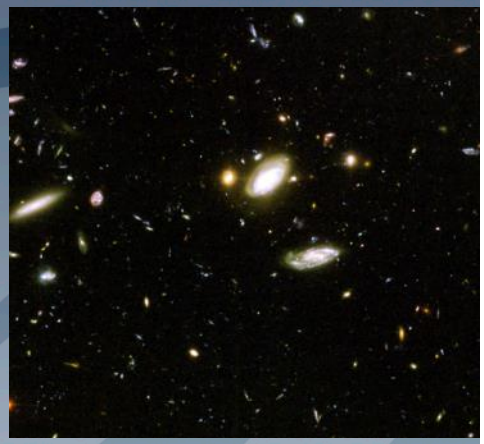
National Aeronautics and Space Administration

Astrophysics



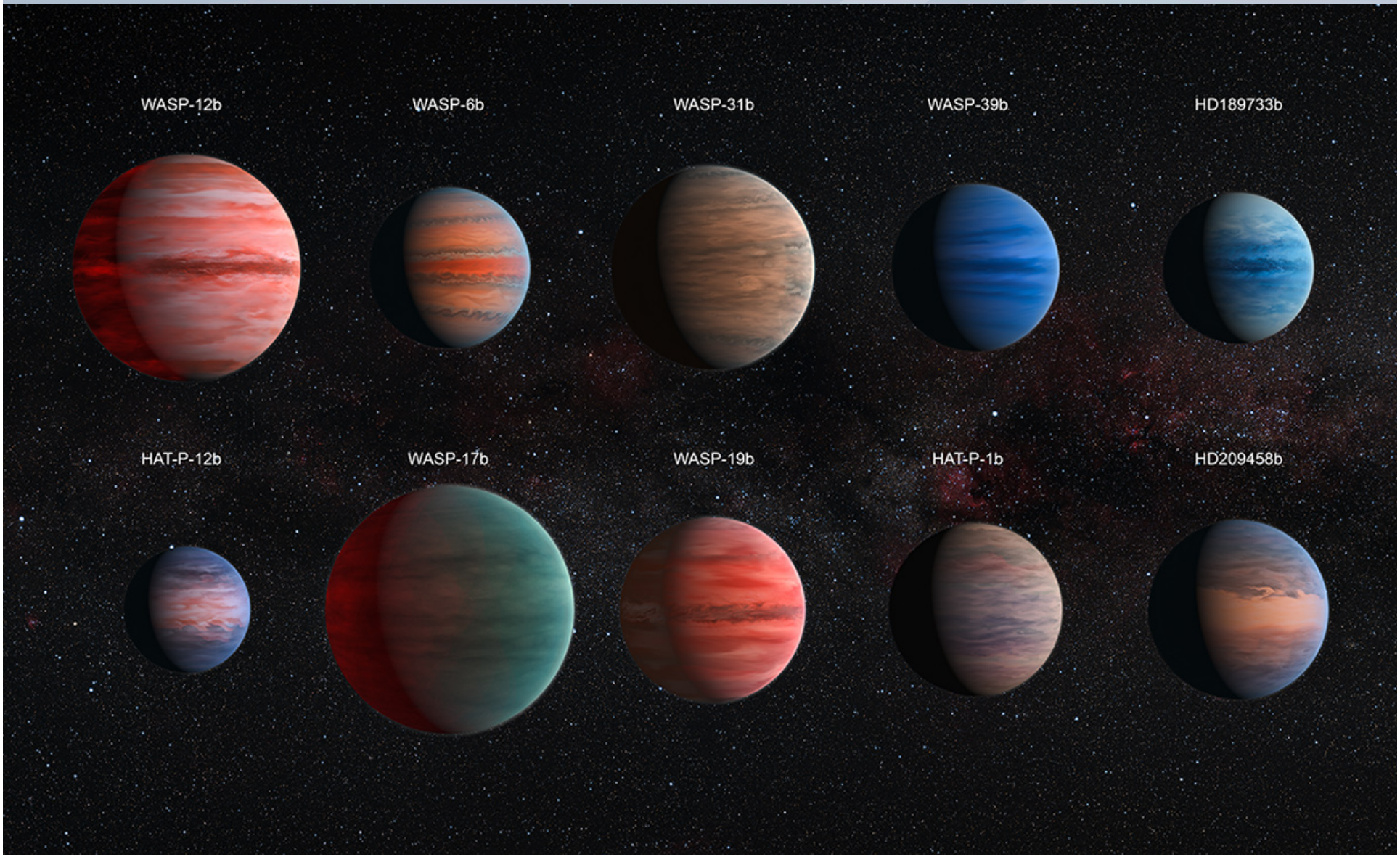



Space Telescope Users Committee
May 12, 2016

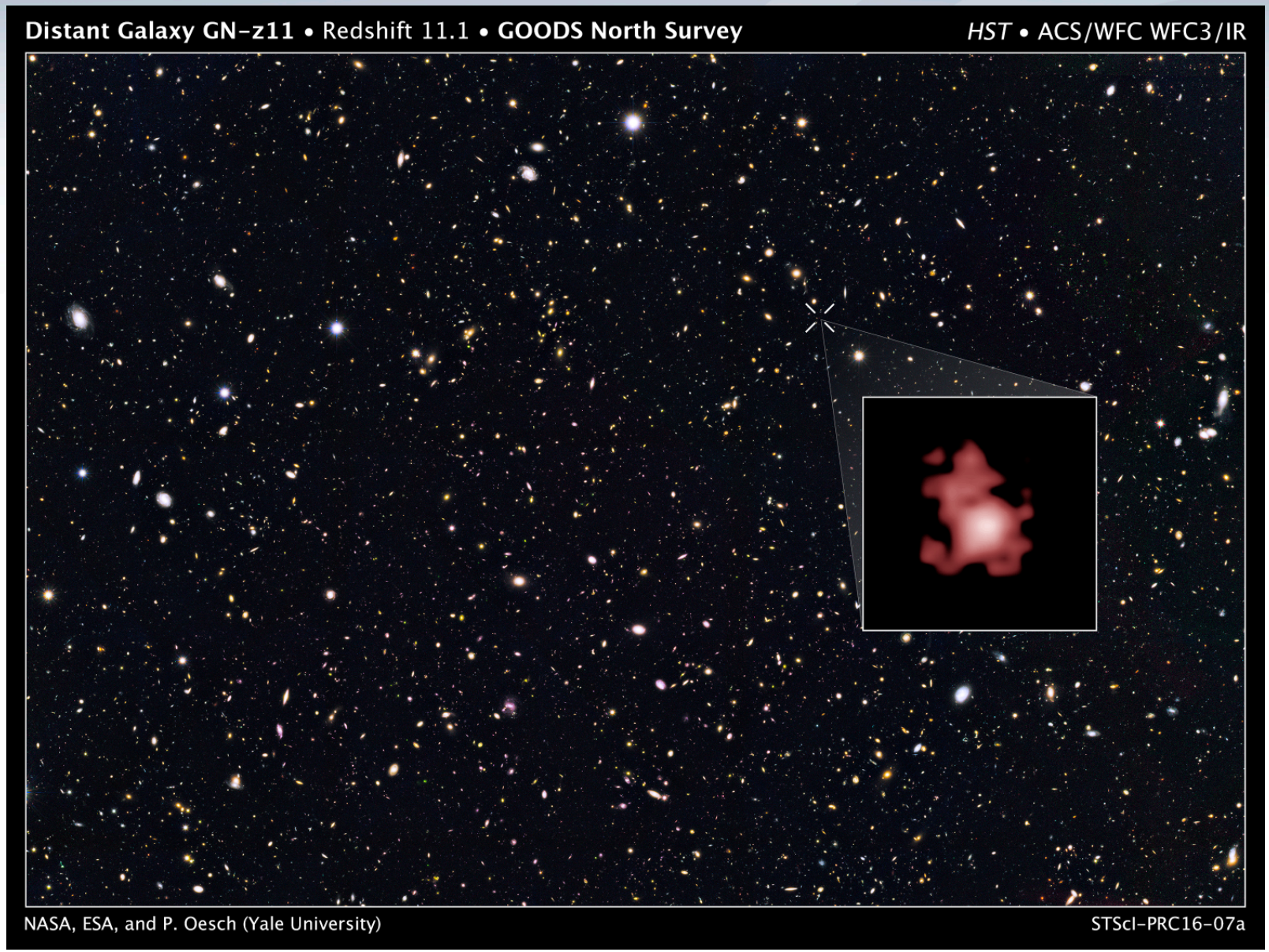
Michael Garcia
HST Program Scientist
NASA HQ

26th Anniversary

Clouds can Hide Water on Hot Jupiters



Shattering Distance Records, JWST Preview



The Force Awakens

UV-HUDF @ House CJS Committee Room

April 05, 2016
MEDIA ADVISORY 16-042
John Grunsfeld Announces Retirement from NASA

S109E5249

In this March 2002 image, John Grunsfeld, former astronaut and associate administrator of NASA's Science Mission Directorate, In this image from March 2002, is shown in space shuttle Columbia's cargo bay.
Credits: NASA

USAJOBS "WORKING FOR AMERICA"

Associate Administrator, Science Mission Directorate

HEADQUARTERS, NASA

Agency Contact Information

1 vacancy in the following location:

Washington DC, DC

Work Schedule is Full Time - Permanent

Opened Wednesday 5/4/2016
(2 day(s) ago)

Closes Monday 6/6/2016
(31 day(s) away)

Salary Range
$180,401.00 to $237,700.00 / Per Year

Series & Grade
ES-1301-00/00

Promotion Potential
00

Supervisory Status

Who May Apply
This announcement is open to all qualified U.S. citizens.

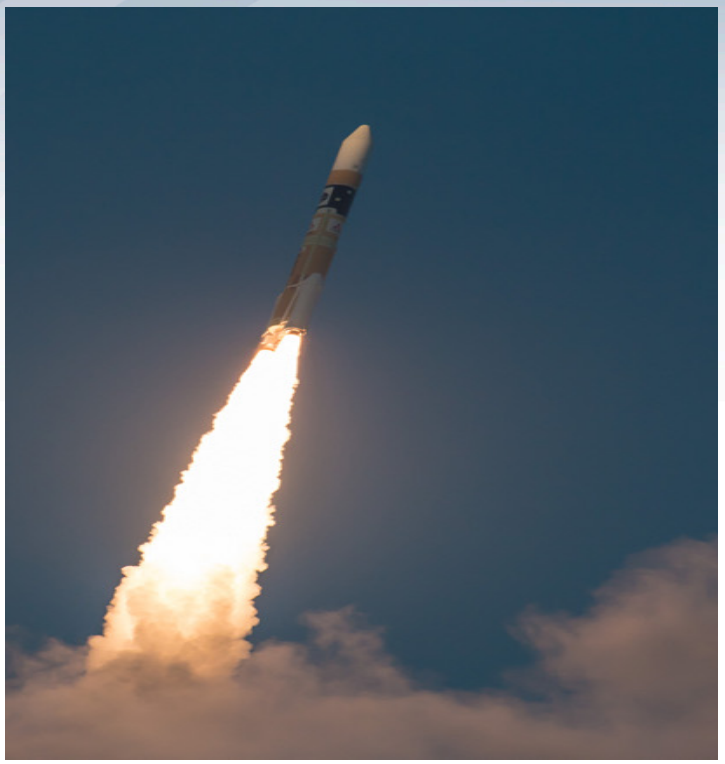
Control Number
437944900

Job Announcement Number
HQ16S0015

CY16 and FY17 Planned Accomplishments

- JAXA's **Hitomi** (nee ASTRO-H**)** mission launched (KDP-E) on February 17, 2016.
- LISA Pathfinder Launch Dec 3, 2015
- **WFIRST** entered formulation (KDP-A) on February 17, 2016.
- The main panel of the **Astrophysics Senior Review** was held in February 2016. The **Fermi Gamma-ray Space Telescope, Nuclear Spectroscopic Telescope Array (NuSTAR), Spitzer Space Telescope, Swift Explorer,** and **XMM-Newton** being reviewed.
- The **Astrophysics Senior Review** for the **Hubble Space Telescope** and **Chandra X-ray Observatory** will be held in March 2016.
- **NICER** will be delivered to Kennedy Space Center by August 2016 and launched to the International Space Station (KDP-E) on CRS SpaceX-11 in FY17.
- Commissioning flights for the second-generation High-resolution Airborne Wideband Camera (HAWC+) instrument will be completed aboard **SOFIA** by August 2016.
- An Announcement of Opportunity (AO) for the next **Astrophysics Medium-Class Explorer (MIDEX)** and **Mission of Opportunity** will be released in FY16 [NET September 2016]
- The payload for **TESS** will be integrated and tested (KDP-D) by September 2016.
- The Step 2 downselect will be made for the next **Astrophysics Small Explorer (SMEX)** and **Explorer Mission of Opportunity** in FY17 [NET December 2016].
- The **ISS-CREAM** experiment will be launched to the International Space Station (KDP-E) on CRS SpaceX-12 in FY17.
- A critical design review for **SOFIA**'s third-generation instrument will be conducted in FY17.
- Spacecraft integration and testing will be completed for **TESS** in FY17.
- WFIRST will have its system readiness review (KDP-B) in FY17.
- Four **Balloon** campaigns are planned in FY16, and three campaigns are planned in FY17
- Three Astrophysics **Sounding Rocket** payloads are planned in FY16, and two are planned in FY17.

Hitomi (ASTRO-H)
Soft X-ray Spectrometer (SXS)



- ASTRO-H successfully launched on Feb 17, 2016 from Tanegashima Space Center on a H-IIA launch vehicle.
- The word Hitomi translates into "eye" or "pupil" hence the spacecraft has become the aperture with which to see the secrets of the universe.
  - Feb 25 SXS first light
  - Feb 28 Deployment of extensible optical bench
  - April 28 confirmation by JAXA of loss due to ACS anomaly

https://heasarc.gsfc.nasa.gov/docs/astroh/

LISA Pathfinder
ST-7/Disturbance Reduction System (DRS)

Dec 3	Launch ✓
Dec 11	On way to L1 ✓
Jan 22	Arrive at L1 ✓
Feb 3	Uncage test masses ✓
Feb 15	Test mass 1 “Elwood” release ✓
Feb 16	Test mass 2 “Jake” release ✓
Mar 1	Begin LTP operations (90 days) ✓
Jun 20	Begin DRS operations (90 days)
Sep 20	ESA mission extension review

http://sci.esa.int/lisa-pathfinder/
https://lisapathfinder.org/

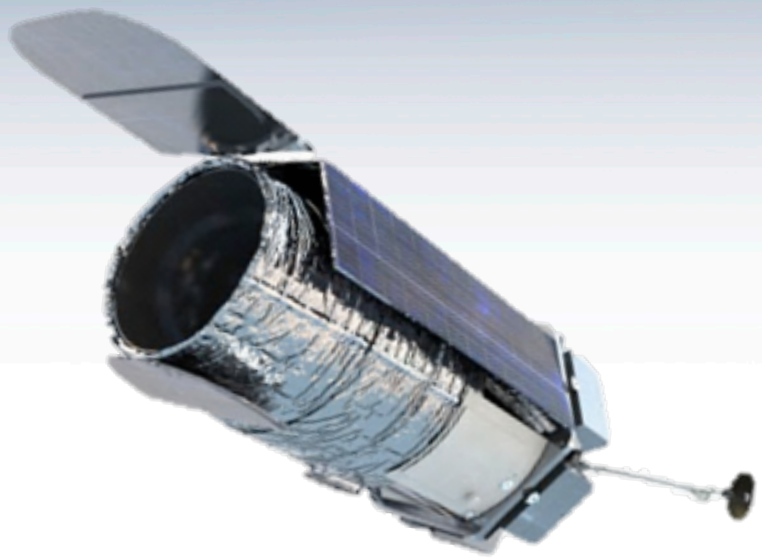
2016 Senior Review Schedule

Action	Date	Done
Draft Call for Proposals issued	August 20, 2015	✓
Deadline to send comments on draft to NASA	September 10, 2015	✓
Final Call for Proposals issued	September 25, 2015	✓
Senior Review Proposals due	January 22, 2016	✓
Main panel meets in Washington, DC	February 22-25, 2016	✓
HST review and site visit in Baltimore, MD	March 8-10, 2016	✓
CXO review and site visit in Cambridge, MA	March 22-24, 2016	✓
Delivery of panel reports to NASA HQ	April 2016	✓
NASA Response/direction to projects. Reports released on APD website.	May-June 2016	

For more information:
http://science.nasa.gov/astrophysics/2016-senior-review-operating-missions/

WFIRST

Wide-Field Infrared Survey Telescope



Wide-Field Infrared Survey Telescope

Top priority of 2010 Decadal Survey

Science themes: Dark Energy, Exoplanets, Large Area Near Infrared Surveys

Mission: 2.4m widefield telescope at L2; using existing hardware, images 0.28deg^2 at 0.8-2μm

Instruments (design reference mission): Wide Field Instrument (camera plus IFU), Coronagraph Instrument (imaging/IFS)

Phase: Currently in Formulation (Phase A)

CURRENT STATUS:

- Completed Mission Concept Review (MCR) held in December 2015
- Formulation Science Investigation Teams selected in December 2015
- Industry RFI released July 2015; RFP for industry studies released in January 2016; contracts to Ball and Lockheed awarded Feb 2016 to support WFI Concept Study.
- Passed Key Decision Point A (KDP-A) in Feb 2016
  - Official start of formulation phase
  - Supported by FY16 appropriation and FY17 request
  - Successful KDP-A DPMC held January 26, 2016.
  - Successful KDP-A APMC held February 17, 2016.
- Schedule under revision to account for FY16 appropriation of $90M and FY17 budget request of $90M.

http://wfirst.gsfc.nasa.gov/

WFIRST has begun Formulation

WFIRST KDP-A Budget Estimates (2 of 2)

- The current WFIRST budget guideline is constrained in FY18-20. As a result, the Project is working two development profiles.
- The life-cycle estimate for the 2024 launch date (an over-guide budget profile) is $2.3B to $2.5B in FY15$.
- The life-cycle estimate for the 2025 launch date in-guide scenario is $2.6B to $2.8B in FY15$.
- In real year dollars, the total mission cost range is $2.7B to $3.2B for the range of launch dates and launch vehicles.
- Budget includes STMD funding in FY16-FY17 for the coronagraph technology. STMD considering funding portion of coronagraph flight development.
- International contributions – discussions in process for potential contributions Europe/ESA, Canada, and Japan. Contributions include elements of wide field instrument, coronagraph instrument, and ground system.

FY16 Appropriation

Outyears are notional planning from FY16 President's budget request

($M)	2014	2015	2016	2017	2018	2019	2020
Astrophysics*	$678	$685	$731	$707	$750	$986	$1118
JWST	$658	$645	$620	$569	$535	$305	$198
Total	$1336	$1330	$1351	$1273	$1285	$1291	$1316

*** Excludes "SMD STEM Activities" in all years.**

- Provides $90M for WFIRST and directs NASA to start Formulation.
- Provides full funding ($85M) for SOFIA operations and places SOFIA into the 2018 Astrophysics Senior Review.
- Provides full funding ($98M) for continued Hubble operations.
- Provides $37M for SMD STEM education activities.
- Requires reduction of $36M in rest of Astrophysics portfolio.

($M)	FY16 Request	FY16 Approps	Delta
JWST	$620	$620	--
WFIRST	$14	$90	+$76
SOFIA	$85	$85	--
Hubble	$97	$98	+$1
Rest of Astrophys*	$493	$457	-$36 (-7%)
Total	$1309	$1351	+$42

* Excludes "SMD STEM Activities."

FY17 Budget Request

Outyears are notional planning from FY17 budget request

($M)	2015	2016	2017	2018	2019	2020	2021
Astrophysics*	$685	$731	$757	$737	$967	$1094	$1168
JWST	$645	$620	$569	$534	$305	$197	$150
Total*	$1330	$1351	$1326	$1271	$1272	$1291	$1318

* Excludes "SMD STEM Activities" in all years.

- Supports the commitment of an October 2018 launch date for JWST.
  - Delivers the Optical Telescope element/Integrated Science (OTIS) instrument module to Johnson Space Center for testing.
  - Conducts OTIS cryovacuum testing;
  - Integrates the cryocooler compressor assembly into the spacecraft bus.
  - Delivers the flight solar array to the observatory for integration.
- Formulates the WFIRST mission.
- Continues development of the TESS exoplanet mission for launch by FY18.
- Supports operating mission extensions, subject to the results of the 2018 Senior review.
- Enables down selection of next Astrophysics Small Explorer mission, and selection of next Astrophysics Medium Explorer mission concepts for competitive study.
- Increases support for research and analysis.

FY17 PBR, CJS language, HST

HUBBLE SPACE TELESCOPE OPERATIONS

Formulation	Development	Operations

FY 2017 Budget

Budget Authority (in $ millions)	Actual FY 2015	Enacted FY 2016	Request FY 2017	Notional FY 2018	Notional FY 2019	Notional FY 2020	Notional FY 2021
Total Budget	98.6	--	97.3	98.3	98.3	98.3	98.3

Astrophysics.—Within funds provided to Astrophysics in order to advance scientific knowledge of the origins of the universe, the Committee provides $98,300,000 for the Hubble Space Telescope…..

Hubble Space Telescope.—The Committee supports continued operations of Hubble at the fiscal year 2016 level. The 2020 Vision Study confirms that constant funding will allow Hubble to continue to deliver outstanding science by ensuring attention is paid to addressing operational anomalies and other risks to Hubble's scientific output. The Committee is concerned that NASA has increased the risks to Hubble science by requiring the program absorb costs for the well-regarded Hubble Fellowship program that were previously funded within Astrophysics. NASA shall detail to the Committee how it will maintain operational capability and science productivity through at least 2 years of overlap with JWST while also continuing support for the Hubble Fellowship Program.

CJS language, WFIRST

Science: Astrophysics: Exoplanet Exploration

OTHER MISSIONS AND DATA ANALYSIS

FY 2017 Budget

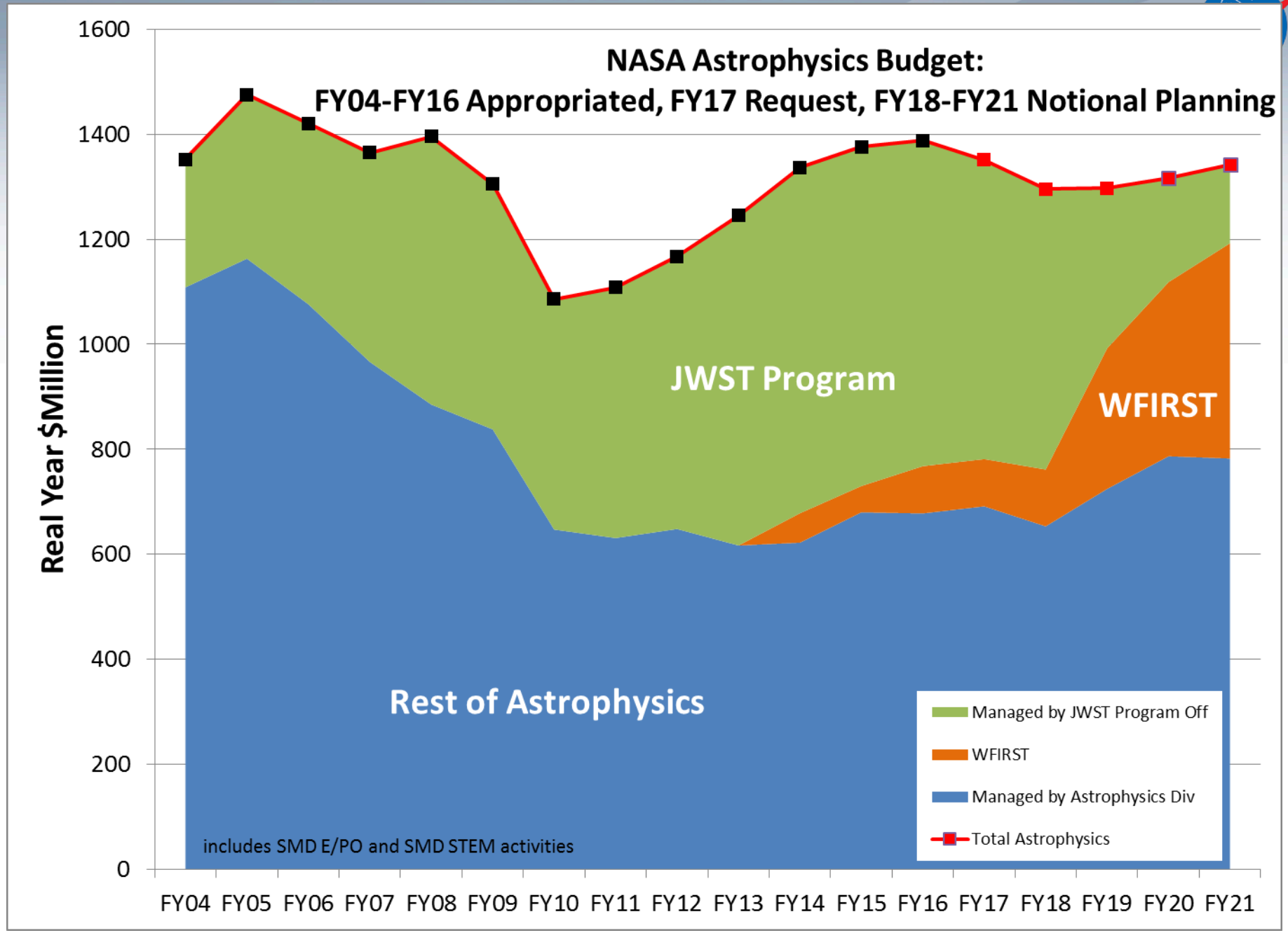
Budget Authority (in $ millions)	Actual FY 2015	Enacted FY 2016	Request FY 2017	Notional FY 2018	FY 2019	FY 2020	FY 2021
Astrophysics Decadal Strategic Mission	50.0	--	90.0	108.2	267.7	331.8	409.9

WFIRST Science Mission.—The Committee has provided $120,000,000 for the WFIRST mission using the Astrophysics Focused Telescope Assets, with the goal of launching the telescope no later than 2024. The Committee is concerned about the cost of the prime mission, especially because inadequate early investment, schedule delay, and creeping mission requirements have contributed to high cost growth in previous NASA missions. The Committee directs NASA to cap WFIRST life cycle costs at no more than $3,500,000,000 through the end of its prime mission.

FY17 Budget Request

	Astrophysics	JWST	STEM	Astrophysics including JWST excluding STEM	Astrophysics including JWST including STEM
FY16 appropriation	$731M excluding STEM	$620M	$37M	$1351M	$1388M
FY17 notional runout of FY16 request	$727M including STEM	$569M	$20M	$1276M	$1296M
FY17 request	$782M including STEM	$569M	$25M	$1326M	$1351M

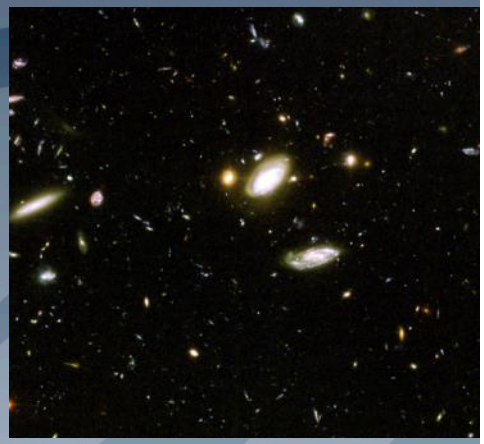
CJS Markup Deltas: +$30M WFIRST, +$1M HST, +$17M STEM,
+$5M segmented mirrors = +$53, $807M = +25M PBR; -$28M rest of APD


NASA Astrophysics Budget:
FY04-FY16 Appropriated, FY17 Request, FY18-FY21 Notional Planning
Real Year $Million
1600
1400
1200
1000
800
600
400
200
0
JWST Program
WFIRST
Rest of Astrophysics
includes SMD E/PO and SMD STEM activities
Managed by JWST Program Off
WFIRST
Managed by Astrophysics Div
Total Astrophysics
FY04 FY05 FY06 FY07 FY08 FY09 FY10 FY11 FY12 FY13 FY14 FY15 FY16 FY17 FY18 FY19 FY20 FY21

National Aeronautics and Space Administration

Astrophysics



BACKUP

Astrophysics Program Content

	Actual FY 2015	Enacted FY 2016	Request FY 2017	Notional FY 2018	Notional FY 2019	Notional FY 2020	Notional FY 2021
Astrophysics	**730.7**		**781.5**	**761.6**	**992.4**	**1,118.6**	**1,192.5**
Astrophysics Research	201.7		226.1	236.3	235.7	248.5	252.0
Science Education	42.0		25.0	25.0	25.0	25.0	25.0
Astrophysics Research and Analysis	71.1		72.7	73.0	73.0	73.0	73.0
Balloon Project	38.0		37.0	37.3	37.4	38.9	40.4
Other Missions and Data Analysis	50.6		91.4	101.0	100.3	111.6	113.6
Astrophysics Data Curation and Archival	18.6		17.8	18.8	18.9	18.9	18.9
Astrophysics Data Program	17.0		17.6	17.6	17.6	17.6	17.6
Astrophysics Senior Review	-		37.4	49.3	40.5	33.6	34.0
Contract Administration, Audit & QA Svcs	15.0		14.9	15.0	15.0	15.1	15.1
Astrophysics Directed R&T	-		3.7	0.2	8.4	26.4	28.1
Cosmic Origins	201.0		198.5	198.4	197.3	195.5	209.5
Hubble Space Telescope (HST)	98.6		97.3	98.3	98.3	98.3	98.3
Stratospheric Observatory for Infrared Astronon	70.0		83.8	84.8	84.8	84.8	84.8
Other Missions and Data Analysis	32.4		17.4	15.3	14.2	12.4	26.4
Cosmic Origins Future Missions	1.2		1.1	1.5	1.5	1.5	1.5
Spitzer	14.6		3.5	-	-	-	-
Herschel	5.1		1.0	-	-	-	-
Cosmic Origins SR&T	8.8		9.3	10.9	9.8	8.0	22.0
Cosmic Origins Program Management	2.6		2.5	2.9	2.9	2.9	2.9

Astrophysics Program Content (cont'd)

	Actual FY 2015	Enacted FY 2016	Request FY 2017	Notional FY 2018	Notional FY 2019	Notional FY 2020	Notional FY 2021
Physics of the Cosmos	104.1		94.1	88.0	94.1	97.7	94.0
Physics of the Cosmos Future Missions	0.1		0.5	2.1	2.1	2.5	2.5
Euclid	7.5		12.9	7.5	7.7	9.9	6.1
Chandra X-Ray Observatory	55.6		52.4	56.7	57.4	58.4	58.4
Fermi Gamma-ray Space Telescope	16.9		-	-	-	-	-
XMM	2.9		-	-	-	-	-
Planck	6.0		-	-	-	-	-
Physics of the Cosmos SR&T	12.0		25.4	18.5	23.7	23.8	23.9
Physics of the Cosmos Program Management	3.0		2.9	3.2	3.2	3.2	3.2
Exoplanet Exploration	100.6		133.8	148.0	309.3	373.3	450.8
Decadal Strategic Mission (WFIRST)	50.0		90.0	108.2	267.7	331.8	409.9
Exoplanet Exploration Future Missions	0.9		0.5	1.1	8.2	8.3	8.3
Kepler	17.2		2.8	-	-	-	-
Keck Operations	6.0		6.1	6.2	-	-	-
Large Binocular Telescope Interferometer	2.0		1.3	-	-	-	-
Exoplanet Exploration SR&T	19.4		28.0	26.5	27.6	26.9	26.2
Exoplanet Exploration Program Management	5.1		5.1	6.0	5.9	6.3	6.4

Astrophysics Program Content (cont'd)

	Actual FY 2015	Enacted FY 2016	Request FY 2017	Notional FY 2018	Notional FY 2019	Notional FY 2020	Notional FY 2021
Astrophysics Explorer	123.3		129.0	91.0	156.0	203.5	186.2
Transiting Exoplanet Survey Satellite (TESS)	80.1	73.5	87.0	27.9	9.1	2.5	0.0
Other Missions and Data Analysis	43.2		42.0	63.1	146.9	201.1	186.2
Astrophysics Explorer Future Missions	1.1		16.8	42.7	132.2	192.6	178.5
ASTRO-H (SXS)	11.3		12.0	11.4	9.5	-	-
NICER	11.7		3.5	1.3	-	-	-
Nuclear Spectroscopic Telescope Array	7.4		-	-	-	-	-
Swift	4.9		-	-	-	-	-
Suzaku (ASTRO-E II)	0.6		-	-	-	-	-
Astrophysics Explorer Program Management	6.2		9.8	7.7	5.1	8.5	7.7
James Webb Space Telescope	**645.4**	**620.0**	**569.4**	**533.7**	**304.6**	**197.2**	**149.8**
Astrophysics + Webb Total	**1,376.1**		**1,350.9**	**1,295.3**	**1,297.0**	**1,315.8**	**1,342.3**