

SMITHSONIAN ASTROPHYSICAL OBSERVATORY

	APPLICATION OF OPERATING RESOURCES							
	FEDERAL APPROPRIATIONS		GENERAL TRUST		DONOR/SPONSOR DESIGNATED		GOV'T GRANTS & CONTRACTS	
	FTE	\$000	FTE	\$000	FTE	\$000	FTE	\$000
FY 2006 ACTUAL	108	22,154	8	2,425	14	2,669	347 ¹	91,788
FY 2007 ESTIMATE	113	22,831	8	2,550	14	2,251	347	96,397
FY 2008 ESTIMATE	113	23,330	8	2,550	14	2,251	347	96,397

¹ These operating resources include indirect FTEs and expenses used to support these grants and contracts.

STRATEGIC GOALS: INCREASED PUBLIC ENGAGEMENT; STRENGTHENED RESEARCH; AND ENHANCED MANAGEMENT EXCELLENCE

Federal Resource Summary by Performance Objective and Program Category

Performance Objective/ Program Category	FY 2007		FY 2008		Change	
	FTE	\$000	FTE	\$000	FTE	\$000
Increased Public Engagement						
<i>Public Programs</i>						
Provide reference services and information	5	818	4	800	-1	-18
Strengthened Research						
<i>Research</i>						
Engage in research and discovery	102	20,686	105	21,211	3	525
Enhanced Management Excellence						
<i>Information Technology</i>						
Modernize the Institution's information technology systems and infrastructure	0	571	0	540	0	-31
<i>Management Operations</i>						
Ensure that the workforce is efficient, collaborative, committed, innovative, and diverse	6	756	4	779	-2	23
Total	113	22,831	113	23,330	0	499

BACKGROUND AND CONTEXT

Founded in 1890, the Smithsonian Astrophysical Observatory (SAO) is the largest and most diverse astrophysical institution in the world. It has an extraordinary scientific staff, including seven members of the National Academy of Sciences. It has pioneered the development of orbiting observatories and large, ground-based telescopes; the application of

computers to study astrophysical problems; and the integration of laboratory measurements, theoretical astrophysics, and observations across the electromagnetic spectrum. Observational data are gathered at our premier facilities: the Submillimeter Array (SMA) in Hawaii; the newly converted 6.5-meter Multiple Mirror Telescope (MMT) and related telescopes at the Fred Lawrence Whipple Observatory in Arizona; a broad range of powerful instruments aboard rockets, balloons, and spacecraft (most notably the Chandra X-ray Observatory); and locations as diverse as the high plateaus of northern Chile and the Amundsen South Pole Station. Headquartered in Cambridge, Massachusetts, SAO is a member of the Harvard-Smithsonian Center for Astrophysics, along with the Harvard College Observatory. The Harvard affiliation gives SAO scientists the opportunity to work with some of the best graduate students in the world, and to use Harvard facilities that include an IBM Blue Gene supercomputer and the twin Magellan Telescopes in northern Chile.

The mission of SAO is to conduct research to increase understanding of the origin and evolution of the universe, and to communicate this information to the scientific community through publications; to students through our connections to Harvard University and universities throughout the nation; and to the public via open presentations.

To achieve the goal of Increased Public Engagement, SAO will strengthen mechanisms to disseminate the results of its research to professional and lay audiences, and continue to conduct outstanding national research programs in science education. SAO will address the goal of Strengthened Research by maintaining its leadership position in astrophysics through the high level of productivity of its permanent scientific staff and by promoting collaborations with visiting scientists and academic research institutions. The goal of Enhanced Management Excellence will be achieved by improving information technology (IT) infrastructure to ensure administrative efficiency and staff commitment, promoting scientific collaboration and innovation, and maintaining a diverse workforce and culture of equal opportunity in all aspects of SAO's employment and business relationships.

The FY 2008 budget estimate includes an increase of \$499,000 for necessary pay for existing staff funded under this line item.

MEANS AND STRATEGY

To achieve the goal of Increased Public Engagement, SAO is directing its resources to the production and delivery of educational services and products that are rooted in SAO research about learning and that meet the

educational needs of SAO's audiences. This sustained outreach effort gives SAO increased publicity and recognition.

To achieve the goal of Strengthened Research, SAO scientists make extensive use of various astronomical facilities to support their research, including the ground-based optical and radio telescopes owned and operated by SAO in Arizona and Hawaii, and space-based telescopes operated by SAO on behalf of the National Aeronautics and Space Administration (NASA). SAO scientists also have research privileges at the two 6.5-meter Magellan telescopes in northern Chile. In addition, SAO scientists and engineers are contributing to the construction of the Very Energetic Radiation Imaging Telescope Array System (VERITAS) in southern Arizona. These facilities enable SAO scientists to make substantial progress in answering fundamental questions about the origin and nature of the universe and questions about the formation and evolution of Earth and similar planets—two of the four science themes on which the Science Commission recommended the Smithsonian concentrate.

SAO scientists will continue to take a leadership role in these scientific areas by participating in or hosting national and international conferences (e.g., the American Astronomical Society, the International Astronomical Union, and the Astronomical Data Analysis Software and Systems conference series) and by participating as keynote and/or invited speakers at such meetings. SAO scientists will also continue to publish in leading peer-reviewed journals such as the *Astrophysical Journal*, the *Astronomical Journal*, and *Astronomy & Astrophysics*. SAO developed and operates the Astrophysics Data System, which is a world leader in the dissemination of scientific literature.

The goal of Enhanced Management Excellence will be addressed by making IT infrastructure robust, reliable, and secure; maintaining a cooperative environment through communication and activities that underscore SAO's special mission and each staff member's contribution to its success; evaluating management officials and supervisors on their compliance with applicable equal opportunity laws, rules, and regulations and on their efforts to achieve a diverse workforce; and facilitating the use of small, minority, women-owned, and other underused businesses in SAO's procurement and business relationships. These management tools support and enhance SAO's scientific and educational missions. SAO will also continue to improve its management through the recent centralization of the administrative and support departments' oversight responsibilities under the purview of the Deputy Director for Administration.

STRATEGIC GOALS AND FY 2008 ANNUAL PERFORMANCE GOALS

Increased Public Engagement

Provide reference services and information to the public (4 FTEs and \$800,000)

- Develop innovative techniques for the rapid public dissemination of new scientific results and ideas that originate at SAO
- Make frequent educational presentations at national, state, and local meetings and conferences
- Complete and/or maintain educational websites for teachers, educators, and the general public. Create an interactive museum kiosk. Produce and distribute professional development DVDs for astronomy educators. Complete the distribution of "Private Universe" DVDs to educators and the public. Process registrations for school sites participating in professional development provided by the SAO-operated Annenberg/CPB channel
- Present workshops or papers at educational research or practitioner conferences
- Support and evaluate the performance of the traveling exhibition, *Cosmic Questions: Our Place in Space and Time*, as it travels to various museums across the country
- Carry out MicroObservatory operations, a telescope network that reaches approximately 100 participating schools and takes about 20,000 images per year

Strengthened Research

Engage in research and discovery focused on understanding the origin and evolution of the universe, Earth and planets, biological diversity, and human culture (105 FTEs and \$21,211,000)

- Maintain a high rate of publications of significant astronomy and astrophysical research results in professional journals
- Maintain a high level of participation at professional meetings in the form of presentations, organization, session leaders, chairs, and proceedings editors
- Seek non-Institution funding to augment the conduct of scientific research. Leverage Institution funding by sharing resources for large projects, thereby increasing the scope of scientific opportunity and involvement of the research staff
- Use the collection of instruments, observatories (facilities), and expert staff at SAO to probe key scientific problems in astronomy and astrophysics. These include (but are not limited to) the search for extrasolar planets; the theory of star and planet formation; the acceleration of very energetic cosmic rays; the properties of space-time in the vicinity of black holes; the origin and evolution of

structure in the universe; and the distribution of dark matter and dark energy. These and other areas of research will be studied through the use of SAO facilities such as MMT, SMA, VERITAS, and other smaller telescopes; the use of NASA space telescopes, including the Chandra X-ray Observatory (which is operated by SAO and includes an SAO-built instrument, and for which SAO scientists have been awarded observing time), the Spitzer Space Telescope (on which an SAO instrument operates, and for which SAO scientists have been awarded observing time), and the Hubble Space Telescope (for which SAO scientists have obtained observing time), and other NASA missions; through theoretical and computational simulations of astrophysical processes; and through the Center for Laboratory Astrophysics

- Develop new scientific instrumentation that enables previously impossible astronomical investigations. These instruments include the MMT/Magellan MegaCam (a large mosaic CCD camera with a 24'x24' field), the MMT and Magellan Infrared Spectrograph (a wide-field, near-infrared imager and multi-object spectrograph), Binospec (an imaging spectrograph with dual 8'x15' fields of view), and the laboratory astrophysics Electron Beam Ion Beam Ion Trap facility
- Develop and disseminate new computational tools to enable novel astrophysical research. These include the astronomical image display tool DS9, the Telescope Data Center World Coordinate Systems toolkit, and the Chandra Interactive Analysis of Observations software package

Enhanced Management Excellence

Modernize the Institution's information technology systems and infrastructure (\$540,000)

- Participate in the implementation of the Enterprise Resource Planning System

Ensure that the Smithsonian's workforce is efficient, collaborative, committed, innovative, and diverse (4 FTEs and \$779,000)

- Continue to inform staff about SAO research discoveries and progress, scientific prizes and awards, Smithsonian directives, and internal policies and procedures, through quarterly town meetings and SAO-wide electronic messages as necessary
- Encourage innovation by annually securing financial resources for internal research and development, and allocating these resources through a competitive, peer-reviewed process
- Increase targeted recruitment of applicants in under-represented categories to increase the size of candidate pools from applicants in those categories. Increased targeted recruitment efforts will help

SAO reach its goal of hiring qualified minorities and qualified individuals with disabilities

- Continue to actively recruit qualified women and to increase targeted recruitment activities in this area
- Continue SAO's policy, to the maximum extent practicable, of purchasing from small or disadvantaged businesses, veteran-owned, service-disabled businesses, HUBZone small businesses, and women-owned small businesses

NONAPPROPRIATED RESOURCES—General trust funds come primarily from overhead charged on grants and contracts. SAO uses these funds to support administrative functions approved in the Indirect Cost Budget submitted to the Defense Contract Audit Agency and the Office of Naval Research, as required by OMB Circular A-122, Cost Principles for Nonprofit Organizations. Donor/sponsor-designated funds come primarily from restricted gifts from individuals, foundations, and corporations, which are earmarked for particular purposes; restricted endowment funds; and non-governmental grants and contracts. Government grants and contracts come from Government agencies for research in areas of SAO's expertise. SAO often conducts this research in cooperation with both governmental and academic institutions in the United States and abroad.