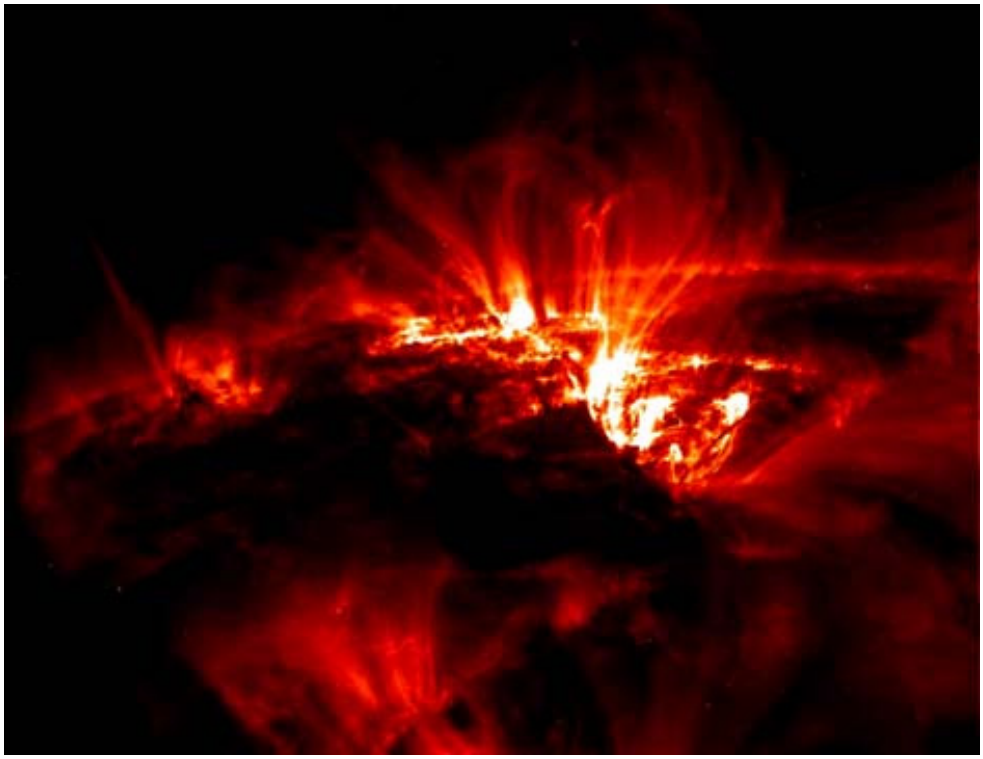
Theme: Sun-Earth Connection



Iron ions heated to a temperature of 1.3 million degrees illuminate filamentary magnetic structures in the Sun's atmosphere. This extreme ultraviolet snapshot, obtained by the Transition Region And Coronal Explorer (TRACE) satellite in September 2000 also shows intricate bright patterns, called "moss," near the solar surface.

Link to Sun-Earth Connection at "http://sec.gsfc.nasa.gov/".

Sun-Earth Connection

MAJOR EVENTS IN FY 2005

- The Solar-Terrestrial Relations Observatory (STEREO) will launch in November 2005. STEREO will use two identically equipped spacecraft to provide revolutionary 3-D imaging of Coronal Mass Ejections.
- The Solar Dynamics Observatory (SDO) will continue in development in FY 2005. It is a cornerstone mission in the Living With a Star program. SDO will study the Sun's magnetic field and the dynamic processes that influence space weather.

Theme: Sun-Earth Connection

OVERVIEW

Life and society on Earth can prosper within a relatively stable and safe biosphere because the Sun provides a steady energy source to Earth, and Earth's upper atmosphere and magnetic field shield the planet from external influences. The Earth's upper atmosphere and magnetic field form a coupled system with the Sun and geospace (the space inside the protective cavity of Earth's magnetic field). This is evident in auroral displays at Earth's poles, and in the belts of high-energy particles encircling Earth and extending out to distances where communication and weather spacecraft operate. The Sun-Earth Connection (SEC) program seeks to understand how the Sun, geospace, and Earth's upper atmosphere are connected in a single system.

Missions	Goals supported by this Theme	Objectives supporting these Goals
To Understand and Protect Our Home Planet	1. Understand the Earth system and apply Earth system science to improve prediction of climate, weather, and natural hazards.	1.3 Understand the origins and societal impacts of variability in the Sun-Earth connection.
To Explore the Universe and Search for Life	5. Explore the solar system and the universe beyond, understand the origin and evolution of life, and search for evidence of life elsewhere.	5.6 Understand the changing flow of energy and matter throughout the Sun, heliosphere, and planetary environments.
		5.7 Understand the fundamental physical processes of space plasma systems.

RELEVANCE

The system comprised of the Sun, Earth's upper atmosphere, their magnetic fields, and geospace, is dynamic. The changes to this system, commonly known as space weather, have important implications for life and society. Space weather effects may induce some climate shifts, modify the ozone layer, change the propagation of radio and radar signals in and through the ionosphere, and produce significant effects on any object or person outside the atmosphere. Increasing our understanding of solar variability, its space weather effects, and its implications for technology and life on Earth will lower the risk of failure or degraded performance of new technologies and maintain the U.S. industry's competitiveness in the global marketplace.

Education and Public Benefits
The Sun-Earth Education Forum and Regional Broker/Facilitator institutions work together to develop and support partnerships between SEC scientists and education professionals in formal and informal settings as well as to encourage coordination of activities. The SEC Division also has significant science resources to share with the public. In the modern age, space exploration continues to thrill the public with new discoveries that help build a better understanding of the Sun, near-Earth space, the solar system, and the universe. The public is informed through news releases highlighting solar events, high-production-value films bringing the excitement of SEC science and research to life, documentaries, innovative planetarium shows, exhibits at museums and science centers, and rich web site environments. A significant fraction of the U.S. population retains an abiding fascination with space exploration and discovery that can be used to improve science literacy throughout the Nation.

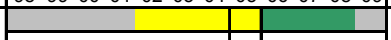
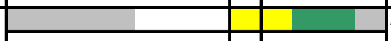
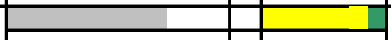
IMPLEMENTATION

The SEC theme is composed of many elements that work together to achieve the program's goals and objectives. Repeated management and scientific peer reviews ensure that each mission provides data in a cost-effective manner. In many cases, the data obtained from different missions are complementary, and are combined in cross-disciplinary studies by members of the scientific community.

Theme responsibility resides in the Space Science Enterprise (SSE) at NASA Headquarters. Enterprise official is Dr. Edward Weiler, Associate Administrator for SSE. Theme director and point of contact is Dr. Richard Fisher, director of the SEC Division at Headquarters. This theme is in full compliance with NPG 7120.5B.

Theme: Sun-Earth Connection

IMPLEMENTATION SCHEDULE

Theme Element	Schedule by Fiscal Year 98 99 00 01 02 03 04 05 06 07 08 09	Purpose
Solar-Terrestrial Relations Observatory (STEREO)		Understand the cause and mechanisms of Coronal Mass Ejection initiation.
Time History of Events and Macroscale Interactions During Substorms (THEMIS)		Answer fundamental questions regarding magnetospheric substorm instability, a dominant mechanism of transport and explosive release of solar wind energy within Geospace.
Aeronomy of Ice in the Mesosphere (AIM)		Study Polar Mesospheric Clouds.
Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED)		Prime Mission.
Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI)		Prime Mission.
Solar Dynamics Observatory (SDO)		Observe Sun's dynamics to help determine the nature and sources of solar variability.
Solar B		Reveal the mechanisms of solar variability.
Two Wide-angle Imaging Neutral-atom Spectrometers (TWINS) - A		Establish global connectivities & causal relationships in different regions of magnetosphere.
Two Wide-angle Imaging Neutral-atom Spectrometers (TWINS) - B		Establish global connectivities & causal relationships in different regions of magnetosphere.
Coupled Ion Neutral Dynamics Investigation		Understand the dynamics of Earth's ionosphere.
Space Technology (ST) 5		Demonstrate and flight-qualify a set of nanosats for application to future space missions.
Solar and Heliospheric Observatory (SOHO)		Extended missions are based on senior review.
Wind		Extended mission (based on senior review)
Polar		Extended mission (based on senior review)
Geotail		Extended mission (based on senior review)
Ulysses		Extended mission (based on senior review)
Voyager		Extended mission (based on senior review)
Advanced Composition Explorer (ACE)		Extended mission (based on senior review)
Fast Auroral SnapshoT Explorer (FAST)		Extended mission (based on senior review)
Solar Anomalous and Magnetospheric Particle Explorer (SAMPEX)		Extended mission (based on senior review)
Transition Region and Coronal Explorer (TRACE)		Extended mission (based on senior review)
Imager for Magnetopause-to-Aurora Global Exploration (IMAGE)		Extended mission (based on senior review)
Magnetospheric Multiscale (MMS)		Understand fundamental processes that connect broad ranges of the magnetosphere.
Global Electrodynamic Connections (GEC)		Obtain systematic multi-point measurements to increase understanding of the ionosphere-thermosphere.
ITM Geospace Mission		Study of effects of changes in solar activity on Earth's ionosphere and thermosphere.
Radiation Belt Mapper (RBM) Geospace Mission		Study of effects of changes in solar actvity on Earth's radiation belts.

Tech & Adv Concept Development Operations Research

No exceptions to NPG 7120.5B have been taken

Theme: Sun-Earth Connection

STATUS

During 2003, the SEC theme accomplished the following: completed the Living with a Star (LWS) Geospace Missions definition team report; updated the SEC roadmap; awarded science investigations and began Phase A for Solar Terrestrial Probes (STP) MMS; delivered both CINDI instruments to host; completed three industry pre-concept studies for STP GEC; awarded investigations for the LWS Space Environment Testbed-1 NRA and the STP MMS AO; started Phase B for the LWS SDO and the Explorers THEMIS and AIM missions; completed the Preliminary Design Review for New Millennium Program (NMP) ST-7 (Disturbance Reduction System), the CDR for the STP STEREO Observatory, at the Flight Readiness Review for NMP ST-6 Autonomous Sciencecraft Experiment; awarded 10 NMP ST-8 concept studies; successfully launched the Explorers GALEX mission; launched 25 sounding rockets; conducted SEC Senior Review of the science proposal from 14 operating missions and made recommendations to SEC Division director; and, achieved minimum science requirement for the Explorers RHESSI mission.

PERFORMANCE MEASURES

Outcomes/Annual Performance Goals (APGs)	
Outcome 1.3.1	*Develop the capability to predict solar activity and the evolution of solar disturbances as they propagate in the heliosphere and affect the Earth.*
5SEC2	Successfully complete Solar Dynamics Observatory (SDO) Critical Design Review (CDR).
5SEC3	Successfully complete THEMIS Critical Design Review (CDR).
5SEC6	Successfully demonstrate progress in developing the capability to predict solar activity and the evolution of solar disturbances as they propagate in the heliosphere and affect the Earth. Progress towards achieving outcomes will be validated by external review.
Outcome 1.3.2	*Specify and enable prediction of changes to the Earth's radiation environment, ionosphere, and upper atmosphere.*
5SEC4	Complete Announcement of Opportunity (AO) Selection for Geospace Missions far ultraviolet Imager
5SEC7	Successfully demonstrate progress in specifying and enabling prediction of changes to the Earth's radiation environment, ionosphere, and upper atmosphere. Progress towards achieving outcomes will be validated by external review.
Outcome 1.3.3	*Understand the role of solar variability in driving space climate and global change in the Earth's atmosphere.*
5SEC8	Successfully demonstrate progress in understanding the role of solar variability in driving space climate and global change in the Earth's atmosphere. Progress towards achieving outcomes will be validated by external review.
Outcome 5.6.1	*Understand the structure and dynamics of the Sun and solar wind and the origins of magnetic variability.*
5SEC1	Complete Solar Terrestrial Relations Observatory (STEREO) instrument integration.
5SEC9	Successfully demonstrate progress in understanding the structure and dynamics of the Sun and solar wind and the origins of magnetic variability. Progress towards achieving outcomes will be validated by external review.
Outcome 5.6.2	*Determine the evolution of the heliosphere and its interaction with the galaxy.*
5SEC10	Successfully demonstrate progress in determining the evolution of the heliosphere and its interaction with the galaxy. Progress towards achieving outcomes will be validated by external review.
Outcome 5.6.3	*Understand the response of magnetospheres and atmospheres to external and internal drivers.*
5SEC11	Successfully demonstrate progress in understanding the response of magnetospheres and atmospheres to external and internal drivers. Progress towards achieving outcomes will be validated by external review.
Outcome 5.7.1	*Discover how magnetic fields are created and evolve and how charged particles are accelerated.*
5SEC12	Successfully demonstrate progress in discovering how magnetic fields are created and evolve and how charged particles are accelerated. Progress towards achieving outcomes will be validated by external review
Outcome 5.7.2	*Understand coupling across multiple scale lengths and its generality in plasma systems.*
5SEC13	Successfully demonstrate progress in understanding coupling across multiple scale lengths and its generality in plasma systems. Progress towards achieving outcomes will be validated by external review
Uniform Measures	
5SEC14	Complete all development projects within 110% of the cost and schedule baseline.
5SEC15	Deliver at least 90% of scheduled operating hours for all operations and research facilities.
5SEC16	At least 80%, by budget, of research projects will be peer-reviewed and competitively awarded.

Theme: Sun-Earth Connection

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Nat'l Academy of Sciences	SScAC	8/03	3/04	Review sci. strategy, program implementation strategy
Nat'l Academy of Sciences	Space Studies Board	6/02	10/12	Decadal survey of effectiveness and quality of the program
Nat'l Academy of Sciences	NAC	6/03	3/04	Review sci. strategy, program implementation strategy
SScAC	SEC Advisory Subcommittee	3/03	2/04	Review sci. strategy, program implementation strategy

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	Change	FY 2005	Comments
Sun-Earth Connection	**479.7**	**755.4**	**-9.5**	**745.9**	
Development	166.7	218.7	+58.4	277.1	
Solar Terrestrial Relations Observatory (STEREO)	68.3	98.7	-24.9	73.8	
Solar Dynamics Observatory (SDO)	57.8	65.8	+92.6	158.4	
Small Development Projects	40.6	54.2	-9.3	44.9	
Operations	35.1	57.0	-23.1	33.9	
Research	134.3	177.2	+17.4	194.6	
Technology	143.6	302.5	-62.2	240.3	

Indicates changes since the previous year's President's Budget Submit

Indicates budget numbers in full cost.

Theme: Sun-Earth Connection
Development: Solar Terrestrial Relations Observatory (STEREO)

PURPOSE

Objectives	Performance Measures
5.6	5SEC1,9,14

The STEREO project will lead to an understanding of the cause and mechanisms of Coronal Mass Ejection (CME) initiation; characterize the propagation of the CMEs through the heliosphere; discover the mechanisms and sites of energetic particle acceleration in the Sun's corona and the interplanetary medium; and develop a 3-D time-dependent model of the magnetic topology, temperature, density, and velocity structure of the ambient solar wind.

OVERVIEW

NASA's STEREO mission will use two identically equipped spacecraft to provide revolutionary 3-D imaging of CMEs. The two spacecraft will be in heliocentric orbits at 1 AU (Astronomical Unit, the mean distance from the Earth to the Sun) with one leading Earth and the other lagging Earth. The STEREO mission will be a multilateral international collaboration involving participants from France, Germany, the United States, and United Kingdom. Investigations for STEREO will include: SEC Coronal and Heliospheric Investigation (SECCHI) using a remote sensing package which will study the 3-D evolution of CME's from birth at the Sun's surface through the corona and interplanetary medium to their eventual impact at Earth; STEREO/WAVES (SWAVES), an interplanetary radio burst tracker that will trace the generation and evolution of traveling radio disturbances from the Sun to the orbit of Earth; in situ Measurements of Particles and CME Transients (IMPACT) investigation, which will sample the 3-D distribution and provide plasma characteristics of solar energetic particles and the local vector magnetic field; and the PLAsma and SupraThermal Ion and Composition (PLASTIC) experiment, which will provide plasma characteristics of protons, alpha particles, and heavy ions. In recent months STEREO has experienced technical difficulties, which will result in schedule and cost increases. These will be fully documented in NASA's Initial FY 2004 Operating Plan. Link to STEREO Homepage for more information. http://stp.gsfc.nasa.gov/missions/stereo/stereo.htm

PROGRAM MANAGEMENT

STEREO is the third mission within the STP Program, with program and project responsibility delegated to Goddard Space Flight Center. The Enterprise Program Management Council (PMC) has STEREO governing responsibility. Enterprise official is Dr. Ed Weiler, Associate Administrator for SSE at HQ. The Theme director and the point of contact is Dr. Richard Fisher, director of the SEC Division at HQ. The program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

The baseline for this commitment is detailed in the 6/2003 STP Program Commitment Agreement (PCA).

Technical Specifications	FY 2005 President's Budget	Change from Baseline
CME Initiation Time:	Accuracy of order 10[120] minutes	None
Location of CME Initiation:	+/- 5 [30] degrees of solar latitude and longitude	None
Operational capability:	Prime mission life=2 yrs for both spacecraft; assuming CME rate consistent w/ minimum of solar magnetic activity cycle, observe at least 60 CME w/ remote sensing instruments & 24+interplanetary events	None
Science Instruments:	4 major science instrument suites	None
Values not enclosed in brackets indicate the accuracy required when both STEREO spacecraft are required to be operational. Values in square brackets indicate the accuracy of the measurements required to be achieved to meet Minimum Mission Success Criteria.		

Schedule	FY 2005 President's Budget	Change from Baseline
Start of Formulation	May 2001	--
Start of Implementation	Mar 2002	--
Mission Critical Design Review	Feb. 2003	2 month slip
Complete S/C I & T	Sept 2004	2 month slip
Complete Observatory S/C I&T	June 2005	--
Launch	Nov 2005	--

Theme: Sun-Earth Connection
Development: Solar Terrestrial Relations Observatory (STEREO)

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The four instrument suites were competitively procured via AO in Dec. 1999. NASA selected these investigations: (1) SECCHI (Naval Research Laboratory), (2) STEREO/WAVES (SWAVES) (Centre National de la Recherche Scientifique Observatory of Paris), (3) In situ Measurements of Particles and CME Transients (IMPACT) (University of California, Berkeley), and (4) PLAsma and SupraThermal Ion and Composition (PLASTIC), (University of New Hampshire). The spacecraft, ground support, mission operations, and mission integration function are a sole source procurement to JHU/APL. STEREO will launch on a Delta 2925-10L from Kennedy Space Center. Changes since FY 2004 President's Budget: None.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	45%	Industry	7%
Cost Reimbursable	96%	Sole Source	55%	Government	21%
Fixed Price	0%		100%	NASA Intramural	4%
Grants	2%			University	68%
Other	2%	Sci Peer Review	100%	Non Profit	0%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Future Acquisition - Major	Selection	Goals
None		

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator for the Space Science Enterprise. External: LOAs are in place with CNES (France), Hungary, Switzerland, PPARC (Particle Physics CNES), the German Aerospace Center and the European Space Agency. An MOU with ESA will also be developed. Changes since FY 2004 President's Budget: None.

RISK MITIGATION

Top Risks		Overall		Cost		Schedule		Technical	Probability	Impact	Mitigation Plan
Y	Spacecraft Software Schedule								Medium	Medium	In Place
Y	cPCI Connector Qualification								Medium	Medium	In Place
Y	Launch Vehicle Cost								Medium	Medium	In Place

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Confirmation Review	Independent Review Team	3/02	3/02	Approval to proceed into Development
Delta Independent Implementation Review	Independent Review Team	4/03	5/04	Annual review to look at implementation

Theme: Sun-Earth Connection
Development: Solar Terrestrial Relations Observatory (STEREO)

BUDGET/LIFE CYCLE COST

Budget Authority ($ millions)	Prior	FY03	FY04	FY05	FY06	FY07	FY08	FY09	BTC	Total	Comments
FY2005 PRESBUD	96.6	68.3	98.7	73.8	32.6	19.3	12.3	2.9		404.5	
Development	96.6	68.3	98.7	73.8	17.0					354.4	
Mission Operations & Data Analysis					15.6	19.3	12.3	2.9		50.1	
Changes since 2004 PRESBUD	+0.3	-6.0	-0.6	+5.5	-10.0	-5.4	-2.7	+2.9	-2.5	-18.5	
Development	+0.3	-6.0	-0.6	+5.5	-5.2					-6.1	ELV realignment
Operations					-10.8	-10.2	-2.1			-23.1	move DSN to STP Future
Mission Operations & Data Analysis					+15.6	+19.3	+12.3	+2.9		+50.1	MO&DA combined
Data Analysis					-9.6	-14.5	-12.9		-2.5	-39.5	
FY2004 PRESBUD	96.3	74.3	99.3	68.3	42.6	24.7	15.0		2.5	423.0	
Development	96.3	74.3	99.3	68.3	22.2					360.4	
Operations					10.8	10.2	2.1			23.1	
Data Analysis					9.6	14.5	12.9		2.5	39.5	
Initial Baseline	90.1	74.3	90.0	61.2	36.5	23.1	17.3	2.8		395.3	
Pre-Development	58.2									58.2	
Development	31.9	74.3	90.0	61.2	20.7					278.1	
Operations					7.4	9.4	4.7			21.5	
Data Analysis					8.4	13.7	12.6	2.8		37.5	

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Sun-Earth Connection
Development: Solar Dynamics Observatory

PURPOSE

Objectives	Performance Measures
1.3	5SEC2,6,14

SDO will increase our understanding of how the Sun's magnetic field is generated and structured, and how this stored magnetic energy is converted and released into the heliosphere and geospace in the form of solar wind, energetic particles, and solar irradiance.

OVERVIEW

The SDO is a cornerstone mission within the LWS program. SDO will use instrument suites in geosynchronous Earth orbit to characterize the Sun's interior (including components of its magnetic activity), its surface, its corona, and the extreme ultraviolet irradiance beyond the corona. These data will be analyzed to improve our capability to predict solar variations (or space weather) and their effects on life on Earth and on technological systems. The project includes funding for the spacecraft, launch vehicle, data analysis (6 years), project operations (five years), education, and outreach. Prime mission operations should end five years and thirty days after launch. Phase A began in 8/2002 when awards for three SDO science investigations were announced. Funding guidelines are subject to change as the requirements, science content and design mature, and will be capped when SDO is confirmed to start development. Link to SDO Homepage for more information. http://sdo.gsfc.nasa.gov/

PROGRAM MANAGEMENT

The SDO spacecraft will be built in-house at the Goddard Space Flight Center (GSFC). GSFC is also responsible for mission management, design, integration, test, and operation. The GSFC Program Management Council (PMC) had SDO governing responsibility until March 2003. The Enterprise PMC confirmed SDO to start Phase B at the PDR/NAR. The Agency PMC began providing oversight and will continue to do so until SDO starts development. The Enterprise will then resume oversight for the remainder of the mission. Enterprise official is Dr. Ed Weiler, Associate Administrator for SSE at HQ. The Theme director/point of contact is Dr. Richard Fisher, director of the SEC Division at HQ. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

No technical commitments will be made until mission is confirmed to start development in FY04. SDO guidelines are in mission Form Auth Doc (FAD) and may change as mission requirements/design mature.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
Orbit	Geosynchronous	--
Prime mission life	5 years	--
Helioseismic and Magnetic Imager (HMI)	Study origin of solar variability through analysis of the Sun's interior and various components of its magnetic activity.	--
Extreme Ultraviolet Variability Experiment (EVE)	Measure extreme ultraviolet irradiance and study it in relationship with the Sun's magnetic features.	--
Solar Heliospheric Activity Res. & Prediction Program (SHARPP)	Study the Sun's atmosphere and develop space weather predictions by using an Atmospheric Imaging Assembly and a white light coronagraph.	--

Schedule	FY 2005 President's Budget	Change from Baseline
Start of Formulation	August 2002	--
Initial Confirmation Review	August 2003	+2 Months
Start of Implementation	April 2004	+3 Months
Launch	April 2008	+8 Months
End of Prime Mission	May 2013	+8 Months

Theme: Sun-Earth Connection
Development: Solar Dynamics Observatory

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The selected investigations are: Helioseismic and Magnetic Imager (HMI) at Stanford University (with assistance from a Lockheed Martin team); Extreme Ultraviolet Variability Experiment (EVE) at the University of Colorado, Boulder, Laboratory for Atmospheric and Space Physics; and Solar Heliospheric Activity Research and Prediction Program (SHARPP) at the Naval Research Laboratory. SDO spacecraft and ground system will be built in-house at GSFC. The launch vehicle will be purchased through Kennedy Space Center. International agreements with Italy, France, and Belgium will provide significant components of instruments. Changes since FY 2004 Pres. Budget: Retraction of United Kingdom contribution.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	12%	Full & Open Competition	100%	Industry	0%
Cost Reimbursable	0%	Sole Source	0%	Government	12%
Fixed Price	27%		100%	NASA Intramural	88%
Grants	0%			University	0%
Other	61%	Sci Peer Review	100%	Non Profit	0%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Future Acquisition - Major	Selection	Goals
Ground system Contracts	Fall 03	100% Sci Peer Review, 20% University, 11% Non Profit.
Instrument Contracts	Fall 03	100% Full and Open Competition, 100% Cost type contracts.
Support Service contract extensions	Fall 03	

AGREEMENTS

Internal: Dependence on other NASA activities outside of the control of the Associate Administrator for the Space Science Enterprise will be established when the LWS PCA is baselined at SDO's Confirmation Review. External: Letters of Agreement with International Co-Investigators were initiated when instrument investigations were awarded (8/2002). Changes since FY 2004 President's Budget: Retraction of United Kingdom contributions.

RISK MITIGATION

Top Risks	Overall	Cost	Schedule	Technical	Probability	Impact	Mitigation Plan
G	Lack of adequate development of 4Kx4K CCDs				TBD	TBD	In Formulation
G	Lack of adequate international coordination will delay launch				TBD	TBD	In Formulation
G	Verification approach for science pointing				TBD	TBD	In Formulation
G	Mission lifetime and reliability in severe GEO radiation environment				TBD	TBD	In Formulation

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Before Initial Confirm. Review (IRC)	Independent Review Team		12/03	Confirm to start Phase B/obtain life cycle cost estimate as directed by Congress
Preliminary Design Review	Independent Review Team		3/04	Assure completed designs meet project specifications
Non-Advocate Review	Independent Review Team	12/03 (LWS)	2/04 (SDO)	Seek approval to start Implementation (tentative date)

Theme: Sun-Earth Connection
Development: Solar Dynamics Observatory

BUDGET/LIFE CYCLE COST

Budget Authority ($ millions)	Prior	FY03	FY04	FY05	FY06	FY07	FY08	FY09	BTC	Total	Comments
FY2005 PRESBUD	9.8	57.8	65.8	158.4	128.9	112.7	40.9	19.1	52.6	646.1	
Development	9.8	57.8	65.8	158.4	128.9	112.7	40.9	19.1	52.6	646.1	
Changes since 2004 PRESBUD	-0.5	+31.2	-0.4	+68.4	+30.0	+24.2	+20.9	+19.1	+52.6	+245.6	
Development	-0.5	+31.2	-0.4	+68.4	+30.0	+24.2	+20.9	+19.1	+52.6	+245.6	
FY2004 PRESBUD	10.3	26.6	66.2	90.0	98.9	88.5	20.0			400.5	
Development	10.3	26.6	66.2	90.0	98.9	88.5	20.0			400.5	

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Sun-Earth Connection
Development: Small Development Projects

PURPOSE

Objectives	Performance Measures
1.3, 5.6	5SEC9,11,14

The SEC Small Projects include the Explorer Program and the Solar-B mission (which is the second mission in the STP program). The Small Explorer (SMEX) program provides frequent flight opportunities for highly focused, relatively inexpensive missions. Missions are selected through the Announcement of Opportunity (AO) process. SMEX investigations are characterized by a total cost to NASA for definition, development, launch service, and mission operations and data analysis not to exceed $120M (fiscal 2003 dollars). Also included in this group are Missions of Opportunity (MO). MO are Space Science investigations that are flown as part of a non-NASA space mission.

OVERVIEW

The missions that are included in the SEC Small Projects are as follows: - Solar-B is an international collaboration building on the highly successful Japan/U.S./UK Yohkoh (Solar-A) experience. Solar-B is a single sun-synchronous low-Earth orbit spacecraft. It will measure the Sun's magnetic field and ultraviolet/x-ray radiation and use the data to increase the understanding of the sources of solar variability. The U.S. responsibility is to manage the U.S. hardware development of three science instruments: focal plane package, x-ray telescope and the extreme ultraviolet imaging spectrometer. - Coupled Ion Neutral Dynamics Investigation (CINDI) will study ion-neutral interactions in Earth's ionosphere to discover their role in the electrodynamic connection between the Sun and Earth's upper atmosphere. These interactions can interfere with communications and navigation systems. - Two Wide-angle Imaging Neutral-atom Spectrometers (TWINS) A and B will provide stereoscopic images of the Earth's magnetosphere for the first time. The TWINS project consists of two identical instruments on two spacecraft in Molniya (highly elliptical) orbits around Earth. - Aeronomy of Ice in the Mesosphere (AIM) will establish the relationship between polar mesospheric clouds and their environment. This will form the basis for the study of long-term changes in the mesosphere.

Link to Solar B: "http://stp.gsfc.nasa.gov/missions/solar-b/solar-b.htm".

Link to TWINS: "http://nis-www.lanl.gov/nis-projects/twins/".

Link to CINDI: " http://129.110.7.63/heelis/cindi.html".

Link to AIM: " http://aim.hamptonu.edu/".

PROGRAM MANAGEMENT

CINDI, TWINS, and AIM are projects within the Explorer Program with management responsibility delegated to Goddard Space Flight Center. CINDI and TWINS are in development. AIM will enter into development in March 2004. The Enterprise Program Management Council (PMC) has governing responsibility. Enterprise official is Dr. Ed Weiler, Associate Administrator for SSE at HQ. The Theme director and the point of contact is Dr. Richard Fisher, director of the SEC Division at HQ. The program is in full compliance with NPG7120.

TECHNICAL COMMITMENT

The baseline for CINDI, TWINS and AIM are detailed in Explorer Program Commitment Agreement (PCA). The baseline for Solar-B was made in 12/00 and is detailed in its Program Level I Requirements.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
Solar-B Focal Plane Package polarimetric accuracy	within 0.001	--
Solar-B X-ray Telescope Angular Resolution	2.0 arcsec	--
Solar-B EUV Imaging Spectrometer spatial resolution	2.0 arcsec	--
CINDI Measure Total Ion Concent. with a spatial separation of at least 1km	200 passes/month	--
TWINS- Two dimensional views of Earth's energetic magnetosphere	~10 images per day	--
AIM	TBD/Confirmation Review 12/03	n/a

Schedule	FY 2005 President's Budget	Change from Baseline
AIM Launch	September 2006	n/a
CINDI Launch	January 2004	+ 3 Months
Solar-B Launch	September 2006	+ 1 Year
TWINS Launch	2nd Qt/2004 & 2nd Qt/2005	+ 6 Months

Theme: Sun-Earth Connection
Development: Small Development Projects

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The Solar-B instrument developers were selected in response to a NASA AO issued in May 1998. Selections made in December 1998 were Lockheed Martin Missiles and Space for the focal plane package, Smithsonian Astrophysical Observatory for the x-ray telescope, and the Naval Research Laboratory for the EIS. CINDI's science investigation and both instruments are being developed at the University of Texas at Dallas. CINDI will be launched on a Pegasus XL by the U.S. Air Force. TWINS Principal Investigator is located at the Southwest Research Institute. The AIM Principal Investigator's institution is Hampton University, which is developing four major instruments. Spacecraft is being built by Ball Aerospace & Technologies Corp; AIM will be launched from Vandenberg Air Force Base on a Pegasus. Changes since FY 2004 President's Budget: None.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	100%	Full & Open Competition	100%	Industry	52%
Cost Reimbursable	0%	Sole Source	0%	Government	12%
Fixed Price	0%		100%	NASA Intramural	0%
Grants	0%			University	22%
Other	0%	Sci Peer Review	100%	Non Profit	14%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Future Acquisition - Major	Selection	Goals
AIM Spacecraft	1st Qt FY 2004	Cost Plus Fixed Fee

AGREEMENTS

Internal: These projects are not dependent on other NASA activities outside of the control of the Associate Administrator of the Space Science Enterprise. External: CINDI -- MOA with USAF. Solar-B -- LOA between NASA and Japan's Institute of Space and Astronautical Science (ISAS), February 3, 2001; LOA between NASA and the Particle Physics and Astronomy Research Council of the United Kingdom, March 24, 2000; MOU with ISAS in process. Changes since FY 2004 President's Budget: None.

RISK MITIGATION

Top Risks	Overall	Cost	Schedule	Technical	Probability	Impact	Mitigation Plan
G	AIM: Cost and Margins				Medium	Medium	Accept Risk
G	Solar-B: Japan Schedule Performance				Medium	Very High	Under Dev
G	Solar-B: ISAS/NASA Merger				Very High	Medium	Accept Risk
G	Solar-B: Lack of Margins and Control Values for Mass Properties				High	Medium	Accept Risk

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
AIM Confirmation Review	Goddard Space Flight Center		3/04	Approval to proceed into Dev. from the AA for Space Sci.
CINDI Confirmation Review	Goddard Space Flight Center	11/01	11/01	Approval to proceed into Dev. from the AA for Space Sci.
SOLAR-B Independent Implement. Review	IPAO	10/02	6/04	Annual implementation review
TWINS Confirmation Review	Goddard Space Flight Center	4/99	4/99	Approval to proceed into Dev. from the AA for Space Sci.

Theme: Sun-Earth Connection
Development: Small Development Projects

BUDGET/LIFE CYCLE COST

Budget Authority ($ millions)	Prior	FY03	FY04	FY05	FY06	FY07	FY08	FY09	BTC	Total	Comments
FY2005 PRESBUD	87.4	40.6	54.2	44.9	23.6	0.7				251.3	
SOLAR-B	64.9	17.2	12.4	12.2	11.3					118.0	
TWINS	14.4	1.7	1.1	0.5						17.7	
AIM	2.2	19.0	39.8	32.2	12.3	0.7				106.1	
CINDI	5.9	2.7	0.9							9.5	
Changes since 2004 PRESBUD	+1.5	+20.7	-0.3	+16.6	+12.8	+0.7				+52.1	
SOLAR-B		+1.0	-0.1	+1.8	+11.3					+14.1	1-year launch delay
TWINS	+0.3	+1.1		+0.1						+1.5	launch delay/contingency
AIM	+2.0	+19.0	-0.2	+14.7	+1.5	+0.7				+37.7	new SMEX selection
CINDI	-0.8	-0.4								-1.2	
FY2004 PRESBUD	85.9	19.9	54.5	28.3	10.8					199.3	
SOLAR-B	64.9	16.2	12.5	10.4						103.9	
CINDI	6.7	3.1	0.9							10.7	
TWINS	14.1	0.6	1.1	0.4						16.2	
AIM	0.2		40.0	17.5	10.8					68.4	
Initial Baseline	62.0	16.8	9.8	7.7						96.3	
SOLAR-B	62.0	16.8	9.8	7.7						96.3	D 12/20/00; Launch Sept. 05

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Sun-Earth Connection
Operations

PURPOSE

Objectives	Performance Measures
1.3, 5.6, 5.7	5SEC6-13,15

This program element sponsors the maintenance of existing mission operations infrastructure and the development of new control center capabilities at GSFC. The program element also supports the multi-mission operations activities at Goddard Space Flight Center (GSFC). These multi-mission activities support both current and future missions for the SEC, ASO, and SEU themes.

OVERVIEW

There are currently 14 operational SEC missions. These include the venerable Voyager spacecraft, Solar and Heliospheric Observatory (SOHO), and the Transition Region and Coronal Explorer (TRACE). Also included is the Thermosphere Ionosphere Mesosphere Energetics and Dynamics (TIMED) mission -- the first of the STP missions. Many missions involve foreign partners, including the European Space Agency and Japan's Institute of Space and Astronautical Science (ISAS). The program element also supports the multi-mission operations activities at GSFC. As a result of the reprioritized Agency activities, the FY 2005 and outyear budgets for SEC Operations have been reduced. The impacts to these programs will be fully assessed as part of the development of the FY 2006 budget.

Starting in FY 2005, the operations funding for SOHO, the Solar-Terrestrial Relations Observatory (STEREO), Wind, Polar, the Advanced Composition Explorer (ACE), Geotail, TIMED, Ulysses, Voyager, TRACE, the Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI), the Imager for Magnetopause-to-Aurora Global Exploration (IMAGE), Aeronomy of Ice in the Mesosphere (AIM), and Time History of Events and Macroscale Interactions during Substorms (THEMIS) will be combined with the Data Analysis funding for those missions (see Enterprise summary section for more information).

Link to Office of Space Science Missions homepage for more information http://spacescience.nasa.gov/missions/index.htm

PROGRAM MANAGEMENT

Enterprise official is Dr. Ed Weiler, Associate Administrator for the Space Science Enterprise at HQ. The Theme director and the point of contact is Dr. Richard Fisher, director of the SEC Division at HQ. TIMED operations are managed by the Johns Hopkins University Applied Physics Laboratory. Ulysses and Voyager are managed by the Jet Propulsion Laboratory. All other activities are managed by the GSFC. The SEC Operations responsibility is retained at Headquarters. The program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

Technical Specifications	Change from Baseline
All missions will meet Level I specifications as identified in the Program Plan.	None.

Mission	Launch Date	Change from Baseline
ACE	Aug. 25, 1997	Mission Extended.
FAST	Aug. 21, 1996	Mission Extended.
Geotail	July 24, 1992	Mission Extended.
IMAGE	Mar. 25, 2000	Mission Extended.
IMP-8	Oct. 26, 1973	Ext Mission Terminated Oct. 2001.
Polar	Feb. 24, 1996	Mission Extended.
RHESSI	Feb. 5, 2002	Prime mission through Feb. 2005.
SAMPEX	July 3, 1992	Mission Extended.
SOHO	Dec. 2, 1995	Mission Extended.
TIMED	Dec. 7, 2001	Mission Extended.
TRACE	Apr. 1, 1998	Mission Extended.
Ulysses	Oct. 6, 1990	Mission Extended.
Voyager-2	Aug. 20, 1977	Mission Extended.
Wind	Nov. 1, 1994	Mission Extended.

Theme: Sun-Earth Connection
Operations

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

Approximately 75% of the activity was supported by the Consolidated Space Operations Contract (CSOC); this contract expired in Dec. 2003. NASA released a request for proposal in April 2003 for a series of new contracts to replace CSOC. The new contracts were put in place by Dec. 2003, including a new contract at GSFC, which assumed the activities sponsored under this budget item. Approximately 25% of the activity involves engineering support and engineering research to improve the technology to be employed in future mission control centers. Changes since FY 2004 President's Budget: None.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	100%	Industry	59%
Cost Reimbursable	75%	Sole Source	0%	Government	0%
Fixed Price	1%			NASA Intramural	19%
Grants	0%		100%	University	22%
Other	24%			Non Profit	0%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Future Acquisition	Selection	Goals
None.		

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator for the Space Science Enterprise. External: None. Changes since FY 2004 President's Budget: None.

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Senior Review	Sr. Review committee	7/03	7/05	To recommend approval and funding level for extending science investigations.

Theme: Sun-Earth Connection
Operations

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD	35.1	57.0	33.9	
SOHO	3.4	2.8		
TIMED	2.1	1.6		
Voyager	2.8	2.0	0.1	
Multi-Mission Ops	19.6	43.9	33.8	
ACE	1.0	1.1		
FAST	0.3			
Geotail	0.1	0.1		
IMAGE	0.4	0.5		
Polar	1.6	1.4		
RHESSI	0.5	0.5		
SAMPEX	0.2			
TRACE	0.5	0.6		
Ulysses	2.2	2.1		
Wind	0.4	0.4		
Changes since 2004 PRESBUD	-8.4	-0.3		MO&DA combined
SOHO	+2.5			
TIMED	-1.0			
Voyager	+2.0			
Multi-Mission Ops	-17.8	-0.3		
ACE	+1.0	+1.1		
FAST	+0.3			
Geotail	+0.1	+0.1		
IMAGE	+0.4	+0.5		
Polar	+1.6	+1.4		
RHESSI	+0.5	+0.5		
SAMPEX	+0.2			
TRACE	+0.5	+0.6		
Ulysses	+2.2	+2.1		
Wind	+0.4	+0.4		
All Other SEC Operations	-1.3	-6.7		
FY2004 PRESBUD	43.5	57.3		
SOHO	0.9	2.8		
TIMED	3.1	1.6		
Voyager	0.8	2.0		
Multi-Mission Ops	37.4	44.2		
All Other SEC Operations	1.3	6.7		

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Sun-Earth Connection
Research

PURPOSE

Objectives	Performance Measures
1.3, 5.6, 5.7	5SEC6-13,15-16

SEC research develops the theoretical tools and laboratory data needed to analyze flight data, makes possible new and better instruments to fly on future missions, and analyzes the data returned by spacecraft so that we can answer specific questions posed and fit them into the overall picture of the Sun, its environment, and solar effects on Earth.

OVERVIEW

The SEC research element funds a variety of programs including, SEC Research & Analysis (R&A); the analysis of data (DA) from SEC operating missions; the suborbital program for sounding rockets and their payloads; and the science data tools and archives needed to perform the research. DA programs are tied to specific missions, which are focused on the achievement of specific strategic objectives. The scope of R&A programs is generally wider because they provide the new theories and instrumentation that guide future investigations. The alignment of Research programs with SEC strategic goals is ensured through two mechanisms. First, NASA Research Announcements (NRA) soliciting R&A proposals contain explicit prioritization criteria with respect to Enterprise objectives. Second, the entire R&A program is reviewed triennially to assess scientific quality and productivity of the major components and to adjust plans to best support Enterprise goals. Data Analysis (DA) programs have traditionally been performed by mission instrument teams and interdisciplinary scientists competitively selected for an individual mission for the lifetime of that mission. The DA program includes annual, open and competitive solicitations to all missions that can accommodate guest investigations. As a result of the reprioritized Agency activities, the FY 2005 and outyear budgets for R&A, DA, and the Sounding Rockets program have been reduced. The impacts to these programs will be fully assessed as part of the development of the FY 2006 budget.

Starting in FY 2005, the operations funding for the following missions will be combined with the Data Analysis funding for those missions (see Enterprise summary section for more information): the Solar and Heliospheric Observatory (SOHO), the Solar-Terrestrial Relations Observatory (STEREO), Wind, Polar, the Advanced Composition Explorer (ACE), Geotail, Thermosphere, Ionosphere, Mesosphere, Energetics and Dynamics (TIMED), Ulysses, Voyager, the Transition Region and Coronal Explorer (TRACE), the Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI), the Imager for Magnetopause-to-Aurora Global Exploration (IMAGE), Aeronomy of Ice in the Mesosphere (AIM), and Time History of Events and Macroscale Interactions during Substorms (THEMIS).

Links to NASA Research Opportunities: http://research.hq.nasa.gov/code_s/code_s.cfm and http://spacescience.nasa.gov/missions/opmsns.htm

Link to Sounding Rockets Program: http://www.wff.nasa.gov/pages/soundingrockets.html

PROGRAM MANAGEMENT

The SEC Research program responsibility is retained at Headquarters. The NASA Program Management Council (PMC) has SEC governing responsibility. Enterprise official is Dr. Ed Weiler, Associate Administrator for the Space Science Enterprise at HQ. The Theme director and the point of contact is Dr. Richard Fisher, director of the SEC Division at HQ. The program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

The baseline for all SEC Theme missions is defined in their respective PCAs or equivalent documentation. Content of R&A is defined in each individual Research Announcement.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
The NASA Strategic Plan has incorporated results of the OSS Strategic Planning process, which specifies a series of goals, strategic objectives and research focus areas. The OSS Strategic Plan draws from the Solar and Space Physics Decadal Survey (NRC) as well as the road mapping activities by the Sun-Earth Connection Advisory Subcommittee (SECAS). All selections processes and reviews of the elements of the SEC research program use these strategic items as guide posts for selection and/or continuation. Proposals for research must relate to these strategic items.		

Schedule	FY 2005 President's Budget	Change from Baseline
R&A Research Opportunities in Space Science (ROSS)	Suspended	Usually released each Feb.
Sounding Rockets Research Opportunities in Space Science (ROSS)	Campaigns run all year	--
Data Analysis Senior Reviews	Every two years	--

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The R&A, DA, and Sounding Rockets programs make awards following peer-reviewed competitions under NRAs, AOs, and Cooperative Agreement Notices (CANs). The Sounding Rocket program has a prime contractor selected via competitive procurement through a Request for Proposals (RFPs). In FY 2003, direct procurement represented 100% of budget authority. Changes since FY 2004 President's Budget: None.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	1%	Full & Open Competition	95%	Industry	33%
Cost Reimbursable	41%	Sole Source	5%	Government	7%
Fixed Price	4%			NASA Intramural	7%
Grants	40%		100%	University	42%
Other	14%			Non Profit	11%
`*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Future Acquisition	Selection	Goals
None.		

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator for the Space Science Enterprise. External: Four of the program elements depend on international agreements with the European Space Agency (the Solar and Heliospheric Observatory, Cluster, and Ulysses) and Japan's Institute of Space and Astronautical Science (Geotail). Changes since FY04 Pres. Budget: None.

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
SEC MO&DA Senior Review	Sr. Review committee	7/03	7/05	To recommend approval and funding level for extending science investigations.

Theme: Sun-Earth Connection
Research

BUDGET/LIFE CYCLE COST

Budget Authority ($ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD	134.3	177.2	194.6	
SEC Research and Analysis	30.4	35.0	37.6	
Science Data and Computing Tech.	9.9	14.9	15.0	
SOHO Mission Operations & Data Analysis	11.0	14.0	16.5	
SEC Mission Operations & Data Analysis	52.9	69.3	80.0	
Sounding Rockets	30.1	44.0	45.5	
Changes since 2004 PRESBUD	+10.0	-1.1		MO&DA combined
SEC Research and Analysis	-0.2	-0.2		
Science Data and Computing Tech.	-1.6	-0.1		
SOHO Mission Operations & Data Analysis	+11.0	+14.0		
SEC Mission Operations & Data Analysis	+52.9	+69.3		
Sounding Rockets	-0.2	-0.3		
SOHO Data Analysis	-10.4	-14.1		
SEC Data Analysis	-41.5	-69.7		
FY2004 PRESBUD	124.3	178.3		
SEC Research and Analysis	30.6	35.2		
Science Data and Computing Tech.	11.5	15.0		
SOHO Data Analysis	10.4	14.1		
SEC Data Analysis	41.5	69.7		
Sounding Rockets	30.3	44.3		

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Sun-Earth Connection
Technology and Advanced Concepts

PURPOSE

Objectives	Performance Measures
1.3, 5.6, 5.7	5SEC3,4,6-13

The SEC Technology and Advanced Concepts effort develops advanced technologies needed for specific science missions. This process begins with mission studies -- the first phase of the flight program development process. In this phase, scientists work collaboratively with technologists and mission designers to develop the most effective alignment of technology available with mission requirements. This collaboration enables intelligent technology investment decisions through detailed analysis of the trade-offs between design considerations and cost. In SEC, future missions will seek to understand how changes in solar activity change Earth's ionosphere, thermosphere, and radiation belts, and how mass and particle ejections from the Sun propagate to Earth and other planets. Technologies critical to the success of these missions include spacecraft and instrument technologies for microsats and nanosats, solar sails and improved conventional propulsion, and improved power and communications technologies. As a result of the reprioritized Agency activities, the FY 2005 and outyear budgets for STP, Future Explorers, and construction of facilities have been reduced. The impacts to these programs will be fully assessed as part of the development of the FY 2006 budget.

OVERVIEW

Technology and Advanced Concepts efforts are dedicated to mission studies, and the pre-concept and formulation phases of flight projects. Space science programs and projects are required to clear all major technology hurdles prior to a science mission's development phase. During pre-concept and formulation phases of missions, scientists work collaboratively with technologists and mission designers to develop the most effective alignment of technology needs and availability with future missions. In order to ensure that the decisions resulting from mission studies are realistic and can be implemented, the studies employ new techniques for integrated design concepts. SEC includes the following pre-development components: the Solar-Terrestrial Probes (STP) program's Magnetospheric Multiscale (MMS) and Global Electrodynamics Connection (GEC) missions; the Living With a Star (LWS) program's Geospace Missions; and future Explorer missions that are not yet selected. Technology and Advanced Concepts includes funding for the Time History of Events and Macroscale Interactions during Substorms (THEMIS) mission, a new Explorer selected in FY 2003 and currently in pre-development. Also included is the New Millennium Program (NMP), which provides a path to flight-validate key emerging technologies to enable more capable and more frequent science missions for all Space Science Themes.

PROGRAM MANAGEMENT

The SSE is responsible for all SEC programs. The Enterprise Program Management Council (EPMC) is the Governing Program Management Council (GPMC) for the STP. Except for SDO, and before LWS is confirmed, the LWS Program's governing PMC is the EPMC. Goddard Space Flight Center is responsible for the Explorers program, and the Jet Propulsion Laboratory for the New Millennium Program. Enterprise official is Dr. Edward Weiler, Associate Administrator for the Space Science Enterprise at HQ. The Theme director and the point of contact is Dr. Richard Fisher, director of the SEC Division at HQ. The program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

Project technical baselines are defined by the individual Formulation Authorization Document (FAD), Program Commitment Agreement (PCA), or equivalent documentation.

Technical Specifications		FY05 Budget Submit							Change from Baseline
		FY03	FY04	FY05	FY06	FY07	FY08	FY09	
New Millennium Program Space Technology-5 (ST-5)	TRL	5	6	6	7				Tests advanced technologies in space flight. Demonstrate and flight qualify a set of nanosats for application to future space missions.
	$M	15.0	30.4	8.8					
New Millennium Program Space Technology-6 (ST-6)	TRL	5	6	7					Improve spacecraft attitude control and pointing.
	$M	13.0	1.6	0.6					
New Millennium Program Space Technology-7 (ST-7)	TRL	5	5	6	7				Validate technologies for a drag free spacecraft.
	$M	15.7	21.0	9.2	2.7	1.3			

Theme: Sun-Earth Connection
Technology and Advanced Concepts

Schedule	FY 2005 President's Budget	Baseline	Change from Baseline
GEC Launch	March 2011	no baseline until confirmation	--
MMS Launch	July 2009	no baseline until confirmation	--
Geospace Mission - ITM Launch	August 2010	no baseline until confirmation	--
Geospace Mission - RBM Launch	August 2010	no baseline until confirmation	--
SDO Launch	April 2008	no baseline until confirmation	--
NMP ST-5	December 2004	LRD at Conf. was May 2004	+7 Months

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

Major acquisitions include: Completion of Phase A studies for STP MMS and LWS Geospace Missions - FUV Imager and ITM; technology investigations and spacecraft providers selected for NMP ST-9 and ST-10. Changes since FY 2004 President's Budget: LWS SDO moved to Development; future Explorers work delayed one year.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	1%	Full & Open Competition	90%	Industry	8%
Cost Reimbursable	39%	Sole Source	10%	Government	20%
Fixed Price	3%		100%	NASA Intramural	18%
Grants	19%			University	52%
Other	38%			Non Profit	2%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Future Acquisition	Selection	Goals
Instrument investigations & spacecraft GM-ITM	Winter 04	40% Full & Open Comp, (Instruments); 60% APL Sole Source
Phase A studies MMS	Sept. 03	85% Full & Open Competition, 15% GSFC mgmt

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator of SSE. External: None at this time; may be baselined prior to mission confirmation. Changes since FY 2004 President's Budget: None.

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
LWS Program & LWS SDO CDR	LWS IRT	12/03	1/06	Confirm SDO for design meets requirements
STP Program & STP IIR	STP IRT	4/03	5/04	Annual assessment of STP projects, including technology

Theme: Sun-Earth Connection
Technology and Advanced Concepts

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD	143.6	302.5	240.3	
New Millennium Program (NMP)	63.2	86.3	82.0	
Future Explorers	19.9	104.7	96.3	
Solar Terrestrial Probes (STP)	11.2	46.2	15.1	
Living With A Star (LWS)	44.1	49.6	46.9	
Program CoF	5.2	15.7		
Changes since 2004 PRESBUD	-112.0	-11.5		
New Millennium Program (NMP)	+0.4	-0.5		
Future Explorers	-76.5	-13.3		Institutional adjustments
Solar Terrestrial Probes (STP)	-1.7	+2.7		Rephased to Solar-B & STEREO
Living With A Star (LWS)	-34.2	-0.3		
Program CoF		-0.1		Rephasing of SS Building at GSFC
FY2004 PRESBUD	255.6	314.0		
New Millennium Program (NMP)	62.8	86.8		
Future Explorers	96.4	118.0		
Solar Terrestrial Probes (STP)	12.9	43.5		
Living With A Star (LWS)	78.3	49.9		
Program CoF	5.2	15.8		

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.