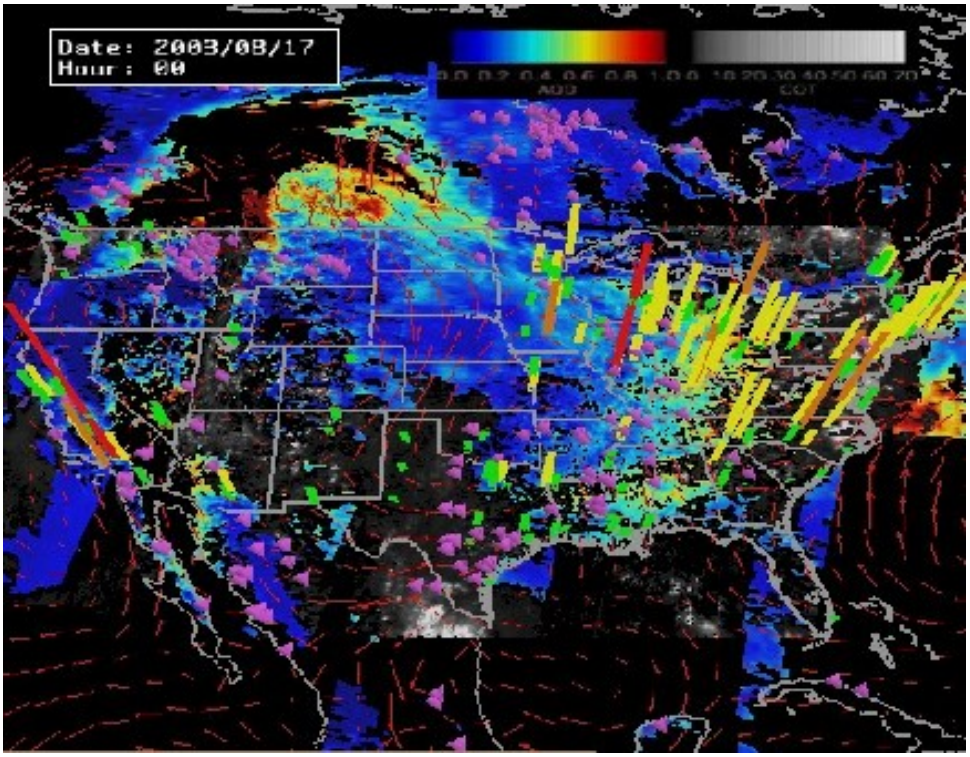
Theme: Earth Science Applications



This image illustrates a fusion of Earth science observations and model products to support air quality forecasting. The image above shows the relationship between aerosols, clouds, winds, fire locations, and ground aerosol measurements to provide a wide area view of aerosol events across North America. Researchers at NASA and US Environmental Protection Agency (EPA) developed this data fusion tool to assist air quality forecasters assess particle pollution and aerosol transport. EPA manages the Air Quality Index (AQI) to report daily air quality levels, and this data fusion assists in improving the accuracy of EPA's AQI. Forecasters use a 3-day visualization of this data fusion to assess transport of aerosols into their region and develop the air quality forecasts they issue.

Earth Science Applications

MAJOR EVENTS IN FY 2005

- ESA will deliver benchmarks of integrated solutions to the Committee on Environment and Natural Hazards (CENR), Climate Change Science Program (CCSP), Climate Change Technology Program, and Interagency Working Group on Earth Observations (IWGEO).
- The Earth Science Applications (ESA) program will continue to extend the use of new technology and knowledge about the Earth system to serve society through partnerships with other Federal agencies and industry partners. ESA can contribute to saving lives and property by working with partners to extend the benefits of the results of NASA's Earth Science research and development activities into areas such as Air Quality, Public Health, and Disaster Management.
- ESA will contribute verification and validation results to support the objectives of Geospatial One Stop (GOS) and Commercial Remote Sensing Space Policy (CRSSP).
- ESA will continue participation in Joint Agency Commercial Imagery Evaluation (JACIE) to provide Earth scientists with verification of the performance of commercial data, thereby optimizing the value to the government of private sector investments.
- ESA will expand the Digital Earth Virtual Environment and Learning Outreach Project (DEVELOP) program in an effort to develop human capital that will meet the future needs of the Earth Science Enterprise and the Applications program. This will be accomplished through student-centered programs that serve communities in at least 26 states.

Theme: Earth Science Applications

- ESA will collaborate to develop and deploy national and international standards and interoperability protocols and processes in support of e-government, Geospatial One Stop, NASA, and science-based solutions in partnership with other Federal agencies.
- ESA will continue to inspire the next generation of Earth explorers by providing opportunities for learners of all ages to investigate the Earth system using unique NASA resources. Solicitations supporting the Earth Science Fellowship Program, GLOBE, New Investigator Program, and K-16/Informal Education Program will be ongoing in FY05.

OVERVIEW

The Earth Science Applications program bridges the gap between scientific discoveries and practical applications that benefit society by providing Earth science data and information in forms readily useable by providers of essential services to the Nation. Observations from NASA Earth observing satellites have proven to be valuable in improving predictions of hurricane landfall, monitoring wildfires, and increasing aviation safety. As we move forward to 2005, the NASA Earth Science Applications program continues to benchmark contributions to relevant decision support tools that are vital for the nation's safety and security.

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.	1.2 Expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology.
	3. Create a more secure world and improve the quality of life by investing in technologies and collaborating with other agencies, industry, and academia.	3.1 Enhance the Nation's security through partnerships with DOD, DHS and other U.S. or international government agencies.
To Inspire the Next Generation of Explorers	7. Engage the public in shaping and sharing the experience of exploration and discovery.	7.1 Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

RELEVANCE

The Applications program enhances the availability, interoperability, and utility of Earth Science Enterprise and private sector data sets, communications, computing, and modeling capabilities to serve national applications as only NASA can. Applications program outputs include prototypes, assessments, procedures, and verification reports resulting from projects that benchmark system solutions. The Enterprise works through partnerships with public, academic, and private organizations to develop innovative approaches for using Earth science information that enhance products and services delivered through decision support tools to serve citizens. In essence, ESE pursues "government-to-government-to-citizen" relationships to extend the Earth science results to society. Key components of the Nation's economy and homeland security can be improved with the best available knowledge of global conditions. The NASA Earth Science Enterprise is focused on a mission to deliver improved predictions of weather, climate, and natural hazards based on global measurements. The Applications program is focused on working with Federal agencies and national organizations to optimize the use of human capital, technology and the data and knowledge generated by the constellation of over 17 Earth observing satellites. These spacecraft, which routinely make measurements using over 80 remote sensing systems, are used by a community of Earth science laboratories, universities, and research institutions throughout the country to model the Earth system and improve predictions.

Education and Public Benefits
Education: In a global economy that depends on access to the best available Earth science information for energy forecasting, aviation safety, agricultural competitiveness, disaster management, and other areas, it is imperative that our Nation have an education system that develops the skills and human capital required to create, maintain, and optimize complex scientific and engineering systems to serve society. The Earth Science Education program works through partnerships to provide knowledge, data, technology, and people to contribute to the education infrastructure needed to develop our next generation of explorers." Public Benefit: NASA's technology, observations and knowledge of the Earth System are harnessed to deliver an improved predictive capability in fields such as energy usage forecasting, agricultural competitiveness, disaster relief, carbon management, water resource management, invasive species management, and air quality management.

Theme: Earth Science Applications

IMPLEMENTATION

The ESA Theme is composed of National Applications, Cross-Cutting Solutions, and Education activities. These components harness information gained through Earth System Science research to enhance decision support tools that improve the lives of American citizens. Earth Science Applications is a multiple-project program with responsibility in the NASA Headquarters (HQ) Office of Earth Science. The Agency Program Management Council (PMC) has governing responsibility. Enterprise official is Dr. Ghassem Asrar, Associate Administrator for the Earth Science Enterprise. Theme Director and Point of Contact is Ronald J. Birk, Director for Applications at HQ.

IMPLEMENTATION SCHEDULE

Theme Element	Purpose
Agricultural Efficiency	Benchmark the process of assimilating NASA enabled predictions of weather, climate and natural hazards via the Crop Assessment Data Retrieval & Evaluation (CADRE) system to improve environmental stewardship, and increase production efficiency and farm income through partnerships with USDA and EPA.
Aviation	Benchmark the process of integrating enhanced weather, climate, and natural hazard predictions and observations into the National Airspace System using active and passive sensor technologies through partnerships with DOT/FAA and the aviation community.
Energy Management	Work in partnership with DOE & EPA to benchmark the use of enhanced weather, climate and natural hazard information to help forecast electrical power use, optimize placement of renewable power facilities, and conduct energy forecasting via the RETScreen & Natural Resources Canada systems.
Carbon Management	Provide monitoring and modeling capability to serve the USDA, EPA, DOE, USGS & USAID in developing a carbon management regime that is planned to include carbon sequestration in soils and biomass to mitigate increases in greenhouse gases in the atmosphere.
Homeland Security	Serve the Nation through partnerships with DHS, NIMA, USDA, USGS, NOAA & DoD to benchmark processes of monitoring air & water quality, tracking the spread of dangerous plumes and particulates, and planning for evacuation scenarios for integration into the DHS Situation Control System.
Public Health	Benchmark the process of assimilating NASA enabled predictions of weather, climate & natural hazards via partnerships with CDC, DoD, NIH, EPA, USGS & NOAA to more accurately predict conditions associated with global environmental indicators of public health risks.
Water Management	Benchmark the process of assimilating NASA enabled predictions of weather, climate and natural hazards to contribute to partnerships w/ USBoR,USGS,USDA & EPA developing tools to quantify, monitor and predict water quantity parameters for resource mgmt via RiverWare, BASINS & AWARDS systems.
Air Quality	Benchmark the process of assimilating NASA enabled predictions of weather, climate and natural hazards through partnerships with EPA, NOAA, USDA & FAA to improve analytical capabilities for emission estimates, & multiple-day air quality forcasting.
Disaster Management	Benchmark the process of assimilating NASA enabled predictions of weather, climate & natural hazards through partnerships with FEMA, USGS, NOAA & USDA to provide improved detection, response & mitigation by monitoring earthquakes, hurricanes, floods, & tornados.
Coastal Management	Benchmark the process of assimilating NASA enabled predictions of weather, climate and natural hazards through partnerships with NOAA & EPA to facilitate the modeling and prediction of harmful algal bloom development and landfall.
Invasive Species	Benchmark the process of assimilating NASA enabled predictions of weather, climate and natural hazards through partnerships with USGS & USDA to enhance current tools and methodologies for detecting, monitoring and mitigating invasive species.

Ecological Forecasting	Benchmark the process of assimilating NASA enabled observations of vegetation structure, topography, rainfall & coastal circulation/suspended sediments through partnerships with USAID & the World Bank to support models of habitat change, the impacts of El Nino and other climate phenomena.
Crosscutting Solutions	Support the national applications core areas through 1) Integrated Benchmark systems, 2) Solutions Networks, 3) Geospatial Interoperability engineering, and 4) Human Capital capacity development.
Earth Science Education	Integrate the knowledge, data, technology and human capital resulting from NASA Earth Science Enterprise research and development into the Nation's education system and enable partnerships with the Departments of Education and Labor, the National Science Foundation, and others.

No exceptions to NPG 7120.5B have been taken.

STATUS

This Theme accomplished the following in FY03: Worked with partners at USDA, USGS, CDC, EPA, FEMA, FAA, and NOAA to achieve citizen benefits from improved predictions of hurricanes, wildfires, and volcanic ash effects; Established agreements with the DOE's National Renewable Energy Laboratory and with the USDA for future benchmarking activities; Provided leadership to the Research, Education, and Applications Solutions Network (REASoN) competitive opportunity, resulting in 41 projects started in FY03/04 that serve as the foundation to benchmark solutions for at least six decision support systems in FY05; Competitively selected University Corporation for Atmospheric Research (UCAR) in FY03 to implement the Global Learning and Observation to Benefit the Environment (GLOBE) education program to connect NASA Earth science with over 1200 U.S. schools and over 100 countries worldwide into and beyond FY05; Provided leadership to the DEVELOP program enabling over 120 students in over 30 states to conduct prototype projects using Earth science results to serve their state, local and tribal governments; Performed assigned roles to support the Agency in six significant programs designated as priorities for the Administration, including the Climate Change Science Program, Climate Change Technology Program, Commercial Remote Sensing Policy, Geospatial One Stop, and the Earth Observation Summit; Was rated using OMB's Performance Assessment Rating Tool (PART) and received a rating of "results not demonstrated." In response to this evaluation, ESA Theme management will improve performance measures to reflect the value added of incorporating NASA data into existing systems, and finalize roadmaps for each of the twelve priority areas that specify how and where NASA content can best be utilized.

Link to theme homepage for more information: http://www.earth.nasa.gov/eseapps/.

PERFORMANCE MEASURES

Outcomes/Annual Performance Goals (APGs)	
Outcome 1.2.1	*By 2012, benchmark the assimilation of observations (geophysical parameters, climate data records) provided from 20 of the 80 remote sensing systems deployed on the flotilla of 18-22 NASA Earth observation research satellites.*
5ESA1	Crosscutting Solutions: Work within the Joint Agency Committee on Imagery Evaluation and the Commercial Remote Sensing Policy Working Group through partnerships with NIMA, USGS, NOAA, and USDA to verify/validate at least two commercial remote sensing sources/products for Earth science research, specifically with respect to land use/land cover observations for carbon cycle and water cycle research.
5ESA2	National Apps: Benchmark measurable enhancements to at least 2 national decision support systems using NASA results, specifically in the Disaster Management and Air Quality communities. These projects will benchmark the use of observations from 5 sensors from NASA research satellites.
5ESA3	Crosscutting Solutions: Expand DEVELOP (Digital Earth Virtual Environment and Learning Outreach Project) human capital development program to increase the capacity for the Earth science community at a level of 100 program graduates per year and perform significant student-led activities using NASA research results for decision support with representation in 30 states during the fiscal year.
5ESA4	Crosscutting Solutions: Benchmark solutions from at least 5 projects that were selected in FY03 REASoN program to serve national applications through projects that support decision support in areas such as agriculture, public health and water quality. These projects will benchmark use of observations from at least 5 sensors from NASA research satellites.
Outcome 1.2.2	*By 2012, benchmark the assimilation of 5 specific types of predictions resulting from Earth Science Model Framework (ESMF) of 22 NASA Earth system science models.*
5ESA5	The DEVELOP (Digital Earth Virtual Environment and Learning Outreach Project) program will advance the capacity of our future workforce with students from at least 20 states working to develop and deliver benchmark results of at least 4 rapid prototype projects using NASA Earth science research results in decision support tools for state, local and tribal government applications.
5ESA6	Crosscutting Solutions: Benchmark solutions associated with at least 5 decision support systems that assimilate predictions from Earth system science models (e.g. GISS, GFDL, NCEP, SpoRT, and the Earth Science laboratories).
Outcome 1.2.3	*By 2012, benchmark the assimilation of observations and predictions resulting from NASA Earth Science research in*

Theme: Earth Science Applications

Outcomes/Annual Performance Goals (APGs)	
	8-10 decision support systems serving national priorities and the missions of federal agencies.
5ESA7	National applications: Benchmark enhancements to at least 2 national decision support systems using NASA results, specifically in the Disaster Management, Public Health, and Air Quality communities. These projects will benchmark the use of observations from 5 sensors from NASA research satellites.
5ESA8	Crosscutting Solutions: Verify and validate solutions for at least 5 decision support systems in areas of national priority associated with the FY03 selected REASoN projects.
Outcome 3.1.3	*By 2012, in partnership with the Department of Homeland Security, the Department of Defense, and the Department of State, deliver 15 observations and 5 model predictions for climate change, weather prediction and natural hazards to national and global organizations and decision-makers to evaluate 5 scenarios and optimize the use of Earth resources (food, water, energy, etc.) for homeland security, environmental security and economic security.*
5ESA9	Benchmark the use of predictions from 2 NASA Earth system science models (including the GISS 1200 and NCEP weather prediction) for use in national priorities, such as support for the Climate Change Science Program (CCSP) and Climate Change Technology Program (CCTP) and the NOAA National Weather Service.
5ESA10	Benchmark the use of observations and predictions of Earth science research results in 2 scenarios assessment tools, such as tools used by the Environmental Protection Agency (specifically in the Community Multi-scale and Air Quality (CMAQ) Improvement Program tools) and the Department of Energy.
Outcome 7.1.4	*Engage the public in NASA missions, discoveries and technology through public programs, community outreach, mass media, and the Internet.*
5ESA11	Provide in public venues at least 50 stories on the scientific discoveries, the practical benefits, or new technologies sponsored by the Earth Science Enterprise.
Uniform Measures	
5ESA12	Deliver at least 90% of scheduled operating hours for all operations and research facilities.
5ESA13	At least 80%, by budget, of research projects will be peer-reviewed and competitively awarded.

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Annual Review	ESS Advisory Council	7/03	7/04	Alignment of Earth Science Enterprise and Research Strategies.
National Academy of Sciences review	NAS/NRC/SSB	9/02	6/05	Alignment of national Earth Science priorities and educational blueprint.

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	Change	FY 2005	Comments
Earth Science Applications	**78.0**	**90.8**	**-13.9**	**76.9**	
Research	50.8	52.0	-7.1	44.9	
Research - National Applications Program	29.7	30.3	-8.5	21.8	
Research - Earth Science Education	21.1	21.7	+1.4	23.1	
Crosscutting Solutions	27.2	38.8	-6.8	32.0	

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

Indicates budget numbers in full cost.

Theme: Earth Science Applications
Research: National Applications Program

PURPOSE

Objectives	Performance Measures
1.2, 3.1	5ESA2,7,9-10,12-13

The National Applications program extends the use of Earth observations into practical applications of knowledge. The program makes significant contributions to the President's Management Agenda, the E-Government initiative, and will contribute to the education and workforce development objectives of the Administration. The program serves the NASA vision "to improve life here" and the NASA mission "to understand and protect our home planet."

OVERVIEW

The Nation is challenged to manage resources to support economic security. In priority applications including energy forecasting, aviation safety, and agricultural competitiveness, it is important that the nation have sound data and analysis to provide decision makers with the best available information. The focus of the National Applications program is to work with partner agencies, including USDA, FEMA, EPA, NOAA, USGS, CDC, NIH, DHS, DoD, and DOE, to improve predictions of weather, climate, and natural hazards using NASA Earth science research and development in those agencies' operational decision support systems. NASA contributes systems engineering, human capital development, and scientific expertise, along with Earth science observations and predictions, to these efforts. In addition, our applications program supports many other important activities across the government, including homeland security, forestry, land management, disaster relief, and other national priorities. The National Applications program funds projects to benchmark solutions with other agencies for fixed periods of time in order to address practical challenges, making a unique contribution. Once solutions using Earth Science research results are benchmarked, the program hands those applications over for operational use to the implementing agencies. Project-level and systems-level solutions are solicited through Cooperative Agreement Notices, such as REASoN and GLOBE competitive sourcing solicitations.

Link to Project Homepage for more information: http://gaia.hq.nasa.gov/eseapps/.

PROGRAM MANAGEMENT

The Earth Science Applications program is managed from Headquarters (HQ) with performing center activity at Stennis Space Center (SSC), Goddard Space Flight Center (GSFC), Langley Research Center (LRC), and Marshall Space Flight Center (MSFC). Enterprise official is Dr. Ghassem Asrar, Associate Administrator for Earth Science at HQ. Theme Director and Program Point of Contact is Ronald J. Birk, Director for Applications at HQ. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

Technical commitment was baselined in the FY 2004 budget.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
Environmental Protection Agency	CMAQ Air Quality Decision Support System (DSS): Community Model for Air Quality	--
Federal Emergency Management Agency	HAZUS Disaster Management DSS	--
Centers for Disease Control/ National Institute of Health	EHTN Public Health DSS	--
Department of Agriculture	Enable implementation of Section 1605(B) of the Energy Act of 1992 (EA92)	--
Department of Agriculture	Crop Assessment Data Retrieval and Evaluation (CADRE) System	--
U.S. Geologic Survey	Biological Invasive Species DSS	--
Bureau of Reclamation - USGS/BoR	BoR RiverWare Water Management DSS	--
Federal Aviation Administration	National Airspace System DSS	--
Department of Energy	Natural Renewable Energy DSS	--
National Oceanic and Atmospheric Admin (NOAA)	Harmful Algal Bloom Coastal Management DSS	--
		--
The National Applications program will benchmark the process of assimilating observations and predictions from NASA missions into the decision support systems of the agencies listed in the table above. (Benchmarking involves systematically determining the improvements to decision support systems that are enabled by NASA results.)		

Theme: Earth Science Applications
Research: National Applications Program

Schedule	FY 2005 President's Budget	Baseline	Change from Baseline
FAA/Nat'l Airspace System-DSS Benchmark Complete	Jun-04	Same	--
Disaster Management-DSS Benchmark complete	Jul-05	New	--
NIH/Public Health-DSS Benchmark Complete	Sept-05	Benchmark 2nd DSS	--

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The acquisition strategy is based on two primary components: 1) Competitive sourcing, 2) Space Act Agreements. Performing organizations include NASA field centers (SSC, GSFC, LRC, MSFC, Ames Research Center (ARC), Jet Propulsion Lab (JPL)) partnering agencies, and competitively selected organizations.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	11%	Full & Open Competition	80%	Industry	15%
Cost Reimbursable	0%	Sole Source	20%	Government	0%
Fixed Price	2%			NASA Intramural	30%
Grants	66%		100%	University	50%
Other	21%	Sci Peer Review	%	Non Profit	5%
* as of FY03 direct procurement	100%	* as of FY03 direct procurement		* as of FY03 direct procurement	100%

Future Acquisition	Selection	Goals
REASoN Cooperative Agreement Notice (CAN)	Jan 05	100% Full & Open Competition.

AGREEMENTS

Internal: The program has a component that is dependent on, and benefits from, the aviation safety program in the Office of Aerospace Technology. External: Memoranda of Understanding with USDA, NOAA, USGS, EPA, DoD, USFS, DOE, WGA, FEMA. International: UNESCO, IAA, CCAD, CEOS, CENR. Changes since FY 2004 Pres. Budget: None.

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Annual Review	ESSAAC	7/03	2/04	Assess alignment with Enterprise Strategy.
National Academy of Sciences	SSB	9/02	6/05	Assess alignment with Enterprise Strategy.

Theme: Earth Science Applications
Research: National Applications Program

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD	29.7	30.3	21.8	
Applications Research	0.2			
National Applications	26.4	23.8	16.5	
Program Planning and Analysis	3.1	6.5	5.3	
Changes since 2004 PRESBUD	+8.9	+6.3		
Applications Research	-15.2			
National Applications	+26.4	+6.3		
Program Planning and Analysis	-2.3			Realigned to National Applications
FY2004 PRESBUD	20.8	24.0		
Applications Research	15.4			
National Applications		17.5		
Program Planning and Analysis	5.4	6.5		

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

Theme: Earth Science Applications
Research: Earth Science Education

PURPOSE

Objectives	Performance Measures
7.1	5ESA11, 13

The Earth Science Education program enables an accessible, dynamic, and engaging learning environment for all citizens that expands and deepens the Nation's awareness and understanding of Earth system science and inspires pursuit of careers in science and technology development.

OVERVIEW

The Earth Science Education program extends NASA's results in the research and development of Earth science, remote sensing, and information technologies to enhance the teaching and learning of Earth and environmental sciences both inside and outside the classroom through partnerships with educational institutions and organizations. The program makes the discoveries and knowledge generated by Earth science accessible to students and the public via Outreach efforts by focusing on the national education agenda and the needs of the learning communities. The program focuses on K-16 curriculum and faculty support in science, mathematics, and geography; professional development in informal education venues; as well as continuing training of interdisciplinary scientists to support the study of the Earth as a system through its fellowship and New Investigators efforts.

Link to Project Homepage for more information: http://earth.nasa.gov/education/catalog/index.html.

PROGRAM MANAGEMENT

The Earth Science Education program is managed from HQ with performing entities at Goddard Space Flight Center, Jet Propulsion Lab, Stennis Space Center, and Langley Research Center, as well as external education organizations (through grants or cooperative agreements). Enterprise official is Dr. Ghassem Asrar, Associate Administrator for Earth Science at HQ. Theme Director is Ronald J. Birk, Director of Earth science Applications Division. Point of Contact is Ming-Ying Wei, Earth Science Education Program Manager.

TECHNICAL COMMITMENT

The baseline for this technical commitment is the FY 2004 budget. A systems-based implementation plan will baseline this commitment.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
Investigator Program	Continue research and educational support for current projects and Earth scientists and/or engineers, and solicit new applications.	--
GLOBE Program	Continue worldwide implementation and U.S. coordination, in partnership with the National Science Foundation.	--
Earth Science Education Cyber Infrastructure	Systems architecture designed to deliver real time compelling teaching tools for teachers and students of all ages.	--
K-16/Informal Education Program	Integrate and coordinate educational projects selected under the REASoN solicitation.	--
Earth System Science Fellowship Program	Support graduate students in pursuit of Master or Ph.D. degrees in Earth System Science applications.	--

Schedule	FY 2005 President's Budget	Change from Baseline
Earth System Science Fellowship Program	Solicitation Dec-03, Selection Jun-04, Awards in Sept-04 (Annual selection)	--
GLOBE: Worldwide Implementation and U.S. Country Coordinator	Selection in Mar-08 and Awards placement in Dec-08 (Selection every 5 years)	--
Investigator Program	Solicitation Sept-04, Selection May-05, Awards in Jun-05 (Selection every 18 months)	--
K-16/Informal Education Program	Solicitation Jun-04, Selection May-05, Awards in Jun-05	--

Theme: Earth Science Applications
Research: Earth Science Education

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The acquisition strategy is based on two primary components: 1) Competitive sourcing, 2) Space Act Agreements. Performing organizations include NASA field centers (SSC, GSFC, LaRC, MSFC, ARC, JPL), research laboratories, partnering agencies, and competitively selected organizations.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	3%	Full & Open Competition	80%	Industry	4%
Cost Reimbursable	0%	Sole Source	20%	Government	0%
Fixed Price	43%			NASA Intramural	23%
Grants	37%		100%	University	73%
Other	17%	Sci Peer Review	%	Non Profit	0%
* as of FY03 direct procurement	100%	* as of FY03 direct procurement		* as of FY03 direct procurement	100%

Future Acquisition	Selection	Goals
FELLOWSHIPS	Jun 2004	100% Full & Open Competition
REASoN Cooperative Agreement (CAN)	Jan 2005	100% Full and Open Competition
GLOBE	Mar 2008	100% Full & Open Competition

AGREEMENTS

Internal: The program has a component that is dependent on, and benefits, the Agency Education programs in the Education and Space Science Enterprises. External: Department of Education, Department of Labor, National Science Foundation, Partner Federal Agency Education Programs. International: International participation of over 100 countries in the GLOBE Education program. Changes since FY 2004 Pres. Budget: None.

RISK MITIGATION

Top Risks	G	Overall	G	Cost	G	Schedule	G	Technical	Probability	Impact	Mitigation Plan
G	Risk negligible										

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Peer Review	ESSAAC	7/03	2/04	Assess alignment with NASA and Enterprise Strategy.
National Academy of Sciences	SSB	9/02	6/05	Assess alignment with NASA and Enterprise Strategy.

Theme: Earth Science Applications
Research: Earth Science Education

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD	21.1	21.7	23.1	
Earth Science Education	12.2	12.3	12.2	
Fellowships & New Investigators	7.9	8.4	8.8	
Outreach	1.0	1.0	2.1	
Changes since 2004 PRESBUD	+3.0	+0.9		
Earth Science Education	+3.1	+0.9		
Fellowships & New Investigators	-0.1			
FY2004 PRESBUD	18.1	20.8		
Earth Science Education	9.1	11.4		
Fellowships & New Investigators	8.0	8.4		
Outreach	1.0	1.0		

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

Theme: Earth Science Applications
Technology and Advanced Concepts: Crosscutting Solutions

PURPOSE

Objectives	Performance Measures
1.2	5ESA1,3-6,8

The Crosscutting Solutions element delivers science and engineering capabilities to partner organizations, enabling them to use NASA's research results and technologies in their decision support systems. This element contributes to human capital development, which focuses on the unique aspects of applying Earth science results in national and international decision support solutions.

OVERVIEW

The Crosscutting Solutions program provides four core elements: 1) integrated benchmark systems; 2) solutions networks; 3) geospatial interoperability, and 4) human capital development. The integrated benchmark systems capability provides the core competencies in NASA systems and science that are required to assimilate Earth science results into the decision support tools of partnering organizations. Decision support tools used to protect life and property require rigorous validation of new sources of data and information. The integrated benchmark systems element verifies, validates, and benchmarks the performance of solutions that are based on NASA Earth science observations and predictions. (The benchmark process involves a rigorous determination of change in performance resulting from change in process.) The geospatial interoperability element supports the President's E-government initiative (Geospatial One Stop) in developing and promulgating standards, including interoperability standards, for geospatial data and systems. The human capital development element of the program enables the next generation of decision makers to effectively develop and use advanced tools that assimilate NASA results. The solutions network element enables competitively selected collaborations to deliver results to the Nation including data sources, data products, data handling systems, and models and decision support systems, moving from research to operations.

Link to Project Homepage for more information: http://www.earth.nasa.gov/eseapps.

PROGRAM MANAGEMENT

The Crosscutting Solutions program is managed in the Earth Science Applications Division at HQ with performing activity at the Stennis Space Center and the Goddard Space Flight Center. The Agency PMC has governing responsibility. Enterprise official is Dr. Ghassem Asrar, Associate Administrator for Earth Science at HQ. Theme Director and Program Point of Contact is Ron Birk, Director for Earth Science Applications at HQ. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

Schedule	FY 2005 President's Budget	Baseline	Change from Baseline
Q3 FY05	Benchmark access to NASA EOS Data by Sponsorship/major participant in an OGC initiative prototyping Decision Support tools using open standards.	Q3 FY05	--
Q1 FY05	Open GIS Web Services Phase II.	Q1 FY05	--
Award in Q3 FY05	Solutions Networks for future Earth Science Research Results Solicitation.	Award in Q3 FY05	--
Award in Q3 FY05	Integrated System Solutions using Earth Science Research Results Solicitation.	Award in Q3 FY05	--
Award in FY04	REASoN CAN support.	Award in FY04	--
Q1 FY05	Expand Workforce Development Program (as part of DEVELOP Program) from 21 to 26 states.	Q1 FY05	--

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The acquisition strategy is based on two primary components: 1) Competitive sourcing; 2) Space Act Agreements. Performing organizations include NASA field Centers (SSC, GSFC, LaRC, MSFC, Ames ARC, JPL) partnering agencies, and competitively selected organizations. Changes since FY 2004 Pres. Budget: None.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	8%	Full & Open Competition	80%	Industry	20%
Cost Reimbursable	0%	Sole Source	20%	Government	0%
Fixed Price	28%		100%	NASA Intramural	30%

Grants	20%			University	40%
Other	44%	Sci Peer Review	%	Non Profit	10%
* as of FY03 direct procurement	100%	* as of FY03 direct procurement		* as of FY03 direct procurement	100%

Future Acquisition	Selection	Goals
REASoN Cooperative Agreement Notice	Jan 05	100% Full & Open Competition.
Integrated Systems Solutions Solicitation	Apr 05	100% Full & Open Competition.
Solutions Networks Solicitation	Apr 05	100% Full & Open Competition.

AGREEMENTS

Internal: Agreements with SSC, LaRC, GSFC, MSFC, JPL, ARC, and Dryden Flight Research Center. External: Agreements with President's e-Government initiative on Geospatial One-Stop, member of Joint Agency Committee for Imagery Evaluation (JACIE) with USGS and NIMA, member of Open GIS Consortium, Federal Geographic Data Committee, and partners in the DEVELOP program. Changes since FY 2004 Pres. Budget: None.

RISK MITIGATION

Top Risks	G	Overall	G	Cost	G	Schedule	G	Technical	Probability	Impact	Mitigation Plan
G	Negligible risk involved										

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Peer Review	ESSAAC	7/03	2/04	Ensure consistency with ESE mission.
National Academy of Sciences	NAS	6/02	6/05	Review commitment to partnerships.

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD	27.2	38.8	32.0	
Cross cutting solutions	27.2	38.8	32.0	
Changes since 2004 PRESBUD	+4.4	+8.8		
Applications Development	-22.8			
Cross cutting solutions	+27.2	+8.8		Realignment to National Applications program.
FY2004 PRESBUD	22.8	30.0		
Applications Development	22.8			
Cross cutting solutions		30.0		

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