The HST Mission Continues With Excellent Performance

- Science programs are exciting
  - Tremendous community interest evidenced by 1135 proposals for Cycle 22
  - Frontier Fields
  - Kuiper Belt Object observations associated with New Horizons
  - Mars and Comet Siding Spring observations October 19-20 (along with full NASA armada!)

- Senior Science Review
  - Proposal and Site Visits were very well received by the panel
  - Final report endorsed the continuation of HST as a robust Great Observatory

- NASA HQ support
  - Strong support for the 2020 Vision and operational overlap with JWST
  - Extremely strong interest and engagement in 25th Anniversary activity planning
  - Hubble History Project
    - The GSFC Project is endeavoring, via a contracted professional historian/group, to document the history of the Hubble Mission since launch
# Project Perspective

The HST Mission Continues With Excellent Performance

- Spacecraft efficiency and science productivity is outstanding
- Spacecraft systems are performing well
- Instruments are in great shape
# HST Observatory Status

<table>
<thead>
<tr>
<th>Subsystem</th>
<th>Summary</th>
</tr>
</thead>
</table>
| **Science Instruments (SI)**     | • WFC3 performance excellent; Channel Select Mechanism (CSM) movement and dust particles monitored  
                                 |   - CSM movements have been significantly reduced  
                                 |   - Most recent particle observed in 8/2013  
                                 | • COS FUV detector sensitivity monitoring continues (Sensitivity decline ARB final report 4/2011)  
                                 |   - Operating at 2nd lifetime position; expect to move to 3rd position early 2015  
                                 | • ACS and STIS repaired instruments (SM4) performing nominally  
                                 | • NICMOS in standby following decision to not restart following Cycle 19 proposal evaluations |
| **Electrical Power System**      | • Performance of batteries is excellent; benchmark set to 510 Amp Hours  
                                 | • Solar Array 3 performance remains excellent  
                                 | • 12/22/12 Software Sun Point (SWSP) safemode entry; first unplanned entry since 2007  
                                 | • Solar Array Drive Electronics (SADE) investigation following 2/15/13 SWSP completed; no further actions |
| **Pointing Control System**      | • Gyro 5 failed on 3/7/14; 1-2-4 gyro configuration; Gyro 6 powered off 3/13/14; Gyro 3 removed from control loop and powered off in 2011; all gyros configured to operate on secondary heater controller  
                                 | • Gyro 4 motor current increased from 120mA to 190mA in 9/2011, has remained stable at ~178 mA  
                                 | • Attitude Observer Anomaly (AOA) (ARB report 10/2011) mitigation completed 11/2012  
                                 | • FGS-3 is degraded; use is minimized to preserve bearings |
| **Data Management System**       | • SI Command and Data Handler (C&DH) has had 6 lockup recoveries since 6/15/09; most recent was 6/2/12  
                                 | • SI FSW enhanced to protect detectors in event HV left on in SI C&DH lock up event  
                                 | • Science Data Formatter (SDF) input cycling modified to reduce thermal load  
                                 | • Solid State Recorders (SSRs) 1&3 have each experienced a single lock up while in the South Atlantic Anomaly (SAA); Alert monitors detect condition to minimize data loss |
| **Communications**               | • Multiple Access Transponder 2 (MAT2) coherent mode failed (12/24/2011); Two-way tracking unavailable  
                                 | • Joint Space Operations Center (JSpOC) now the source for the operational ephemeris via Conjunction Avoidance Risk Assessment (CARA) team and the Flight Dynamics Facility |
| **Thermal Protection System**    | • Condition of Multilayer Insulation (MLI) observed during SM4 was as expected  
                                 | • New Outer Blanket Layers (NOBLs) installed on Bays 5, 7, and 8 during SM4 |
Mission Operations

**Life Extension Initiatives**

- Fine Guidance Sensor (FGS) clear filter implementation to enable lowering the visual magnitude of guide stars from 14 to 14.5
  - Magnitude dependent commanding for FGS 2R2 to be evaluated in the November/December timeframe
  - FGS 1R has field dependencies; analysis and implementation strategies underway
- Spacecraft Release 3.9 (V2-axis attitude disturbance mitigation) was operational in July
- Release 4.0 addresses One Gyro Science (OGS) mode requirements and will be operational in the Spring
- Release 4.1 content will be determined within a few weeks
- Refreshing GSFC 2002 vintage Sun (Oracle)-based control center systems
  - Control Center System (CCS) 9.0 is operational; 9.1.1 comes online by 2015
  - Science Pipeline (SP) 1.0 is operational; 1.1 comes online in the Spring
  - Archive 3.0 to be completed by mid-2015
  - Front end Packet Filter, will be completed in the Fall of 2015
# Contract/Budget Status

- **Science Operations Contract Status**
  - Current contract period of performance is through April 30, 2016
  - Currently working initial steps in the process to acquire the follow on contract
  - Anticipate acquiring a 5 year contract that continues current scope of work into 2021

- **General Observer / Archival Research**
  - Cycle 21 awarded value was $28.6M
  - Current goal is to maintain essentially flat cycle values through JWST activation period
  - Expect to finalize the value of Cycle 22 by the end of October

- **Budget Outlook**
  - Executing FY15 at a flat level from FY14 ($98.3M)
  - In healthy dialogue with NASA HQ to establish budgets through 2021 that support the 2020 Vision of HST operating productively as a Great Observatory
  - “Level is the new up” still seems to be the theme at best - level funding will require additional efficiencies to be identified to mitigate inflation
Discussion

- Questions?