 4

- Joint STScI/Project team
  - SMOV Leads
    - Biagetti/STScI, Burley/GSFC (SMOV Leads)
  - SI/Subsystem Leads
    - Mackenty/Turnbull (WFC3), Keyes (COS), Proffitt (STIS), Sahu/LSmith (ACS), Nelan (FGS), Lallo (OTA), Wiklind (NICMOS), DSMith/GSFC (PCS), Abel/GSFC (TCS), Noll (ERO), Krol/GSFC (EPS)

- SMOV Project Review = Oct. 12
  - Basic plan reviewed and approved by NASA Project

- Remaining schedule outline and milestones
  - Today through Aug 2008: SMOV Implementation Phase - Proposal generation/iteration; ERO program; Operations planning
  - Starting in June 2008: Start scheduling of proposals
  - In July 2008: GSFC Launch Readiness (FRR) &
    - STScI SM4/SMOV Readiness Review
  - 07 Aug 2008: SM4 Launch
  - 15 Aug 2008 to ~Dec 2008: SMOV4
  - Feb 2009: SMOV4 Closure Review
SMOV 4 Schedule

- Bright Earth Avoidance (BEA) period ends 21 days after Release
  - With some BE allowances in Weeks 2 & 3
- Proceed with commissioning of existing SIs while new ones out-gass
  - Use BEA period for SI/Subsystem engineering check
- FGS2R2 – Start commissioning prerequisites early using BEA-compatible targets and BEA allowances
  - Allows relief to FGS3 guiding asap
- STIS – Use BEA-compatible targets for early commissioning activities
- Start NCS early for NICMOS cool-down
  - 2-week cooldown assumed for planning purposes
- Commission new SIs after outgassing period
## SMOV 4 Resource estimates

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<thead>
<tr>
<th>SMOV ACTIVITIES</th>
<th>EXTERNAL ORBITS</th>
<th>INTERNAL ORBITS</th>
<th>PARALLE ORBITS</th>
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<td><strong>490</strong></td>
<td><strong>190</strong></td>
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</table>
SMOV 4 External orbits - very preliminary

POST-BEA EXTERNAL ORBITS

POST-BEA WEEK

ORBITS

PCS
NICMOS
STIS
ACS
COS
WFC3
SM4 Training exercise

- **Purpose** - develop and spread knowledge of the new instruments and remind ourselves about the to-be-repaired instruments
- **Aim** - is to have staff trained by spring 2008 so that we can operate the SM4 instruments safely, efficiently, and in an optimal scientific manner
- **Audience** - all staff directly involved in working on the science operations of the SM4 instruments
- **Format** - Various - hands-on, and bi-weekly round table discussion & lectures.
- **Syllabus** - Overview
  - For COS and WFC3, 3 lectures on Instrument Descriptions and Detectors, 2 Round-table discussions on Science Operations, and 2 talks on Instrument Calibration and typical Observing Plans
  - Plus - 2 general talks on Lessons already Learned, and Parallel observing in SM4.
  - Reduced length for STIS
- **Schedule** - STIS starting end-October, COS in November-December 2007, and WFC3 start January 2008, to be completed by Cycle 17 Phase 2 receipt.
SM4 Training exercise

• Syllabus details
  • Lecture (INS lead) - Instrument description - basics from Handbook
    • Optical path and layout, optical elements, FoVs & geometric distortion, science, instrument comparisons,
  • Lecture (INS lead) - Instrument description - details from Handbook
    • Filter anomalies, ghosts, red leaks, quad filters, use of special apertures
  • Lecture (INS lead) - Detectors
    • Types, how they work, read-out formats, quality issues, bad pixels, bright objects, CTE, lifetime issues, anomalies
  • Round Table discussions (INS, EOD, with commanding and TRANS)
    • science operations: patterns/sequences, read-outs, time-tag, dithers & multi-drizzle techniques, overheads, target acquisitions, SI reconfigurations,
    • operations - part two: CARD walk through, including CAL channel, safe-mode recoveries, SI reconfigurations
  • Talk on Instrument Calibration & SMOV
    • SI characterization; Calibration files & tables, final calibration products, any calibration concerns
  • Talk on typical observing planning
  • Talk on Lessons already Learned
    • Ground system testing, Thermal Vacs, SMGTs, SMOV prep
  • Round Table discussion on Parallels in Cycle 17
Computer Network upgrade at STScI

- Project goal is to provide a reliable, secure data storage environment for HST Mission information.
  - Reliable and timely backups is a major part of this goal.
  - Increased off-site storage and recovery.
  - Examples of HST Mission Information:
    - Calibration Reference Files
    - DA/IS intermediate processed data files
    - Data analysis scripts, test files, etc.
  - Increases in data volume had eroded existing decentralized model for data storage, data sharing, and backups.
    - The Institute’s data volume appears to double every 12-18 months.
    - The SM4 Instruments will add to this increase.
Network upgrade and central storage

Solution that is currently being implemented

- Centralized network attached storage (NAS) and content addressable storage (CAS) devices.
  - NAS populated with 50TB usable (300 TB max.)
  - CAS populated with 10TB usable (40 TB max.)
- Data backups are cached to a disk library, then transferred to tape.
  - Decreases time that data disks are affected by backup process.
  - Possible to restore from cache without tape restore.
- Portions of internal network upgraded to support 1Gbps to the desktop.
  - Major portion of building upgraded to CAT 6e cable.
  - Internal Backbone upgraded to 10 Gbps.
  - Network switches upgraded to provide 120 1Gbps connections.
  - Provides for better performance in accessing centralized data.
Network upgrade and central storage

**Status**

- Network upgrades completed
  - 95 1Gbps connections in use
    - Remaining are assigned and waiting 1Gbps capable equipment.
- Central Storage HW configuration Completed
- Data Migration to Central Storage
  - SI Teams currently moving to central storage.
  - Currently populated with 12 TB data from 28 systems.
  - 87 /user areas available on central store
    - 26 HST critical users actively using /user areas.
    - 31 additional HST critical users scheduled to transition by 11/09.
- /grp area contains data from OTA, ACS, WFC3, and WFPC2.