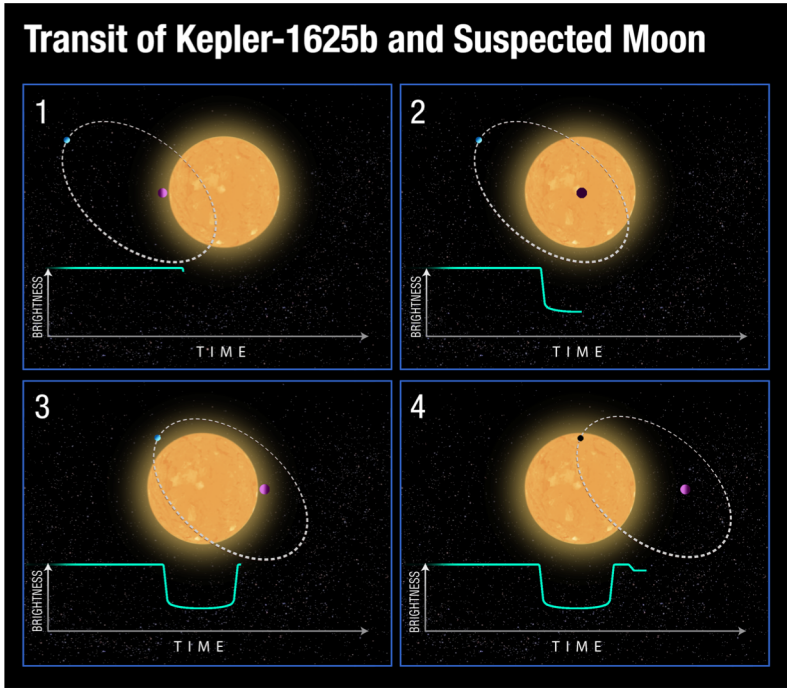

STScI | SPACE TELESCOPE SCIENCE INSTITUTE
EXPANDING THE FRONTIERS OF SPACE ASTRONOMY
HST Mission Office Report
Tom Brown
STUC – 13 November 2018

Summary

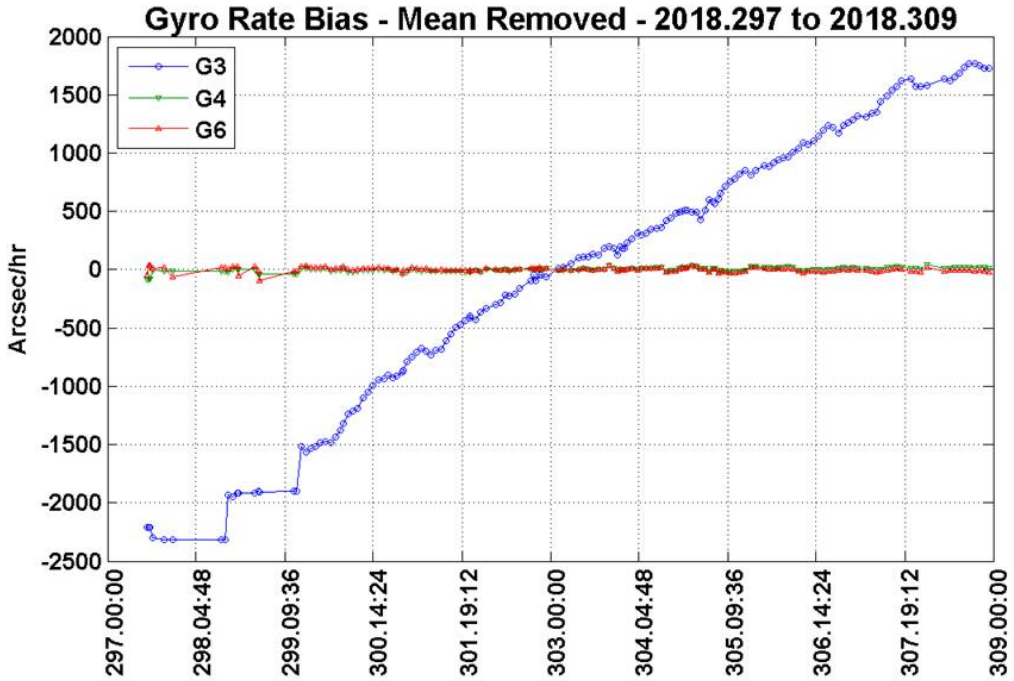
Hubble is yet again at its highest levels of scientific performance and productivity

- Cycle 26 began Oct 1, & results from ΔTAC will be added to plan soon (see SMO presentations)
- Instruments performing nominally (see INS presentations)
- Monitoring Gyro 3 performance
- Science ops resumed Oct 27 after 3-week hiatus due to Gyro 2 failure and subsequent Gyro 3 rate bias issue (see HSTP presentation)
- Senior Review preparations underway (see Osten presentation)
- User documentation (web sites and handbooks) are being migrated to new content management systems

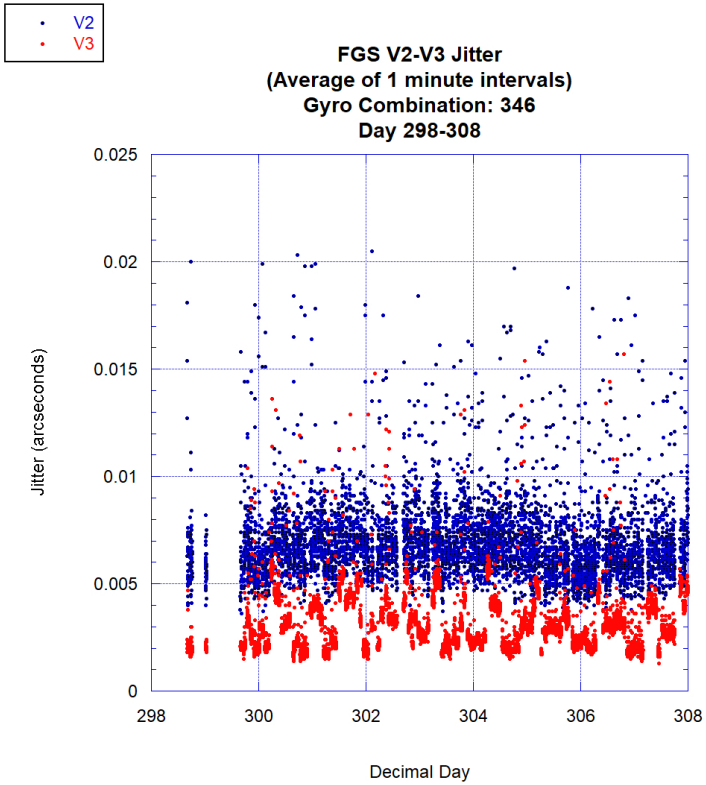


Hubble and Kepler find first evidence for exo-moon

Monitoring Gyro 3 Performance



Gyro 3 rate bias is high but manageable



Jitter is now at ~7 mas

Was ~15 mas prior to Gyro 2 failure (October)

Was ~10 mas prior to Gyro 1 failure (April)

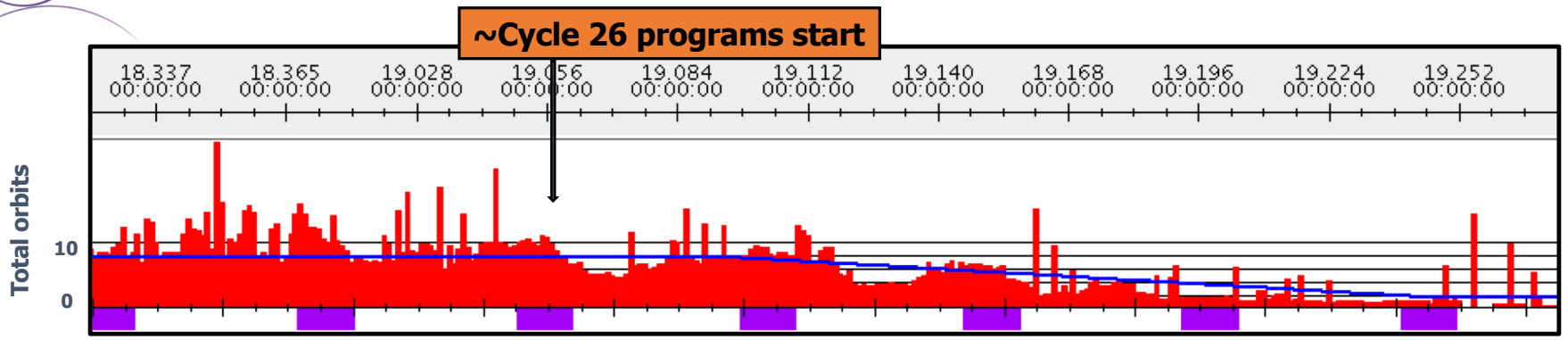
LRP: Current Status

- Cycle 26 began October 1; 2300 orbits of Cycle 24/25 material remain.
  - No Cycle 26 in the Long Range Plan yet, other than continuation and calibration programs.
  - Larger than usual ``Cycle tail" due to extra material taken in Cycle 25 TAC.
  - Gyro downtime means hundreds of orbits get moved later in plan.

- Remaining material is *fairly inflexible*.
  - Many programs have small planning windows due to timing, orient, period-phase constraints.
  - Most flexible Cycle 25 material came forward during the year to fill scheduling gaps.

- Highlights:
  - 330 orbits of exoplanets with tight period/phase constraints remain:
    - Windows beyond the predictive ephemeris time frame (>10 weeks) are unstable/unreliable.
    - Visits with no earlier opportunities are "stored" late in the cycle – "the bullpen."
    - Potential spots checked weekly, visits are pulled forward as possible.
  - 90 of 101 orbits of Cycle 25 Large Program BUFFALO remain. Timing links, one-week constraint windows.
  - 69 of 70 orbits of Cycle 25 Large Program SUSHI remain. Non-disruptive ToO program, extended.

LRP: Current Status



- While Cycle 26 started October 1, 2018…
  - Cycle 25 material subscribes plan through February 2019; tapers off into September 2019.
  - Additional material accepted in Cycle 26 ΔTAC (~2100 orbits) – medium/large/coordinated programs.
  - New Cycle 26 material will mostly be planned in March 2019 or later (unless science requires it earlier).
- Upcoming Cycle 26 ingest
  - TAC met second week of October; Notifications went out November 8
  - December 5 Phase II deadline. Internal proposal processing follows.
  - LRP build late December. Windows released to the community in mid-January.
  - Program Coordinator and Contact Scientist review into late January.
  - March 1 calendar starts building in mid-February.

LRP: Current Status

Cycle 25 scheduling rate was high: 85 orbits/week scheduled over 52 weeks

- Despite high level of constrained programs, extra Cycle 25 material helped efficiency.
- Average over Cycles 17-23: 84 orbits/week
- Cycle 24: 82 orbits/week
- But gyro issues led to higher failure rate, leading to less science completed.

Previous Cycle Completeness

- Cycle 22: Finished in Jan 2018.
- Cycle 23: Finished June 2018.
- Cycle 24: ~53 orbits remain, mostly in 14767-Sing, 14784-Shkolnik. Mostly completed by March 2018.
- Cycle 25: ~2000 orbits remain (due to 1200+ more orbits accepted in Cycle 25).

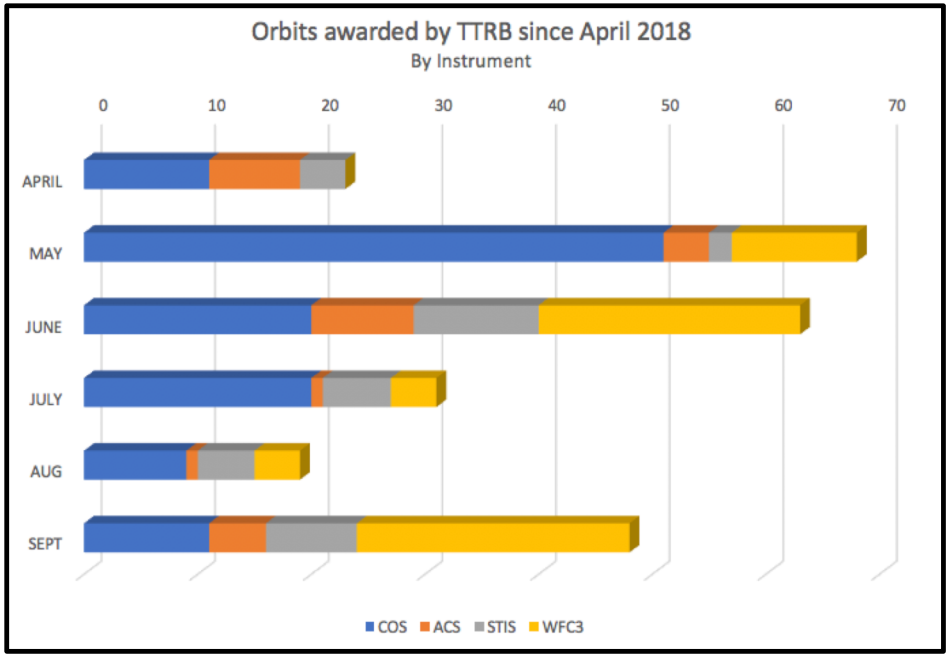
LRP: Recent activity

Recent Gyro-2 issues contributed to backlog

- Cycle 25 – larger HOPR rate due to Gyro 2 irregularities
  - Typically have 1-2% failure rate; varied by ~5 to ~25% weekly since Gyro 1 failed in April

- Eventual change to 1-gyro mode will require ~1 month for transition
  - Software changes: few days
  - Proposal re-prep: ~1 week, but some programs will need PI rework
  - New LRP built: ~1 week
  - Calendar/TDRSS: 11 days

- Will be lower orbit counts in 1-Gyro
  - 3-gyro mode: ~84 orbits/week
  - 2-gyro mode: ~70-75 orbits/week
  - 1-gyro mode: similar to 2-gyro mode



LRP: Statistics

- Exoplanet Programs: Highlights
  - Sing (Cycles 24/25 Large): 448 of 498 orbits complete.
    - 35 orbits remain in the plan, including 5 HOPRs. Others TBD.
  - Benneke (Cycle 24 Large): 72 of 78 orbits complete.
    - One 6-orbit visit planned for December.
  - deWit (Cycle 25 Large): 61 of 114 complete.
    - 10 orbits planned by January 2019
  - Crossfield (Cycle 25 Large): 37 of 127 complete
    - 34 orbits planned by January 2019

- 330 orbits of C24/25 exoplanets with period/phase constraints remain in the plan.
  - Few opportunities, and unreliable plan windows past 70 days.
  - Cycle 26 exoplanet programs will have the same constraints and compete with previous cycles.

LRP: Statistics

Planetary Programs: Highlights

- Jupiter
  - In solar exclusion until late January 2019.
  - Major Juno-coordinated programs close to complete.
    - **Grodent** (Cycle 24 Large): 153 of 151 orbits done (some failures already repeated). 1-orbit repeat still under review.
    - **Wong** (Cycle 24 Medium): 39 of 45 orbits done. Six planned for Feb 12,2019 perijove.
- Europa Cycle 25 mid-cycle campaign
  - **Roth**: 33 of 55 orbits done.
  - **Sparks**: 24 of 30 orbits done.
  - **deKleer**: complete (10 orbits).
- OPAL: Outer Planet Atmospheres Legacy
  - **Cycles 22-24**: 29 total orbits per cycle on Jupiter, Saturn, Uranus, Neptune.
  - **Cycle 25**: 41 total orbits
    - **Neptune**: 8 orbits in September failed (guide stars). Currently scheduled in early November.
  - **Cycle 26:** 41 orbits planned
    - Uranus: 8 orbits planned for mid-November.

Cycle 24 Large/Treasury programs

C24 Program	alloc	Exec/sched by 11/18/18	Planned before 1/31/19	Planned after 1/31/19	comment
Benneke - *	78	72	6	0	December 2018 finish
Bielby	96	96	0	0	Complete
Dalcanton	108	108	0	0	Complete
Grodent	151	153	0	0	Complete?
Kallivayalil	164	164	0	0	Complete
Roman-Duvall	101	99	0	0	Complete
Shkolnik	130	120	9	0	December 2018 finish
Sing - *	498	448	5	30	3 visits unplanned
Suzuki (ToO)	26	26	0	0	Complete

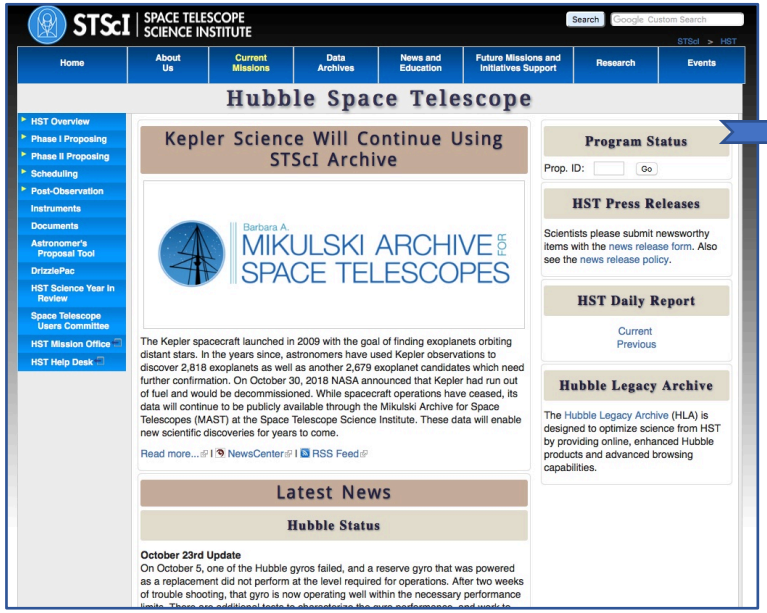
* - exoplanet visits not planned, “in the bullpen” until the LRP group can pull them forward.

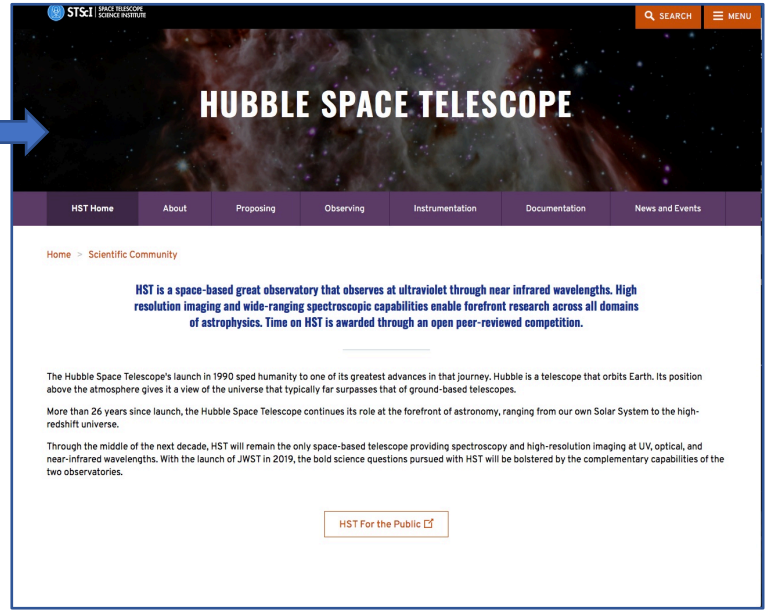
Cycle 25 Large/Treasury programs

C25 Program	alloc	Exec/sched by 11/18/18	Planned before 1/31/18	Planned after 1/31/18	comment
Bedin	40	35	0	5	HOPRs in Feb 2019
Bowen	91	30	23	38	
Chen	169	104	43	12	40+ HOPR orbits, more coming
Crossfield - *	127	37	28	62*	
Froning	157	32	43	82	
Jansen	36	28	0	8	
Krauss	132	70	25	37	
Riess	168	159	5	3	1 not in plan
Shapley	87	66	21	0	
Steinhardt	101	12	16	40	BUFFALO. 33 need windows
Suzuki (ToO)	70	1	18	3	2nd cycle SUSHI; extended to Dec
deWit - *	114	61	8	36*	9 not in plan

* - exoplanet visits not planned, “in the bullpen” until the LRP group can pull them forward.

Website Migration



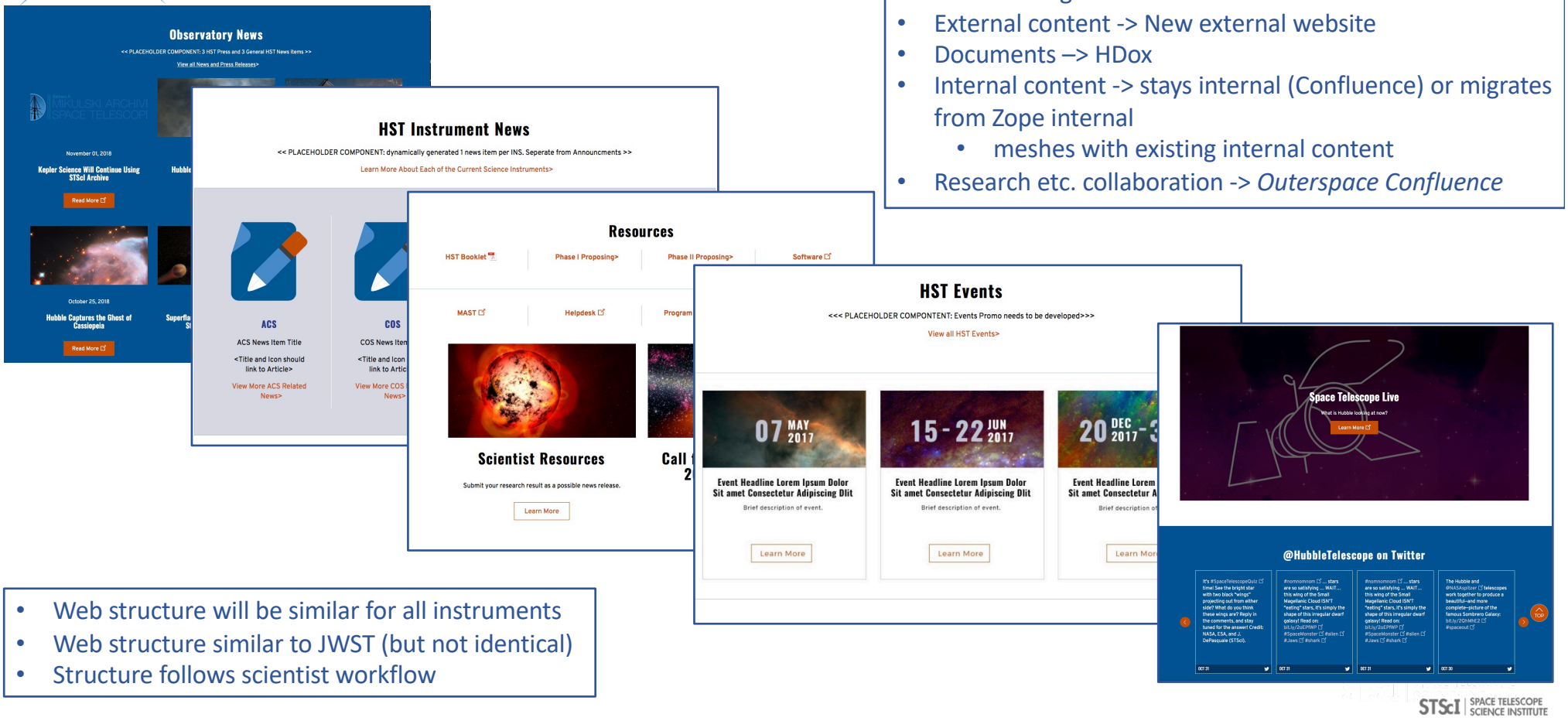


- Zope content management system is at end of life (will be archived)
- Organic unstructured growth of website content over HST mission (30,000+ pages)
- Difficult to navigate

➢ Migrating to Jahia (portal and web content management)

➢ New site will be mobile-friendly (ADA compatible)

Website Migration

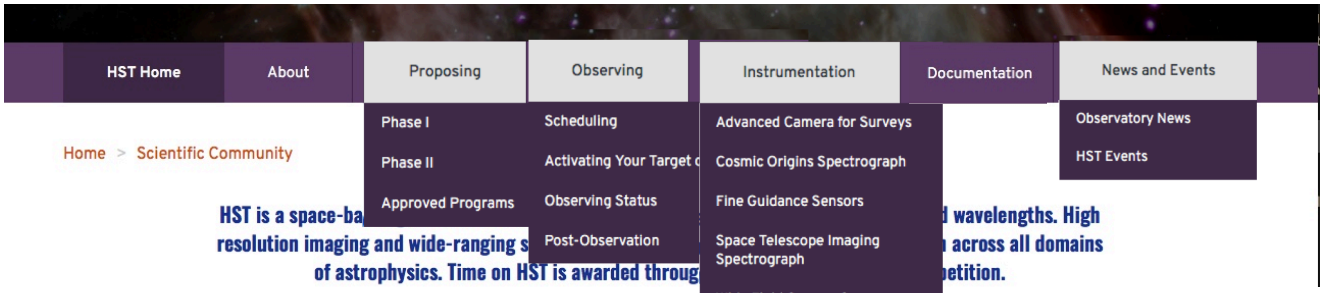


HST content migration

- External content -> New external website
- Documents –> HDox
- Internal content -> stays internal (Confluence) or migrates from Zope internal
  - meshes with existing internal content
- Research etc. collaboration -> *Outerspace Confluence*

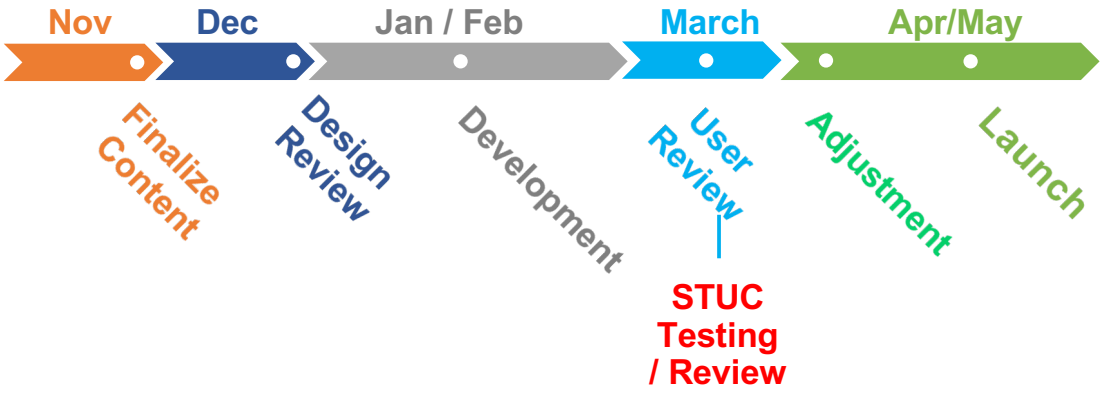
- Web structure will be similar for all instruments
- Web structure similar to JWST (but not identical)
- Structure follows scientist workflow

Website Migration

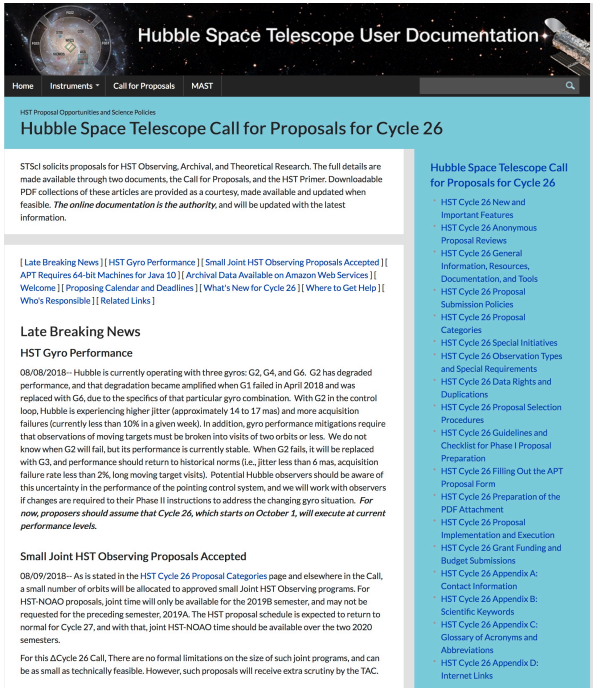


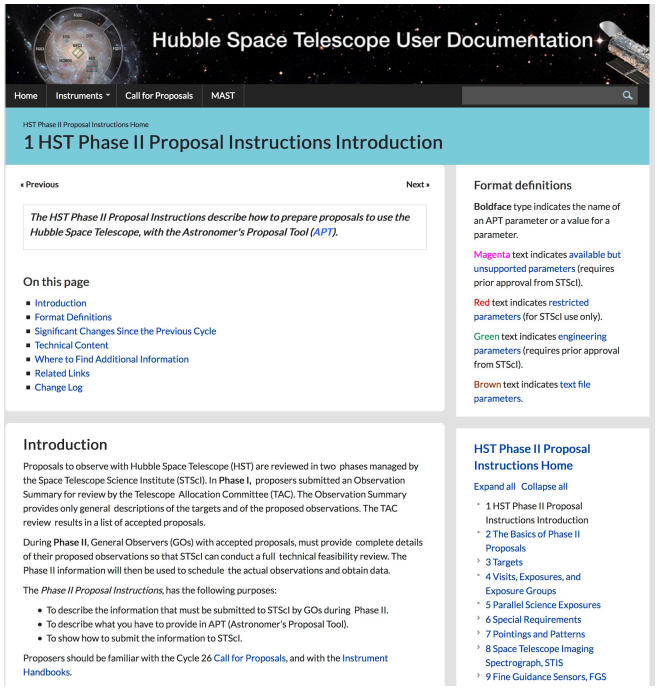
Organization follows research workflow

Timeline



Document Migration





- CfP, P2PI, Primer, and Roadmap were migrated to HDox as test particles
- After instrument websites are migrated to Jahia, we will resume migration of other HST documentation
- Instrument handbooks and data handbooks will be migrated throughout 2019, with eye toward Cycle 28
    - Some of this work has already begun in the background, copying content from old structure to HDox templates