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Chandra Users' Committee

**CXC Manager's Status Report**  
**For the period October 2013 – September 2014**

**Roger Brissenden**  
**CXC Manager**

**23 October 2014**

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# Topics

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- **Program Management**
- **Mission Operations**
  - Spacecraft
  - Science Instruments and Calibration
  - Mission Planning
  - Operations Control Center
- **Science Operations**
  - CXC Data Systems
  - Calibration
  - Data Processing
- **Chandra Director's Office**
  - GO Program
  - Einstein Program
- **Education and Public Outreach**



# Top Level Summary

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- **Management**
  - Harvey Tananbaum retired as CXC Director after 23 years
  - Belinda Wilkes was appointed CXC Director in April
  
- **Spacecraft and instruments are performing superbly**
  - There are no known spacecraft limitations due to degradation, aging or consumables that would prevent our meeting Level 1 requirements over the course of a 25-year mission



## Top Level Summary

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- **2014 NASA Senior Review**
  - Submitted proposal 31 Jan; SR committee visited 24-27 March
  - Received committee report and letter from Paul Hertz on 15 May. Letter provided direction for the continued operations of Chandra and the planning budget for FY15-FY19.
  - Committee report was extremely positive: “Chandra is the most powerful facility for X-Ray astrophysics, and its unique capabilities have no likely successor in the foreseeable future. ... The prospects for further compelling science return in the future are excellent. This panel enthusiastically endorses the extension of the Chandra mission.”
  - Developed action plan for responding to recommendations; responses in work.

<b>Budget Plan (\$k)</b>				
<b>FY15</b>	<b>FY16</b>	<b>FY17</b>	<b>FY18</b>	<b>FY19</b>
55,780	55,440	55,580	55,610	55,610



# Top Level Summary

## Response to Senior Review Committee Recommendations

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Recommendation	Response
SR14-01. Develop major, focused scientific projects building upon recent scientific successes. Solicit community input for such key projects.	Arranged session on future Chandra science in 15 Years symposium (11/14). Invited chairs of last Decadal Survey as panelists for open session. Will use recommendations in CXC planning. Completion: 2/15/15
SR14-02. Maintain funding of General Observer program at least at the current level.	Confirmed PPBE plan retains current levels of GO funding, subject to continued funding level from HQ. <b>Completed: 8/15/14</b>
SR14-03. Engage younger researchers in long-range planning.	Will utilize opportunities through the 15 Years, CUC, peer review, Einstein Fellows program and development of subsequent senior review proposals to actively involve early career scientists. Completion: 2/15/15
SR14-04. Ensure orderly transfer to HEASARC of data reduction and analysis software and science data.	Develop plan for final calibration, processing and transfer to the HEASARC. Plan to include identification of software. Close action with description of plan and schedule. Completion: 2/15/14; Plan outline 10/15/14



# Top Level Summary

## Response to Senior Review Committee Recommendations

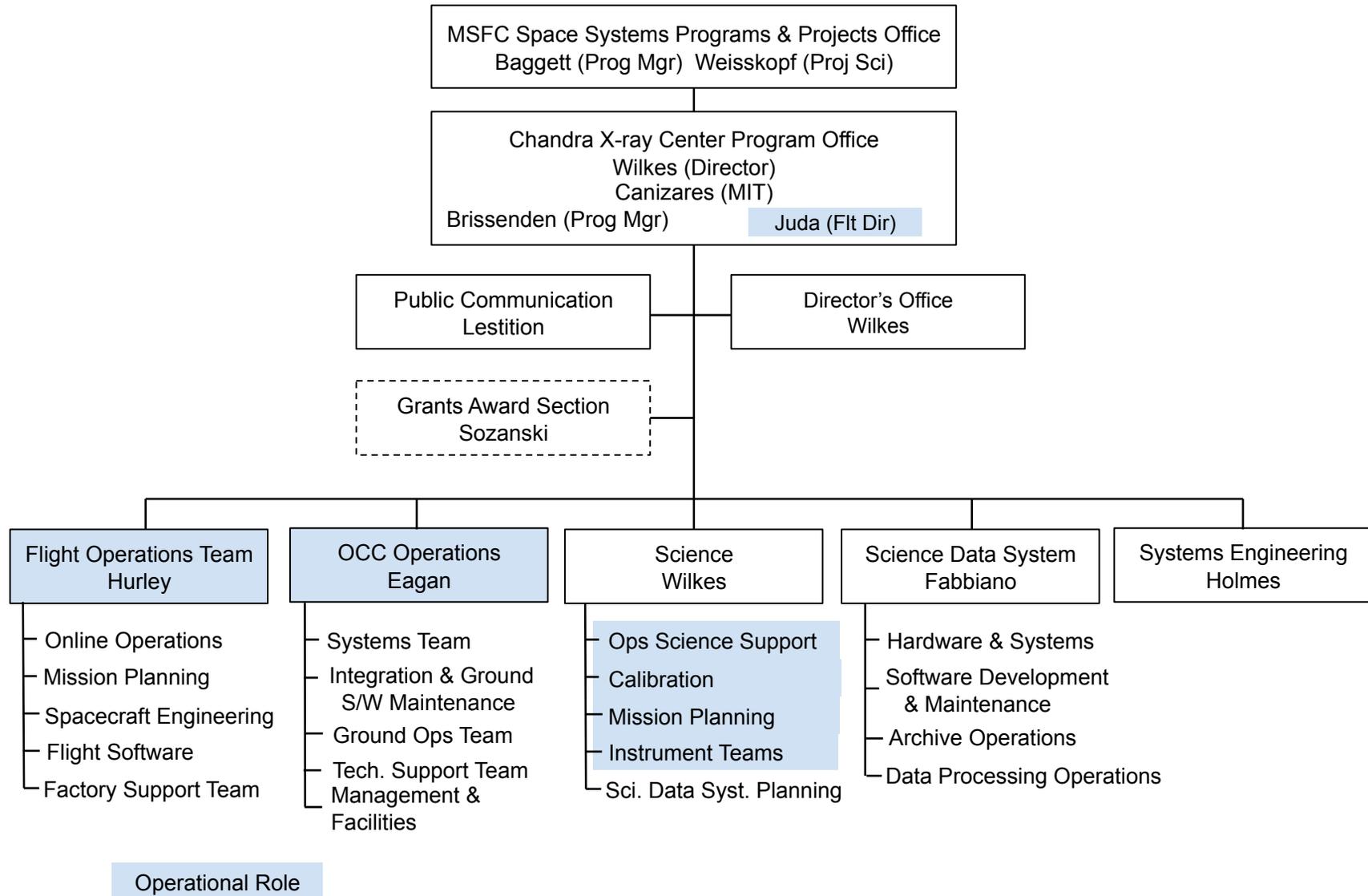
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Recommendation	Response
SR14-05. To reduce cost, engage senior engineers from other NASA projects to review Chandra mission operations and ground systems, with aim of developing new ideas that may result in cost efficiencies.	Convene a team with expertise in mission operations from other missions to discuss Chandra's present mission operations cost model, and discuss lessons learned and approaches to maximize efficiency and minimize cost. Close action with an updated trade study for reducing operations costs. Completion: 4/15/15
SR14-06. Mitigate effects of flat budgets beyond FY16, which would present significant challenges.	Work with HQ through the PPBE process to request inflation in FY17 budget and beyond. Completion: 5/1/15

- Actions to be closed by submission of documents and information to MSFC and presentation at CXC Quarterly Review
- Following concurrence by MSFC and HQ, the CXC program manager will maintain for record and inclusion in the next Senior Review proposal



# Program Management





# Program Management

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- **Contract**
  - Contract (Option 1) currently runs through 30 Sept 2016
  - Option 2 is available through 30 Sept 2019
- **Budget and Staffing**
  - The CXC's budget and expenditures are in line with the PPBE-16 plan
  - Current staffing profile is consistent with PPBE-16
  - CXC is funded through 12 Nov; Einstein program through 30 Apr 15
- **Other**
  - Complying with NASA travel restrictions, which have increased administrative burden at CXC and MSFC
  - HQ assigned CXC to allocate FY14 EPO funding to PCOS missions; submitted plan, solicited requests from missions, arranged transfer mechanism with MSFC, completed transfers



# Program Management

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- **CXC-organized Conferences and Reviews**
  - Einstein Fellows Symposium (29-30 Oct 13) at CfA
  - Chandra Peer Review (23-27 June 14) Boston
  - Workshop: X-ray View of Galaxy Ecosystems (9-11 July 14) Boston
  - CXC Users' Committee (23-24 Oct 14) at CfA
  - Einstein Fellows Symposium (28-29 Oct 14) at CfA
  - 15 Years of Science with Chandra symposium (18-21 Nov 14) Boston



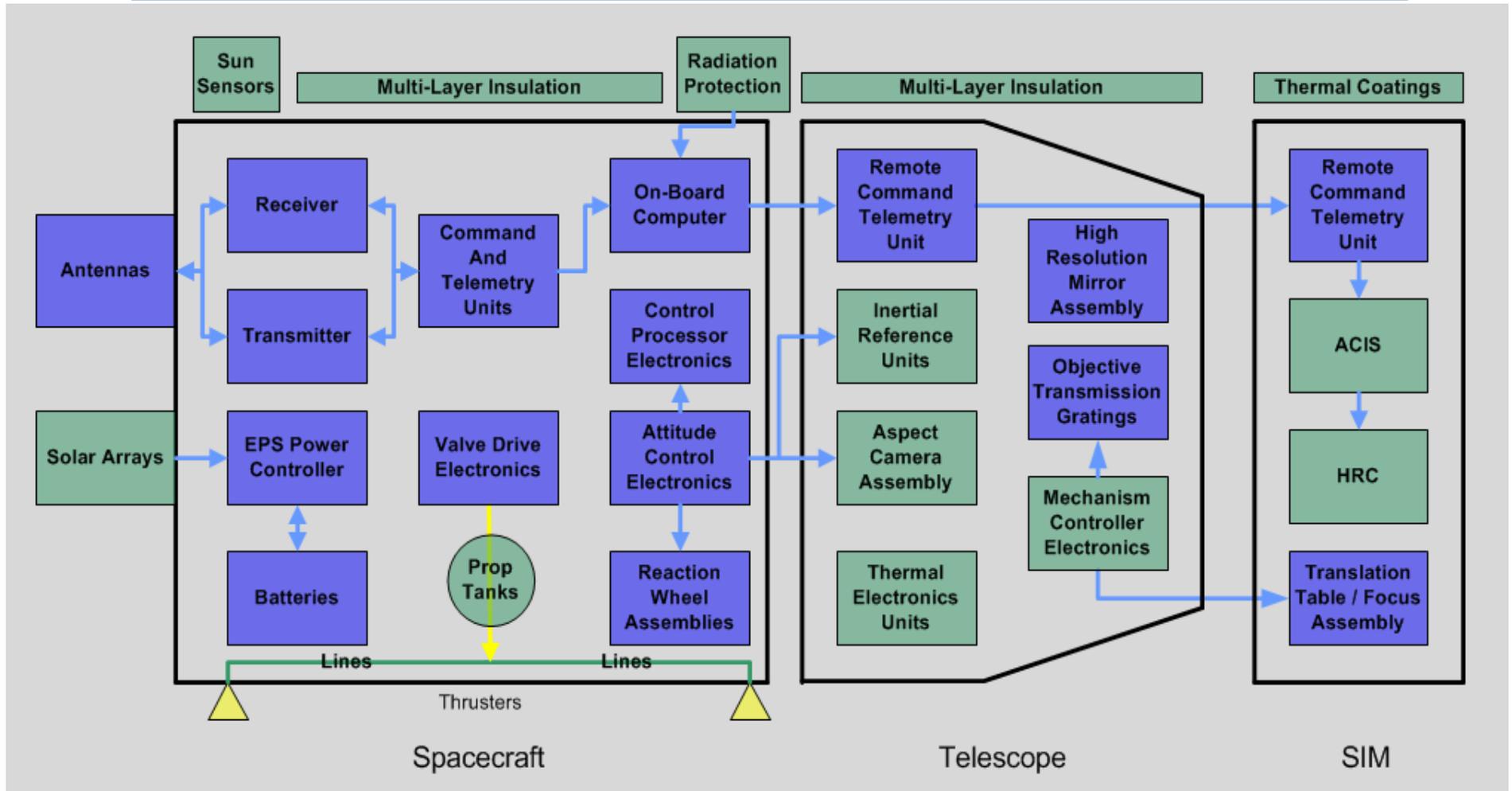
# Mission Operations

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- **Spacecraft**
  - Continues to operate extremely well
  - Nominal passages through eclipse seasons
  - EPHIN was removed from radiation sensing process; supplanted by HRC & ACIS
- **Science Instruments**
  - Instruments are operating extremely well
  - Installed ACIS software patch to eliminate occasionally occurring “trickle-bias” bug
- **Operations Control Center**
  - Smooth operations
  - Installed and tested virtual OCCDS upgrades at backup OCC
- **Mission Planning**
  - 7 fast-turnaround (load interrupting) TOOs during this period
  - Observing efficiency is  $\sim 74\%$ , near maximum but declining due to orbit evolution



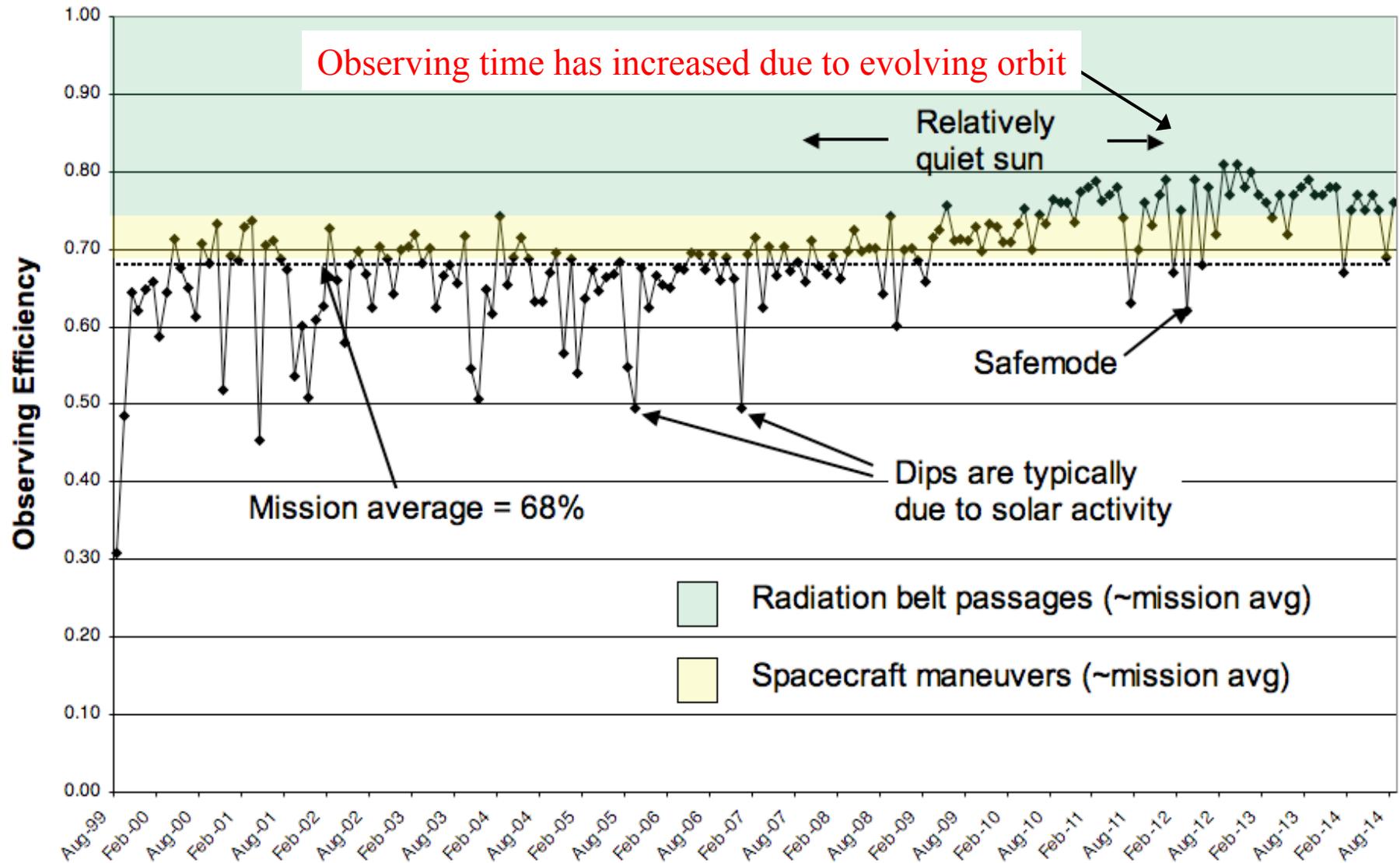
# Spacecraft Subsystem Status



- Subsystem functioning perfectly
  - Minor problem but subsystem meets all requirements
- Moderate problem but manageable
  - Major problem with large impact



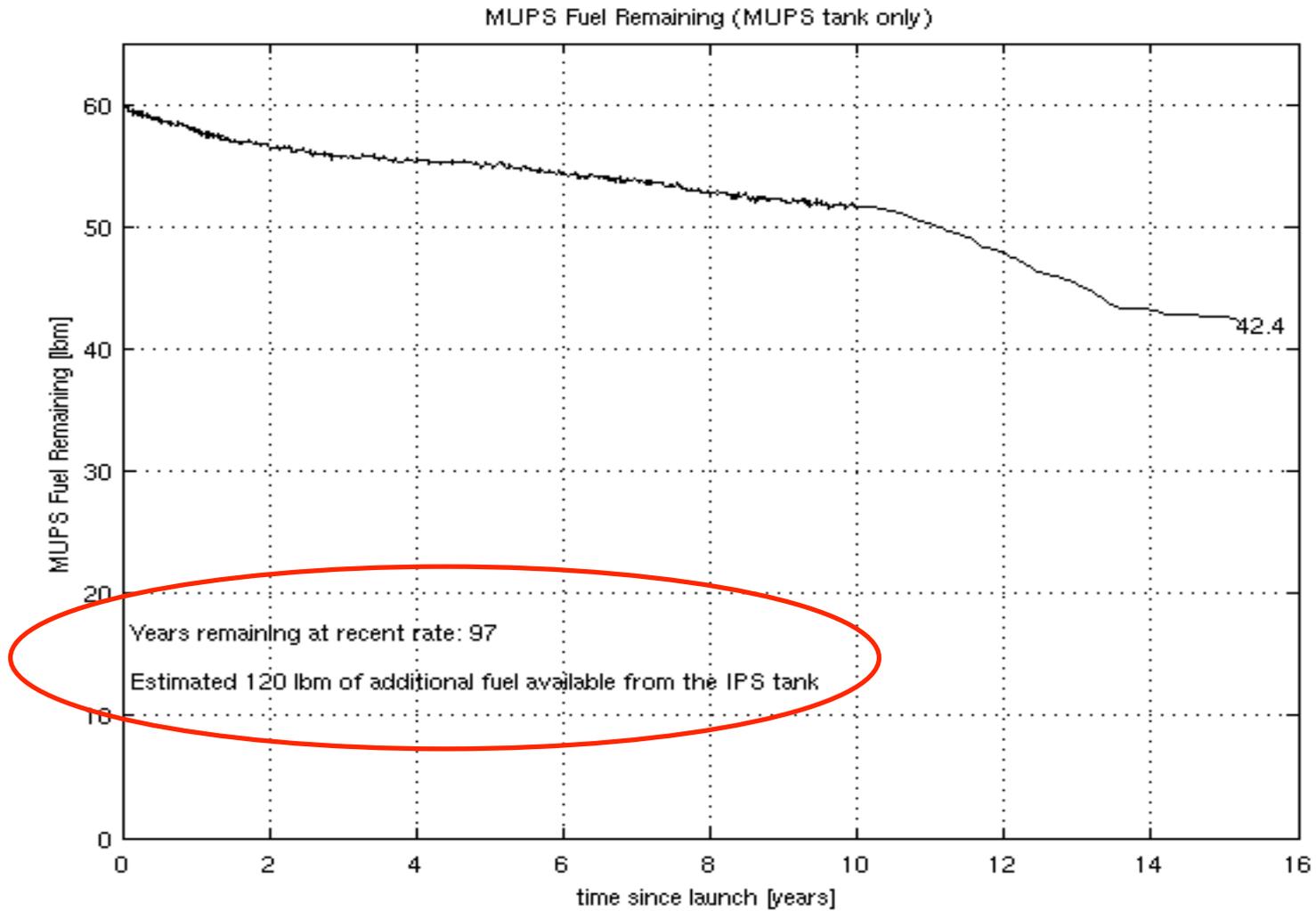
# Mission Operations – Observing Efficiency





# Mission Operations – Consumables

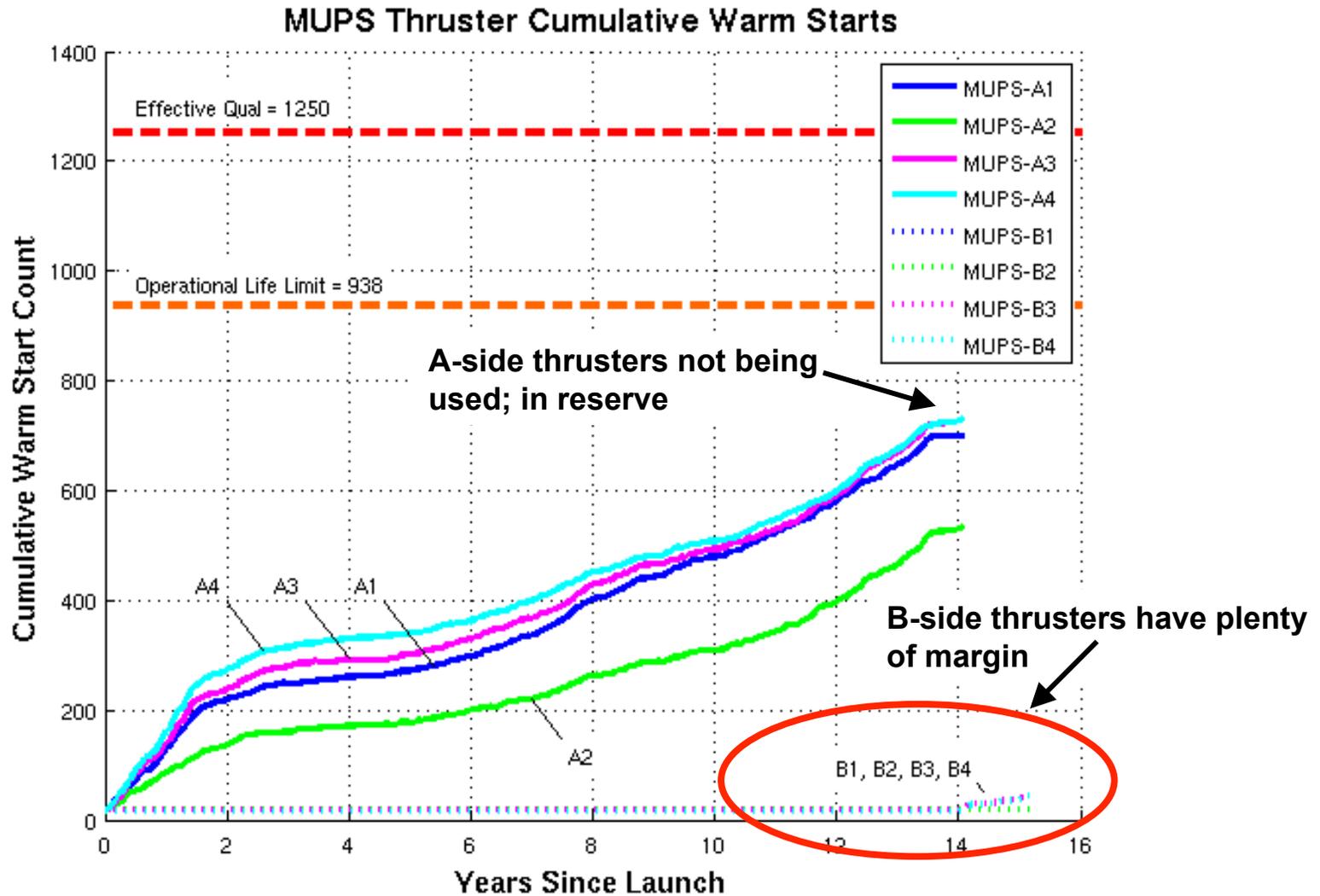
## Momentum Unloading & Propulsion System (MUPS) Fuel Usage





# Mission Operations – Consumables

## MUPS Thruster Warm Starts





## Science Operations

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- **CXC Data System Releases**

<u>Version</u>	<u>Date</u>	<u>Main contents</u>
DS 10.1	08Oct13	Archive server 64 bit migration
DS 10.1.1	29Oct13	SOT aspect V&V parameter update
DS 10.2	12Dec13	CfP16 proposal planning support
DS	23Jan14	Multimon/HEAD mail update
DS 10.2.2	24Apr14	WebReports
DS 10.2.3	29May14	Peer Review GUI & Database
DS 10.2.4	23Jun14	Operations Support
DS 10.3	Oct 2014	Archive Server migration to Linux (major release)

- **CIAO Data Analysis Releases**

<u>Version</u>	<u>Date</u>	<u>Main contents</u>
CIAO 4.6 B2	18Oct13	CIAO 4.6 Beta 2
CIAO 4.6	12Dec13	CIAO 4.6
CIAO 4.6.1	06Feb14	Sherpa Bugfix
CIAO 4.7 B1	18Jul13	Internal Beta 1
Sherpa B1	29Sep14	Public stand-alone beta release



## Science Operations

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- **Data Processing**

- Automatic processing is current; mean time from end of observation to delivery to user remains at about one day

- **Calibration**

- Products released since October 2013**

- Quarterly ACIS detector gain maps
  - Updated ACIS contamination model
  - Annual HRC detector gain maps
  - Annual HRC-1 background image and spectrum

- Products to be released by December 2014**

- Update to ACIS contamination model
  - Revised HRC-S quantum efficiency maps, one for each year since launch



# Science Operations Data Delivery

As of middle of following month						As of 10/7/14			
<u>Month</u>	<u>Number of Obs</u>	<u>Days to Data Delivery</u>			<u>Number Deliv</u>	<u>Number Outstanding</u>	<u>Number Deliv</u>	<u>Number Outstanding</u>	<u>Comments</u>
		<u>Min</u>	<u>Avg</u>	<u>Max</u>					
Oct-13	67	0	1	5	67	0	67	0	
Nov-13	67	0	1	6	67	0	67	0	
Dec-13	75	0	1	11	75	0	75	0	
Jan-14	63	0	1	4	63	0	63	0	
Feb-14	60	0	1	2	60	0	60	0	
Mar-14	53	0	1	5	53	0	53	0	
Apr-14	49	0	1	4	49	0	49	0	
May-14	38	0	1	3	38	0	38	0	
Jun-14	59	0	1	4	59	0	59	0	
Jul-14	55	0	1	11	55	0	55	0	
Aug-14	53	0	1	3	53	0	53	0	
Sep-14	58	0	1	3	58	0	58	0	

Avg delivery ~1 day from observation



## Chandra Director's Office

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- **General Observer Program – Cycle 16**
  - Proposal deadline 13 Mar; peer review 24-27 Jun
  - 637 proposals received (476 U.S., 161 non-U.S.)
    - > Include archive and theory proposals
    - > Time oversubscription: 4.8x
  - Approved 169 observing proposals for 22 Msec
    - > Include 3 X-ray Visionary Projects totaling 5.3 Msec
    - > Allotted observing time includes some time in cycle 17
    - > 126 U.S.-based proposals, 43 non-U.S.
- **Einstein Fellowship Program**
  - 2014 Call for Proposals released 2 Aug 13 (deadline 7 Nov 13)
  - 185 applicants for 12 fellowships
  - New fellows start fall of 2014
  - Fellows symposium 28-29 Oct in Phillips auditorium



# Chandra Director's Office Grant Awards

Month of Data Delivery	Federal Grants <sup>(1,3)</sup>	SAO Grants <sup>(2)</sup>						
		<u>As of middle of following month</u>				<u>As of 10/8/14</u>		
		Non-Federal Grants <sup>(3)</sup>	No. Grants Awarded	No. Outstanding	Avg days to award <sup>(4)</sup>	No. Grants Awarded	No. Outstanding	Outstanding Awards Proposal no, Comments
Oct-13	0	6	6	0	5	6	0	
Nov-13	0	1	0	1	n/a	1	0	
Dec-13	0	3	3	0	14	3	0	
Jan-14	10	58	58	0	18	58	0	
Feb14	0	20	15	5	20	20	0	
Mar-14	0	14	12	2	16	14	0	
Apr-14	0	9	8	1	8	9	0	
May-14	0	11	7	4	5	11	0	
Jun-14	5	13	9	4	7	13	0	
Jul-14	0	9	9	0	11	9	0	
Aug-14	1	12	11	1	10	12	0	
Sep-14	1	11	10	1	11	10	1	15400871

<sup>(1)</sup> Grants awarded to scientists at Federal institutions as interagency transfers through MSFC.  
<sup>(2)</sup> Grants awarded to scientists at non-Federal institutions through SAO Contracts and Grants Department.  
<sup>(3)</sup> Number of grants eligible for award, for which data were delivered to the observer in the month.  
<sup>(4)</sup> Average days from data delivery to grant award to observer.

Grants are typically awarded within ~2-3 weeks of observation



# Education and Public Outreach

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- **Press**

- 1 AAS press release; 12 add'l science, 2 non-science releases; 1 press release posting, 15 image releases, resulting in > 4000 articles in print, web news and science web sites. Monthly estimated audience in tens of millions.

- **Web, Digital, Social Media**

- Public web site attracts average of ~13 million hits per month
- Award-winning podcasts remain the #1 download with ~half million hits/month
- Social media platform continues to grow, with cumulative ~60k Twitter followers. ~200k Facebook likes, >1 million YouTube views, 28k Google+ followers
- New initiatives include Google Hangout, iPhone app, improvements in image processing

- **Public Outreach**

- Launched “Light: Behind the Bulb” for International Year of Light. SPIE-sponsored exhibits in US (AAS Seattle) and internationally. See <http://lightexhibit.org>



## Education and Public Outreach (con't)

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- **Education**

- 23 events at National Science Teachers and 9 other presentations
- National Science Olympiad; supported national competition events and coaches clinics reaching ~100,000 students on over 6000 teams
- HQ designated the CXC as EPO “provider” for Physics of the Cosmos missions for FY14 and FY15; collected and prioritized education activities of PCOS missions, distributed approximately \$800k in funding

- **EPO guidelines**

- EPO guidelines for FY16 are in flux
- There is a hard separation between public outreach and education, although definitions are not clear
- Public Outreach is to be funded from within mission budgets.
- Education is detached from specific mission programs, open to competition. Draft announcement of opportunity to be released soon.