Space Science Mission Operations Project (Code 444)

Ron Mahmot
Project Manager

Patrick Crouse
Deputy Project Manager

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Mission Business Manager

Andy Dantzler
Acting Senior Project Scientist

June 26-27, 2003
Wallops Flight Facility

AGENDA

- Organization overview
- Current Missions
- Future Missions
- Selected Items of Interest
  - Space Link Extension (SLE)
  - IT Security
  - AIAA Space Operations and Support Technical Committee
- Areas for More Work

Organization Overview

Space Science Mission Operations Project

Charter

- SSMO has management responsibility for the safe and productive operations of Goddard Space Flight Center Space Science missions in the operations phase and for selected GSFC instrument operations on non-GSFC managed spacecraft operations
- SSMO works with missions in the development phase to feedback lessons learned and to ensure that operations concepts are sustainable
- SSMO works with the GSFC Mission Services Evolution Center (GMSEC) to ensure that the mission services infrastructure is kept current, and that technology development and infusion efforts are integrated with mission needs

Operations Philosophy

- Mission safety is the number one priority
- Goal is to maximize science data collection within budget and risk constraints

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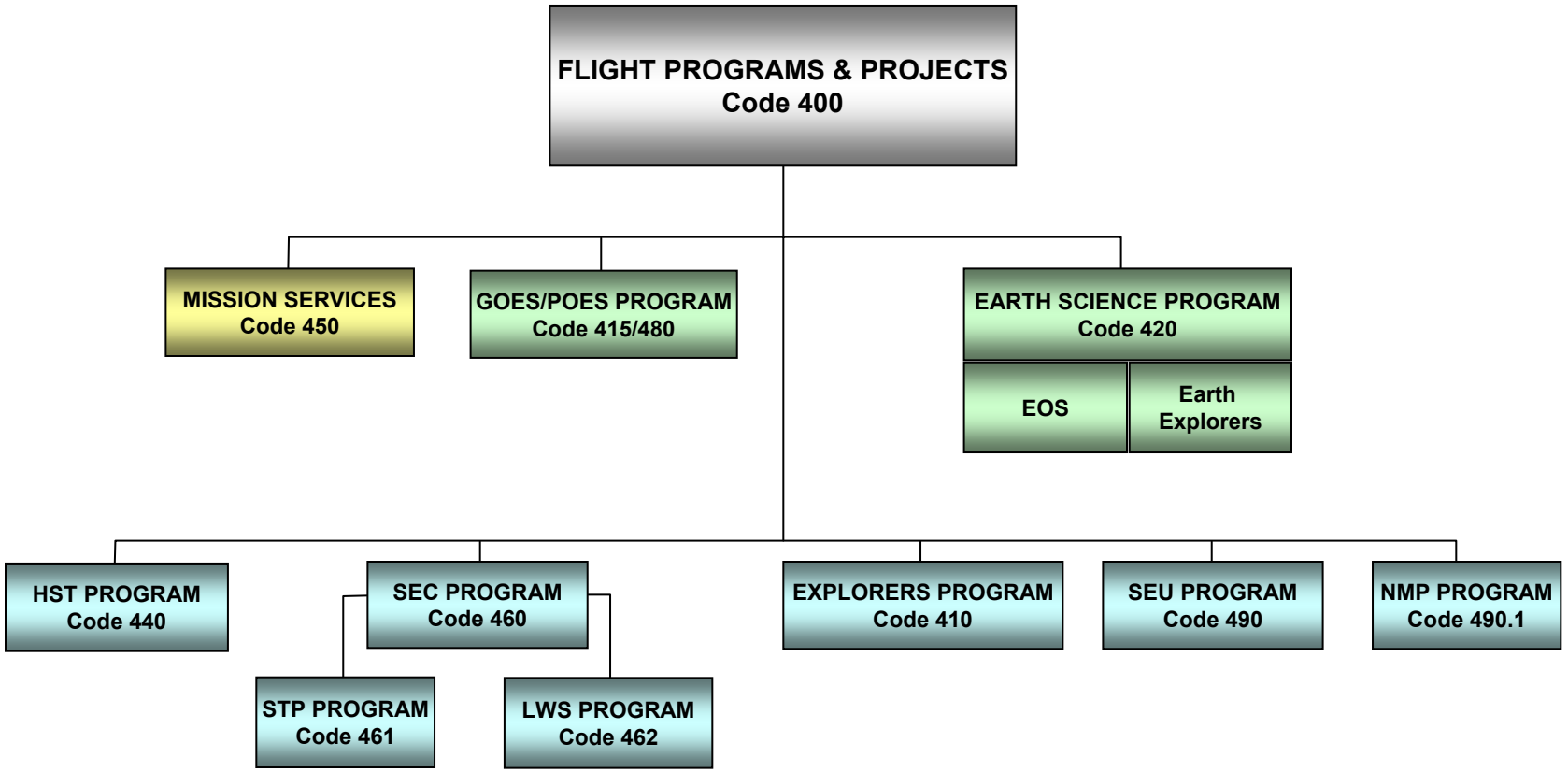
Organization Overview



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Organization Overview

Space Science Mission Operations (SSMO)

Project Manager
Ronald E. Mahmot
Patricia Robinson +
Project Secretary

SSMO Deputy Project Manager
Patrick Crouse

SSMO Deputy Project Manager/ Resources
Susan M. Sparacino +

Senior Project Scientist for SSMO
Andrew A. Dantzler *

SSMO Project Financial Manager
Gregory R Manfra +

SSMO Project Support Manager
Hilda Thien +

SSMO Mission Business Manager
Valda Jones +

SSMO Resource Analyst
Dianne Lim +

SSMO Resource Analyst
Priti Vasudeva +

SSMO Project Administration
Clayton A. Stokes III

SSMO Mission Engineer
Scott E Glubke

SSMO IT Security Officer
Richard Chu

SSMO Configuration Management Officer
Lou Barbieri

Mission Director
SOHO, CLUSTER *
Robert N Dutilly

Mission Director
RXTE, IMP,ACE ,FUSE
TIMED, GLAST
Robert J Sodano

Mission Director
HETE-2 *, WIRE *
Patrick Crouse

Mission Director
SWAS, FAST, RHESSI
SAMPEX, TRACE
Maureen P Madden

Mission Director
INTEGRAL, XMM
Leslie Ambrose

Mission Director
GALEX, WIND, POLAR,
GEOTAIL
Stephen K Odendahl

Mission Director
IMAGE
Richard J Burley

Mission Director
WMAP
Steven E Coyle

Mission Director
CHIPS
Gary F Meyers

+ Shared between Projects

* Acting

Original Signed By **June 4 2003**

Ronald E Mahmot, Space Science Mission Operations Project Manager **Date**

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Mission Set
Mission Parameters

Mission	Launch Date	Orbit Type	Attitude Control	Network	Control Center
ACE	08/25/97	L1	Spin @ 5 rpm	DSN	GSFC/CSOC
CHIPS	01/13/03		3-axis	UCB/Adelaide/GN	UCB
FAST	08/21/96	4150 km X 348 km @ 83 deg	Spin @ 12 rpm	GN	UCB
FUSE	06/24/99	775 km circ @ 25 deg	3-axis	UPRM/GN/SN	JHU
GALEX	04/28/03		3-axis	USN/SN	Orbital
Geotail	07/24/92	2 x 210 Re Equatorial	Spin @ 20 rpm	DSN/ESA	ISAS
HETE-2	10/09/00	625 km circ Equatorial	3-axis	MIT	MIT
IMAGE	03/25/00	1000 km X 45900 km @ 90 deg	Spin @ 0.5 rpm	DSN	GSFC/Honeywell
WMAP	06/30/01	L2	Spin @ 0.5 rpm	DSN	GSFC/Honeywell
Polar	02/24/96	2 X 9 Re @ 86 deg	Spin @ 10 rpm	DSN	GSFC/CSOC
RHESSI	01/24/02	600 km circ @ 38 deg	Spin @ 15 rpm	UCB/GN	UCB
RXTE	12/30/95	565 km X 583 km @ 23 deg	3-axis	SN	GSFC/CSOC
SAMPEX	07/03/92	550 km X 675 km @ 82 deg	3-axis	GN	BSU/GSFC/CSOC
SOHO	12/02/95	L1	3-axis	DSN	GSFC/CSOC
SWAS	12/02/98	600 km circ @ 70 deg	3-axis	GN	GSFC/CSOC
TIMED	12/07/01	625 km circ @ 74 deg	3-axis	APL/USN/SN	APL
TRACE	04/02/98	600 km X 650 km @ 97 deg	3-axis	GN	GSFC/CSOC
Wind	11/01/94	Variable/250 Re Max	Spin @ 20 rpm	DSN	GSFC/CSOC

Mission Set
Reentry Analysis

Name of S/C	Earliest Reentry	Reentry Analysis Completion Date	Would uncontrolled reentry result in greater than 1 in 10,000?	Controlled reentry via thrusters possible?	Shuttle return possible?	End of Mission Plan Completion Date	Comment
WIRE	10/2005	10/2000	No (5.75 m^2)	No	No	TBD	DAS 1.0 analysis. 254 Kg Mass
SAMPEX	11/2008	02/2001	No (1.44 m^2)	No	No	TBD	DAS 1.0 analysis. 161 Kg Mass
RXTE	8/2009	07/2001	Yes (30.3 m^2)	No	No	TBD	DAS 1.5.3 analysis. 3031 Kg Mass
HETE-2	2011	05/2000	No (<1 m^2)	No	No	TBD	DAS 1.0 analysis. 125 Kg Mass
TIMED	2015	4/1999	Yes (9.2 m^2)	No	No	TBD	DAS 1.0 analysis. 587 Kg Mass
TRACE	07/2020	1/2002	No (6.74 m^2)	No	No	TBD	DAS 1.5.3 analysis. 214 Kg Mass
FAST	2027 +	03/2002	TBD	No	No	TBD	187 Kg Mass
FUSE	2027 +	05/2002	TBD	No	No	TBD	1335 Kg Mass
SWAS	2027 +	07/2002	TBD	No	No	TBD	283 Kg Mass
GEOTAIL	Centuries	N/A	N/A	No	No	TBD	9 R_e x 30 R_e Orbit
IMAGE	Centuries	N/A	N/A	No	No	TBD	1000 x 7000 Km Orbit
IMP-8	Centuries	N/A	N/A	No	No	TBD	35 R_e Orbit
POLAR	Centuries	N/A	N/A	No	No	TBD	2 R_e x 9 R_e Orbit
WIND	Centuries	N/A	N/A	No	No	TBD	5 R_e x 185 R_e Orbit
ACE	Never	N/A	N/A	No	No	TBD	L1 Orbit
SOHO	Never	N/A	N/A	No	No	TBD	L1 Orbit
	Spacecraft may violate 25 years after end of mission guideline					Spacecraft violates 8 m^2 debris casualty area guideline	

Mission Set
Future Missions/Strategic Planning

- Establishing Memorandums of Agreement with Space Explorers, Sun Earth Connections, and Structure and Evolution of the Universe Programs
  - **Involve operations early in the project life cycle (operations concept development, trade studies, best practices/lessons learned)**
  - **Communicate SSMO requirements and criteria for successful transition**
  - **Facilitate maintenance and evolution of operations infrastructure**

- Working with the GSFC Mission Services Evolution Center (GMSEC) to ensure that the mission services infrastructure is kept current, and that technology development and infusion efforts are integrated with mission needs

- Some missions of particular interest:
  - **Swift – University based operations/DAS user - '04**
  - **Stereo – 2 satellites at Lagrange points – '05**
  - **GLAST and SDO – GSFC-based operations - '06-'08 timeframe**
  - **MMS – constellation operations -'09**

Selected Items of Interest

Space Link Extension (SLE)

- Agreed to eliminate use of 4800 Bit Block communications with DSN
- DSN and ESA currently use SLE (Ex: Integral) to facilitate interoperability
- SSMO is currently providing WIRE as an on-orbit asset to evaluate AVTEC system in Wallops antenna
  - **Commanding performed from Houston during this phase**
  - **SSMO and GMSEC anticipate continuing effort from GSFC**
  - **Evaluating SLE for 4800 BB replacement with DSN**
- Considering demonstration/test of SLE for SOHO commanding via ESA assets

Selected Items of Interest

IT Security

- **Recent decision to move JPL/DSN off of the Closed IONet**
  - Creation of "Restricted" IONet
  - Migration timeline to be established
  - "Transparent" to the user
  - Implications for GN?
- **Implementation of SAFS/CSAFS architecture**

Selected Items of Interest

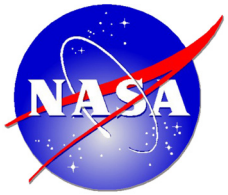
AIAA Space Operations and Support Technical Committee

- Best Practices
  - **Effort is geared at developing satellite operations industry-wide best practices**
  - **Focus has been on satellite operations and operations management**
  - **Working document available**
  - **Support was included in the Mission Operations and Mission Services (MOMS) SOW**
  - **Could benefit from network operations experiences**

- Annual Workshop
  - **Usually tracks in Best Practices, Tools and Technologies, Automation, Launch Support Operations, etc.**

Areas for More Work

- Understand impact of recent SOHO High Gain Antenna anomaly
- Continue along path of increased automation (Wind/Polar/ACE)
- Establish Svalbard as a SMEX GN resource
- Work CSOC to Mission Operations and Mission Services (MOMS) transition
- Define requirements and establish viable backup control centers as necessary
- Keep lines of communication open
  - **Separate Services (Mission and Data)**
  - **Still an integrated and interrelated system**



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Acronym List

ACE	Advanced Composition Explorer
APL	Applied Physics Laboratory (JHU)
CDHF	Central Data Handling Facility
CHIPS	Cosmic Hot Interstellar Plasma Spectrometer
CSOC	Consolidated Spacecraft Operations Contract
DPU	Data Processing Unit
DSN	Deep Space Network
ESA	European Space Agency
ESTEC	European Space Research & Technology Centre, Noordwijk, Holland
FAST	Fast Auroral SnapshoT Explorer
FDF	Flight Dynamics Facility
FOT	Flight Operations Team
FUSE	Far-Ultraviolet Spectroscopic Explorer
Geotail	Geomagnetic Tail Laboratory
HETE	High Energy Transient Explorer
IMAGE	Imager for Magnetopause-to-Aurora Global Exploration
IMP	Interplanetary Monitoring Platform
IRU	Inertial Reference Unit
JHU	Johns Hopkins University
LASP	Laboratory for Atmospheric and Space Physics
MAP	Microwave Anisotrophy Probe
NISN	NASA Integrated Services Network
OSS	NASA's Office of Space Science
PACOR II	Packet Processor
PI	Principal Investigator
Polar	Polar Plasma Laboratory
PSLA	Project Service Level Agreement
RHESSI	Reuven Ramaty High-Energy Solar Spectroscopic Imager
RXTE	Rossi X-Ray Timing Explorer
SAMPEX	Solar Anomalous Magnetospheric Particle Explorerrer
SDP	Science Data Processing
SEC	Sun-Earth Connection
SMEX	Small Explorers
SODA	Space Operations Development Activity
SOHO	Solar Heliospheric Observatory
SOMO	Space Operations Management Office
SOW	Statement of Work
SSMO	Space Science Mission Operations
SWAS	Submillimeter Wave Astronomy Satellite
TDRSS	Tracking and Data Relay Satellite System
TRACE	Transition Region and Coronal Explorer
UCB	University of California at Berkeley
Wind	Interplanetary Physics Laboratory