Goddard Space Flight Center

HST/GSFC Project Report

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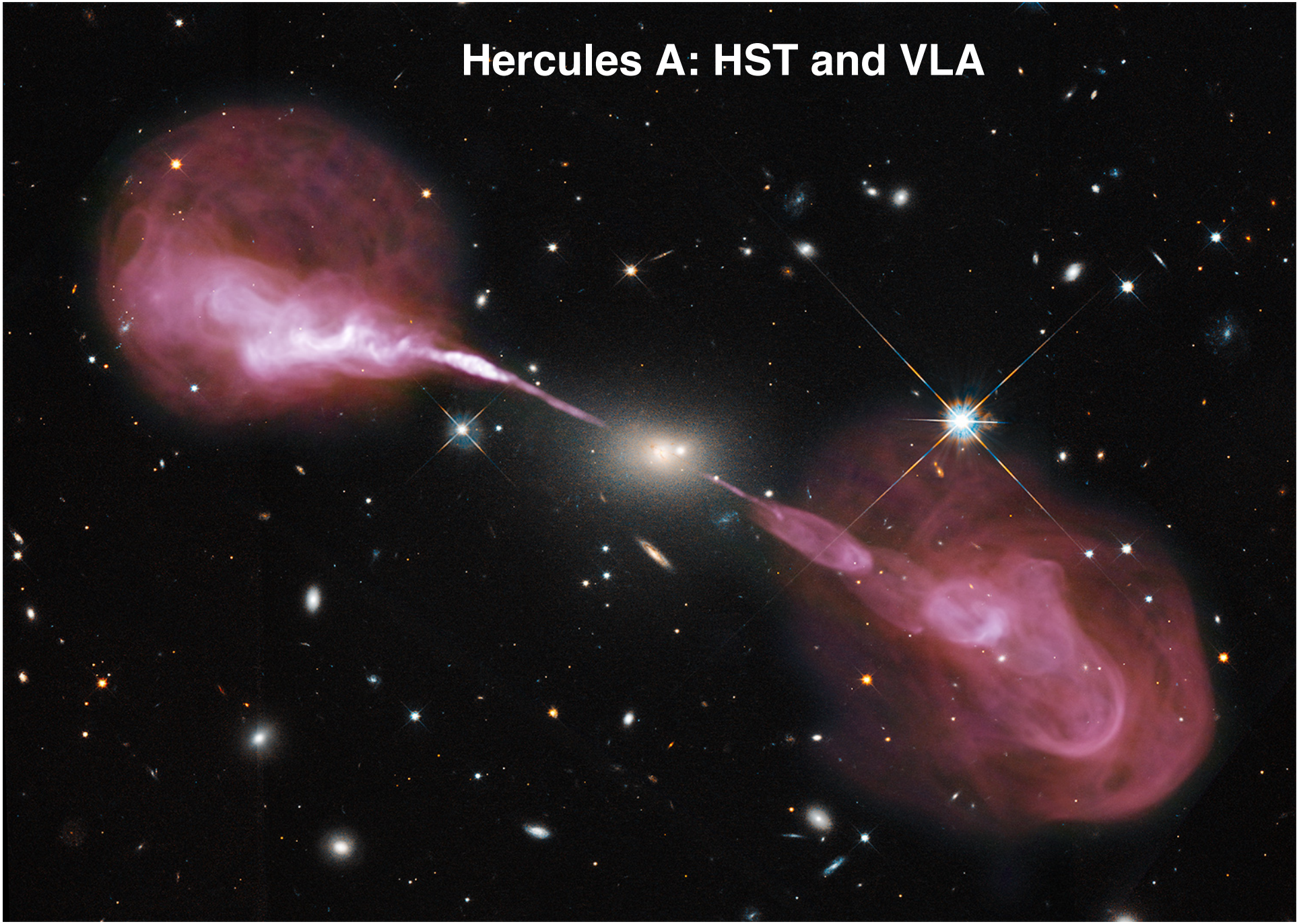
Space Telescope Users Committee Meeting
April 26, 2013

Hercules A: HST and VLA



Project Perspective

- Mission performance is excellent overall (with room for improvement)
- Spacecraft and Instruments are healthy
- Science programs are exciting
  - Historically high community interest marked by 1097 proposals for Cycle 21
  - Enhanced blue wavelength science using Cosmic Origins Spectrograph (COS)
  - Enhanced Wide Field Camera 3 (WFC3) spatial scanning capability
  - Completing final year observations for Multi-Cycle Treasury Programs
  - New Frontiers Deep Fields Initiative
- Strong support from NASA HQ
  - Stable budgets through 2019 in difficult budget climate
  - Astrophysics stated at January AAS meeting that the plan is to operate as long as possible; there is no planned end date
  - Supports the Project intention to operate to 2020 and beyond

HST OBSERVATORY STATUS

Status as of: 3/31/13

Subsystem		Summary	Status/Comments
Science Instruments	**G**	• WFC3 Excellent • COS FUV detector sensitivity degradation • COS FUV Count Rate Protection Anomaly • ACS WFC repaired (single-string) • STIS Repaired (single-string) • NICMOS Instrument excellent, NCS safed	• COS FUV detector sensitivity degradation – ARB Final Report April 5, 2011 – **Rate of degradation has declined** • CRP Anomaly Recovery completed June 2012 • COS Operating at second lifetime position since July 2012 • Following Cycle 19 Proposal evaluations, decision was made to not activate NICMOS
Electrical Power System	**G**	• Performance of new batteries is excellent; benchmark set to 510 Ampere-Hours • SA3 performing very well (~76 of 80 strings)	• December 22, 2012 Software Sun Point (SWSP) safemode entry was first unplanned mode entry since 2007 • SADE controller investigation underway with ESA support
Pointing Control System	**G**	• Gyro 3 performance degradation • FGS-1R Excellent • FGS-2R2 Excellent • FGS-3 Degraded (Bearing performance sub-par; higher torques required)	• 6-4-5 gyro configuration; G3 powered off • Gyro 4 switched to its secondary heater controller in 10/10; motor current increased 120mA to 190mA in 9/11 • AOA ARB completed 10/11; mitigation implemented 11/12 • FGS-3 use reduced to preserve bearings
Data Mgmt System	**G**	• SI C&DH-R • SI C&DH Lock Up Anomaly • Science Data Formatter (SDF) Temperature • Solid State Recorder (SSR) Lock Ups	• 6 SI C&DH recoveries since June 15, 2009; most recently June 2, 2012 • SI FSW enhanced to protect detectors • SDF Input Cycling to reduce thermal load • SSR 1& 3 have each experienced a lock up while in SAA • Key Monitors alert SSR condition for timely response
Communications	**G**	• MAT2 COHO Mode Anomaly • On/off cycles for the Multi-access & S-band Single-access transmitters are accumulating	• Unable to perform two-way tracking using MAT2 • JSpOC-CARA-FDF interface to provide operational ephemerides in lieu of MAT-2 COHO mode
Thermal Performance	**G**	• Condition of MLI observed during SM4 was as expected; degradation continuing • NOBLs installed on Bays 5, 7 and 8 during SM4	• Thermal performance of Equipment Bays with new NOBLs tracking predictions well

Mission Operations

- **Two independent Software Sun Point (SWSP) safemode entry events**
  - December 22, 2012: back to back solar array slews were too close together
  - February 15, 2013: Single Event Upset (SEU) in Solar Array Drive Electronics (SADE) controller led to array position deviating from the expected profile
  - Follow on actions associated with each event have been completed, or will be completed in May

- **HST Solar Array Drive Electronics (SADE) Investigation**
  - An anomalous Solar Array (SA) slew profile seen during an on-orbit checkout of the SADE following the February 15, 2013 Software Sun Point Safemode event is under investigation by ESA and HST Operations Engineers
  - A theory is that during nominal operations the cabling torque compensation circuits in the SADE retain the last computed compensation torque based on the SA wing position of the last processed slew
  - The SADE ***does not*** retain this following a power cycle, therefore, the first slew may have an anomalous profile
  - Initial archival searches of past solar array slew profiles support the theory

Mission Operations

- **Life Extension Initiatives**
  - Developing procedures and proposals for WFC3 and COS side-switches
    - WFC3 Flight Readiness Review Assessment (FRRA) conducted on April
    - COS FRRA is expected by July
  - Completed System Requirements Review (SRR) for spacecraft flight software enhancement release 3.8 (enables more onboard anomaly detection and response, and improves the Attitude Observer Initialization (AOI) algorithm)
    - Conducting content Design Reviews for individual features
    - Expect to be operational in December 2013
- **Ground System Activities**
  - Refreshing 2002 vintage Sun-based control center systems
    - Control Center System (CCS) is entering System Test phase
    - Level 0 science data processing system (PACOR) will be replace by a new Science Pipeline (SP) system in FY14
    - Remaining components, including test facilities, upgrade will continue into FY16
  - Assessing test facilities for long term sustainability risks

Mission Operations

Mission Operations Review (June/July timeframe)

- **Various operational issues encountered over the past 2 years**
  - Project directed review to identify if deeper systemic causes exist
  - Ensure best practices and operational footing to operate to 2020 and beyond
- **Scope**
  - Procedures, processes, documentation, and software changes affecting proposal generation through onboard execution (STScI and GSFC Mission Operations)
  - Routine operations and special operations
  - Quality Assurance, Configuration Management processes (including software changes)
  - Requirements analysis through acceptance test/transition to operations
  - Staffing analysis, including training needs and status
- **Independent Panel (meaning not currently HST staff)**
- **Success criteria**
  - Mature, well documented, and adhered to processes are apparent
  - Traceability to requirements within testing program demonstrated
  - Training needs identified and training plans established

Discussion

- **Sequestration Impacts**
- **Presidents FY14 Budget Request**
- **Questions?**