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Chandra Users' Committee

**CXC Manager's Status Report**  
**For the period October 2011 – September 2012**

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

**10 October 2012**

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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**



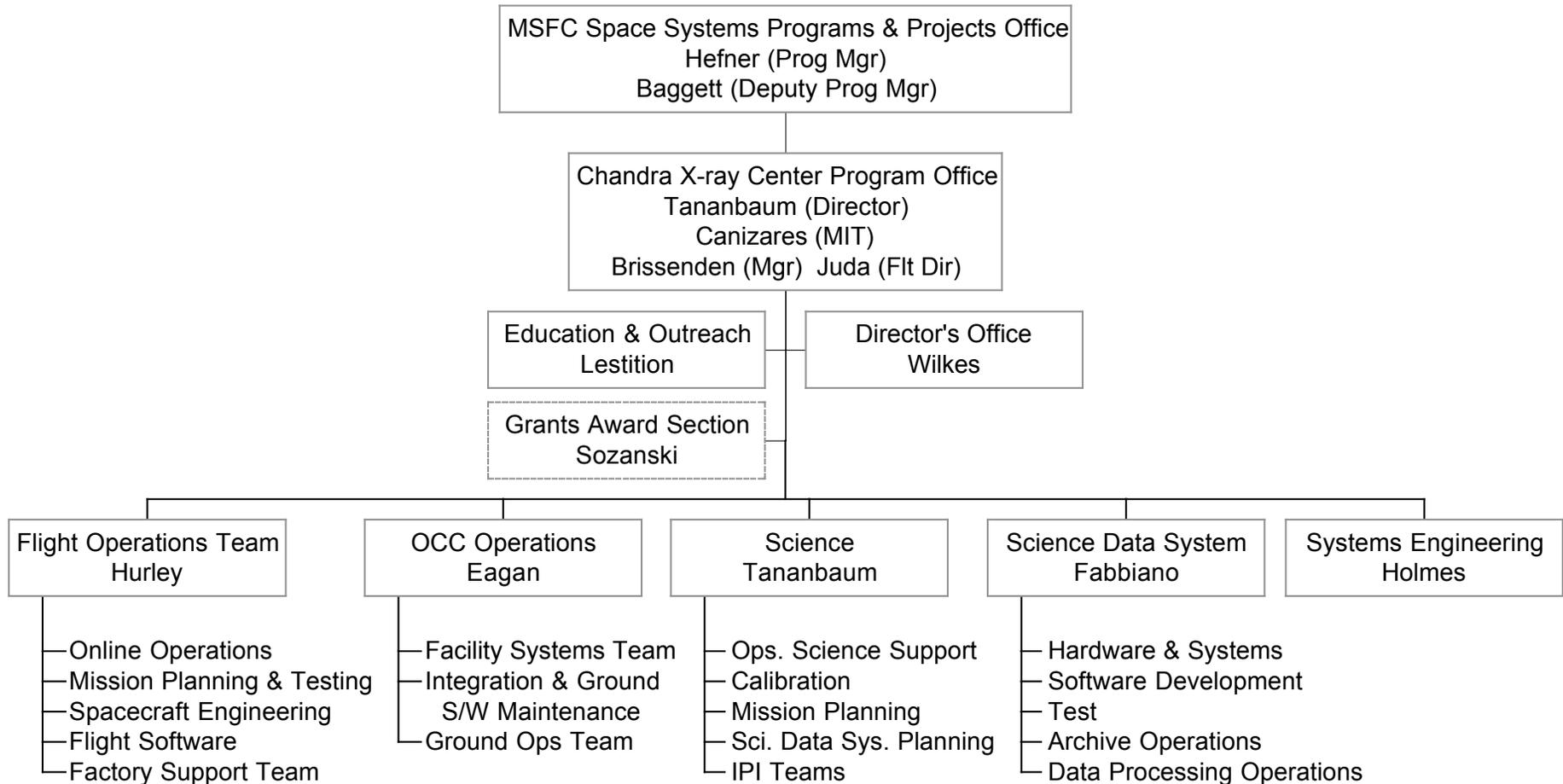
## Top Level Summary

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- **Spacecraft and instruments are performing superbly**
  - Safemode in May resulted from small change in Fine Sun Sensor performance near edge of field of view; no harm; fully recovered and mitigated
  - 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 20-year mission
- **Extremely successful NASA Senior Review**
- **CXC contract extended to 2016 via Option 1**



# Program Management





# Program Management: NASA Senior Review

- Review of operating missions included Chandra, Hubble, Fermi, Kepler, Planck, Spitzer, Suzaku, Swift, XMM-Newton
- Submitted EPO proposal 12/15/11, main proposal 1/18/12
- Presented to SR Committee 2/29/12
- Committee reports released 4/2/12

MISSION	DISCOVERY SPACE	LONG TERM IMPACT	PUBLICATION/\$	SYNERGY	CRITICAL CAPABILITY	HEALTH OF SCIENCE PROGRAM (RYG)
CHANDRA	9	9.5	7	9	9.5	G

- Comments on Senior Review proposal:
  - One of the “two most important missions in this Senior Review.”
  - Recommendations (a) Examine ways to further reduce operations costs; (b) compete all observing time (excluding DDT).
  - “The Senior Review recommends an extension for Chandra with the proposed in-guide budget for FY2013 and FY2014. In addition, the committee recommends the proposed augmentation to increase the GO budget. We recommend an extension through 2016, although the appropriate level of support should be examined at the next Senior Review.”
- Comments on EPO proposal:
  - “This is an outstanding proposal with likely continued success of each of the existing elements and future success of the newer elements proposed. The Chandra E/PO program has proven its value to the general NASA E/PO and broader education community and clearly plans to continue this record in the years to come.”
  - Recommendations: (a) Generate a diversity plan; (b) consider creating a citizen science project; (c) re-evaluate print-products and resources budget.



# Program Management

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- **CXC Contract**

- MSFC exercised Option 1 to extend CXC contract through Sept 2016
- SAO extended subcontractors through Sept 2015, with options through Sept 2019
- Restructured PSU subcontract for ACIS Instrument Principal Investigator program
  - ACIS IPI Gordon Garmire retired from Pennsylvania State University
  - Previously, PSU subcontracted to MIT for GTO research
  - SAO will have separate subcontracts directly with PSU, MIT and Dr. Garmire (as Huntingdon Institute of X-ray Astrophysics) for ACIS IPI program
  - Dr. Garmire remains Instrument Principal Investigator
  - All ACIS subcontracts are in place; will run through Sept 2015, with options through 2019



# Program Management

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- **Budget**

- NASA has provided CXC with ongoing funding through 11/30/12; reduces impact of potential Federal continuing resolutions
- The CXC's budget and staffing are consistent with the current NASA budget plan
- The program budget is flat through FY16, which results in decreasing resources due to inflation. The Senior Review augmentation allows for ~level funding for the GO/archive/DDT programs through FY16 (~\$11M/yr)

- **Staff**

- OCC lead network administrator position is vacant; 2 candidates are scheduled for interviews Provides for baseline period to 9/30/13 with two three-year options to 9/30/16 and 9/30/19
- 2 CXC Data System positions are vacant; no viable candidates after extensive advertising; will use outside recruiter
- 1 SDS scientist to leave in October, per staffing plan



# Program Management

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- **CXC-organized Conferences and Reviews**
  - Portals of the Universe Workshop (26-27 Apr 12) Baltimore
  - Chandra Peer Review (25-29 June 12) Boston
  - Workshop: X-ray Binaries (10-12 July 12) Boston
  - CXC Users' Committee (10-11 Oct 12) at CfA
  - Einstein Fellows Symposium (23-24 Oct 12) at CfA



# Mission Operations

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- **Spacecraft**

- Continues to operate extremely well
- Nominal passages through eclipse seasons
- Independent (“split”) command loads for science and spacecraft commanding were implemented in Dec 2011. Performed successfully during many radiation safings; enables momentum unloading during perigee passages
- Safe mode on 5/28/12 due to erratic data from Fine Sun Sensor-A near edge of field of view; no harm; rapid recovery aided by split command load capability; effect mitigated by reducing size of FOV; FSS-B study in process

- **Science Instruments**

- Instruments are operating extremely well
- Patched flight software to incorporate ACIS in radiation monitoring and safing system
- Developed model that successfully predicts ACIS focal plane temperature, aids in scheduling observations



# Mission Operations

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## Operations Control Center

- Smooth operations
- Contract for OCC air conditioning system upgrade has been signed; bidder's protest resolved; work moving forward; expect completion ~February 2013

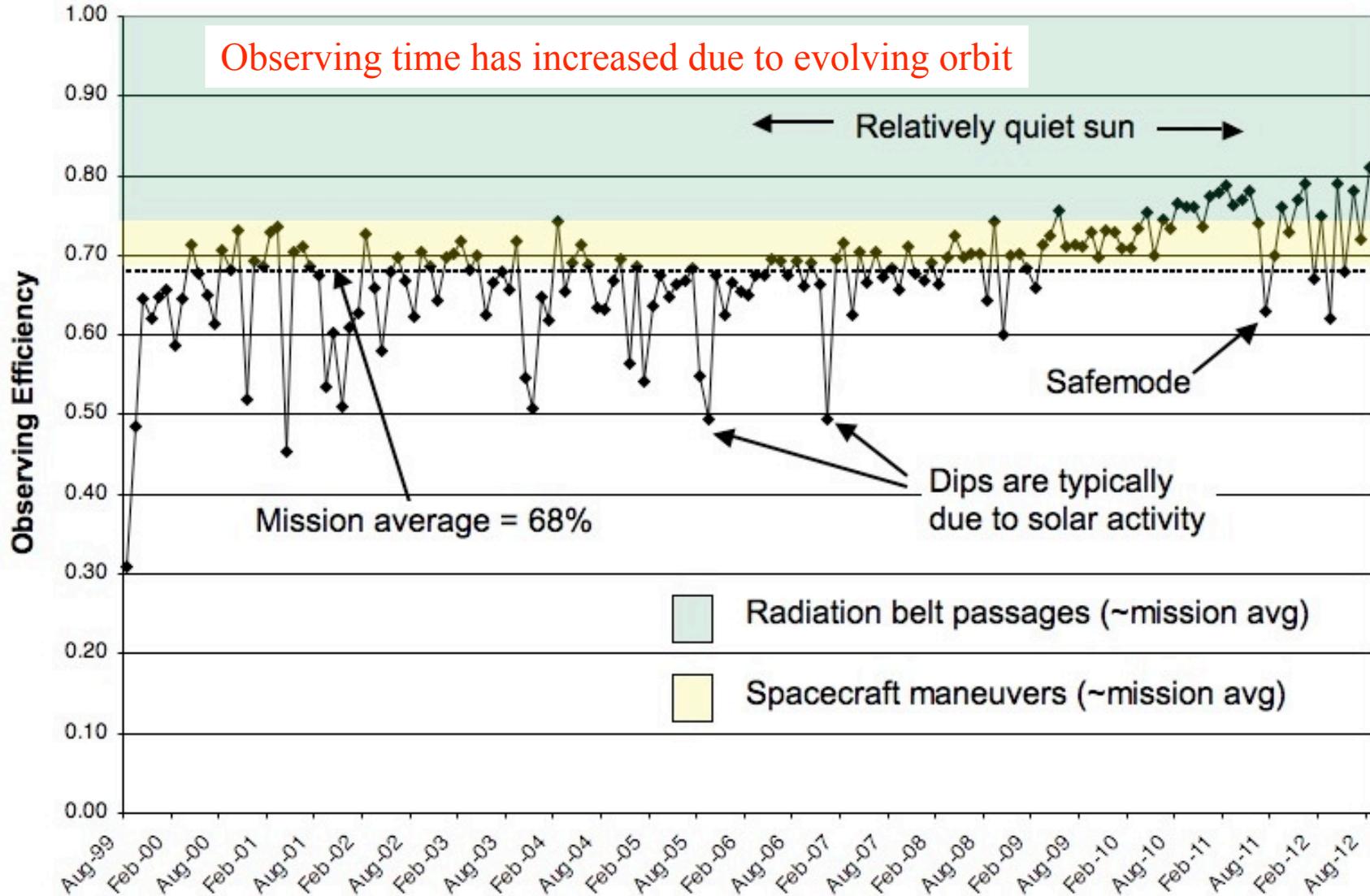
- **Mission Planning**

- 3 fast-turnaround (load interrupting) TOO's during this period
- Observing efficiency is ~80% maximum due to orbit evolution



# Mission Operations

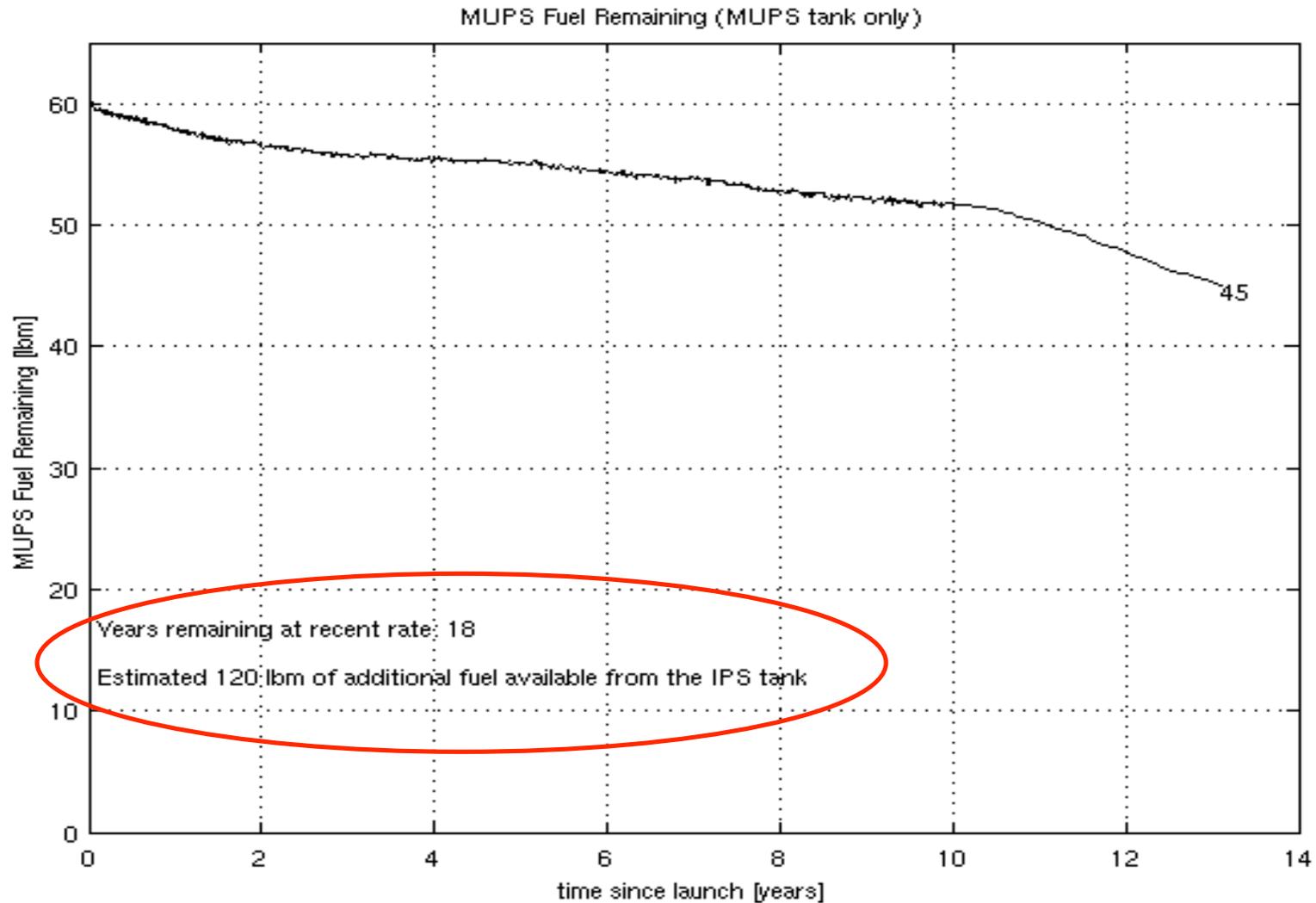
## Observing Efficiency





# Mission Operations – Consumables

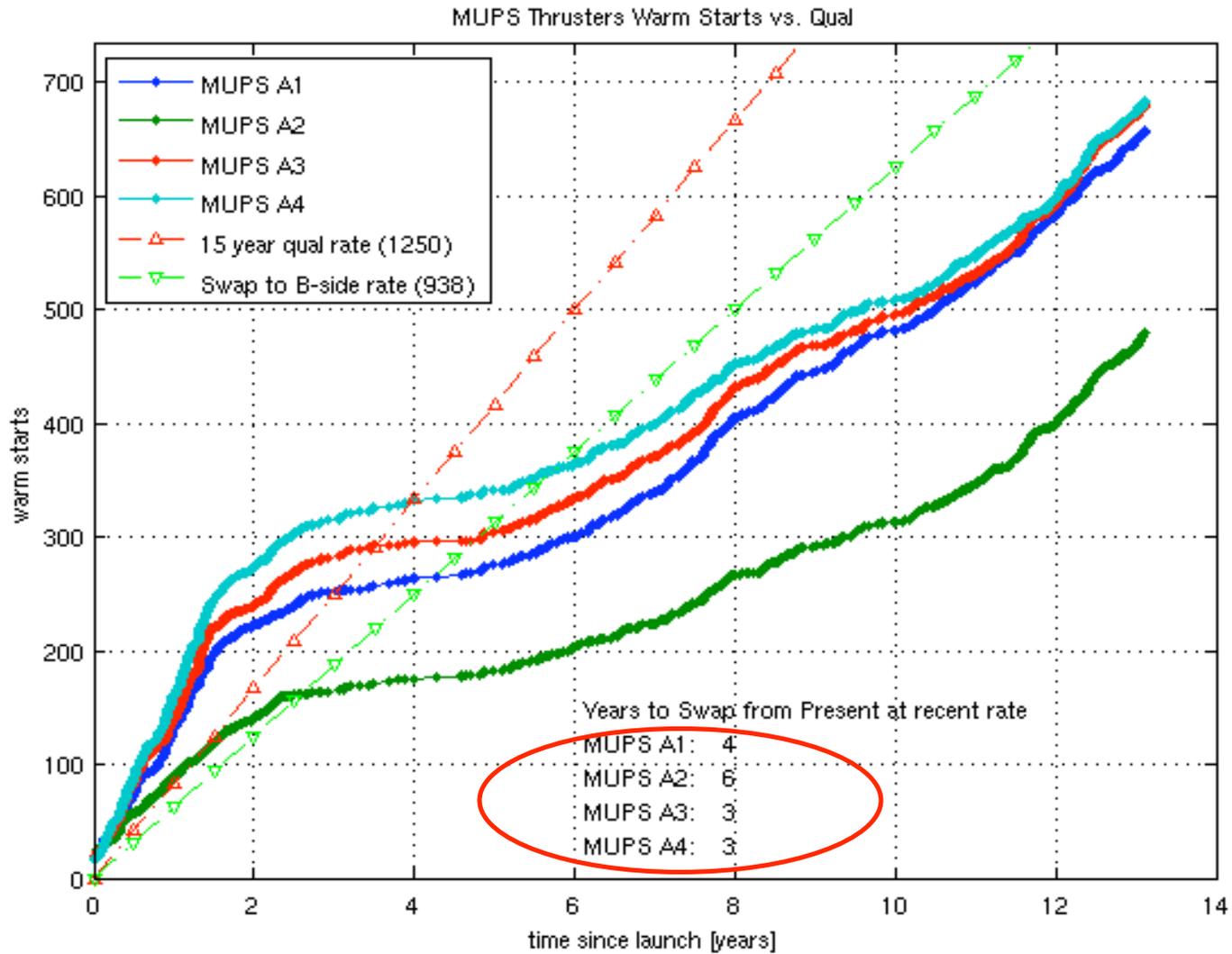
## Momentum Unloading & Propulsion System (MUPS) Fuel Usage





# 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 8.4.1	01Nov11	Repro-IV prep release
DS 8.4.1.1	01Nov11	ACIS-S aimpoint change
DS 8.4.3	14Dec11	CfP 14 proposal planning support
DS 8.4.2	20Dec11	New ACIS afterglow/hotpixel tool for SDP pipeline
DS 8.4.3.1	13Feb12	Small Repro-IV patch - change e-mail notifications
DS 8.4.4	17Apr12	Proposal support; leap second update
DS 8.4.5	23 Mar12	Peer Review support; 2 bug fixes to DSOps

- **CIAO Data Analysis Releases**

<u>Version</u>	<u>Date</u>	<u>Main contents</u>
CIAO 4.4	14Dec11	Annual CIAO release
CIAO 4.4.1	18Jun12	Leap second patch



# 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**

- Released updated ACIS contamination model
- Raised HRC-S high voltage to mitigate decreased detector gain
- Released new HRC-S gain table appropriate to new HV setting
- Planned for Dec 2012:

- Time-dependent ACIS quantum efficiency

- Improved low energy gains for ACIS back-illuminated chips

- QE file for HRC-S matched to new HV setting



# Science Operations Data Delivery

As of middle of following month							As of 9/11/12		
Month	Number of Obs	Days to Data Delivery			Number Deliv	Number Outstanding	Number Deliv	Number Outstanding	Comments
		Min	Avg	Max					
Sep-11	43	0	1	12	43	0	43	0	
Oct-11	68	0	2	26	68	0	68	0	
Nov-11	121	0	1	5	121	0	121	0	
Dec-11	80	0	1	15	80	0	80	0	
Jan-12	62	0	1	14	62	0	62	0	
Feb-12	62	0	2	7	62	0	62	0	
Mar-12	53	0	1	5	53	0	53	0	
Apr-12	57	0	1	3	57	0	57	0	
May-12	53	0	1	8	53	0	53	0	
Jun-12	64	0	1	7	64	0	64	0	
Jul-12	53	0	2	7	53	0	53	0	
Aug-12	55	0	1	9	55	0	55	0	

Avg data delivery ~1 day from observation



## Chandra Director's Office

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- **General Observer Program – Cycle 14**
  - Proposal deadline 3/15/12; 670 proposals received; 5.9x time oversubscription
  - Peer review 6/22-29/12
  - 185 proposals approved for 23.3 Msec, including 4 X-ray Visionary Projects totaling 6.2 Msec
  - 151 U.S.-based proposals, 34 non-U.S.
- **Einstein Fellowship Program**
  - Einstein Fellowship Symposium (Cycle 14) held 25-26 Oct 2011 at GSFC
  - Fellowship Symposium (Cycle 15) to be held 23-34 Oct 2012 at CfA
  - Einstein Fellowship applications (Cycle 16) due 1 Nov 2012



# Chandra Director's Office Grant Awards

Month of Data Delivery	Federal Grants (1,3)	SAO Grants (2)						
		<u>As of middle of following month</u>				<u>As of 9/11/12</u>		
		Non-Federal Grants (3)	No. Grants Awarded	No. Outstanding	Avg days to award (4)	No. Grants Awarded	No. Outstanding	Outstanding Awards Proposal no, Comments
Sep-11	1	17	15	2	26	17	0	
Oct-11	1	13	11	2	15	13	0	
Nov-11	1	16	16	0	12	16	0	
Dec-11	1	17	11	6	25	17	0	
Jan-12	2	50	46	4	21	50	0	
Feb-12	1	24	24	0	12	24	0	
Mar-12	0	11	11	0	17	11	0	
Apr-12	2	11	9	2	13	11	0	
May-12	1	10	7	3	15	10	0	
Jun-12	1	14	13	1	20	14	0	This number includes 4 Einstein fellowship awards.
Jul-12	0	20	18	2	19	18	2	13610546 A & B: awaiting paperwork. This number includes 11 Einstein fellowship awards.
Aug-12	0	18	17	1	15	17	1	13400312 to be awarded. This number includes 12 Einstein fellowship awards.

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

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



# Education and Public Outreach

## Highlights

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- **Press**
  - 1 NASA media telecon, 1 AAS press event (plus press releases)
  - 10 science press releases, 18 image releases, 2 non-science releases
- **Web, Digital, Social Media**
  - Redesigned public web site to include large screen display, other improvements
  - Completed tagging all ~6000 public images with World Coordinate System data for compatibility with widely accepted Astronomy Visualization Metadata standards
  - 2 Pixie awards for videos
- **Public Outreach**
  - Participated in USA Science & Engineering Fair (D.C.) and others
  - Launched “From Earth to the Solar System” exhibit; >100 installations worldwide
- **Education**
  - 21 events at National Science Teachers & other professional education meetings
  - Chandra-themed issue of The Earth Scientist (magazine for middle school teachers)
  - Intensive summer Astrophysics Institute (19 students, 4 pre-service teachers)
  - Clinic for National Science Olympiad; supported national competition events