

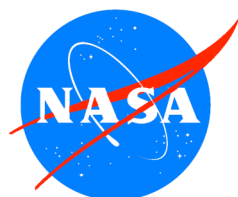
NASA SCIENCE MISSION DIRECTORATE

Earth-Sun System Applied Sciences Program Public Health Program Element FY 2005-2009 Plan



Version 1.1

March 16, 2005



*Expanding and accelerating the realization of economic and societal
benefits from Earth-Sun System science, information, and technology*

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NASA Science Mission Directorate
Earth-Sun System Division
Applied Sciences Program

Applied Sciences for the Public Health Program Element

This document contains the Public Health Program Element Plan for Fiscal Years 2005-2009. This plan derives from direction established in the NASA Strategic Plan, the Earth Science Enterprise Strategy, the Space Science Enterprise Strategy, the Earth Science Applications Plan, and OMB/OSTP guidance on research and development. The plan aligns with and serves the commitments established in the NASA Integrated Budget and Performance Document.

The Program Manager and the Applied Sciences Program leadership have reviewed the plan and agree that the plan appropriately reflects the goals, objectives, and activities for the program element to serve the Applied Sciences Program, the Earth-Sun System Division, NASA, the administration, and society.

(Signature on file)

John Haynes
Program Manager, Public Health
Applied Sciences Program
NASA Earth-Sun System Division

February 11, 2005

Date

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NASA Earth-Sun System Division -- Applied Sciences Program Public Health

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NASA Science Mission Directorate – Applied Sciences Program

Public Health Program Element Plan: FY 2005 - 2009

I. Purpose and Scope

This plan articulates the goals and direction of the Public Health Program Element for the period from Fiscal Year (FY) 2005 to 2009 by detailing the purpose of the program and our strategy to fulfill the Public Health mission with the resources available. The plan describes the Program's scope, including NASA's role in partnerships, the focus on decision support tools, and the types of Earth-Sun system science results we seek to extend. Within the Earth-Sun System Division, this plan functions as a program management tool, describing the program structure, functional mechanisms, performance measures, and general principles that the Public Health activity will follow. The plan includes projects in which Earth-Sun system science results can be applied to decision making with related socioeconomic benefits.

NASA's Public Health Program Element extends products derived from science information, models, technology, and other capabilities into partners' decision support tools for public health, medical, and environmental health issues.¹ The Public Health Program foci of partnerships with the public health practice community are their decision support systems known as Epidemiologic Surveillance Systems in the areas of:

- infectious disease
- environmental health
- bioterrorism

NASA collaborates with the professional public health community that is responsible for surveillance to understand and respond to factors in the environment that adversely impact the health of the American public. These factors include disease vectors, air and water contaminants, ambient temperature extremes, ultra-violet radiation and a myriad of other factors associated with public health problems. NASA's Public Health Program Element uses Earth observing instruments, advanced communication technology, high speed computing capabilities, data products, and predictive models of Earth-Sun System phenomena associated with the occurrence of disease to assist partners in enhancing their surveillance systems. International health is included in the scope of the Program as it represents a national health concern through its potential impact on American public health, economics, and national security. To this end, the program has strong connections with the Group on Earth Observations (GEO), the Inter-agency Working Group on Earth Observations (IWGEO), the World Health Organization (WHO), and The Observing-System Research and Predictability Experiment (THORPEX) program under the auspices of the World Meteorological Organization (WMO). The program also collaborates with the U.S. State Department.

¹*The public health, medical, and environmental health communities are fundamentally related entities with overlapping institutional, statutory, and academic frameworks. However, each employs a distinct driving philosophy. Public health focuses on the health of populations, medicine focuses on the health of individuals, and environmental health focuses on both as a function of the environment (including the workplace).*

The decision support structure of the public health community is based partially upon health information provided by epidemiologic surveillance. According to the Centers for Disease Control and Prevention (CDC), epidemiologic surveillance may be described as "the ongoing and systematic collection, analysis, and interpretation of health data in the process of describing and monitoring a health event." As outlined by CDC, the primary attributes of a surveillance system that combine to determine its usefulness for decision-makers include:

- simplicity: structure and ease of operation
- flexibility: adaptable to changing needs or operating conditions
- acceptability: willingness of individuals and organizations to participate
- sensitivity: proportion of disease detected, ability to detect epidemics
- predictive value positive: proportion of identified cases truly having the condition
- representativeness: accurately describes occurrence over time, distribution by place and person
- timeliness: speed or delay between steps in the system

A useful surveillance system enables the continual collection of data for monitoring disease trends and outbreaks for a public health response. While this data may be used for scientific investigations, research is not the primary purpose of a surveillance system. Surveillance systems are designed primarily to support decision makers.

In general, the incorporation of Earth-Sun science observations into measurement systems and models is intended to improve their accuracy with regard to spatial and temporal dimensions of the phenomena they represent. These improvements enhance the *representative* attribute of surveillance systems. The Public Health Program plans to enhance the ability of surveillance systems to assimilate observations and predictions of weather, climate and environmental risk factors to predict disease events. In surveillance terms, the goal for integrating Earth-Sun science and Public Health observations is to *represent* more accurately these environmental risk factors in terms of the populations potentially affected by them. The Public Health Program addresses four of the seven attributes of a reliable surveillance system: *simplicity*, *flexibility*, *acceptability*, and *timeliness*. These five attributes of partner surveillance systems will be enhanced by ensuring interoperability of Earth-Sun system science measurements with other important public health functions identified in the evaluation, verification, and validation stages of the collaboration.

NASA partners with federal agencies, and regional and national organizations that have public health responsibilities as well as mandates to support public health practitioners. Primary partners are the CDC, the National Institutes of Health (NIH), the U.S. Environmental Protection Agency (EPA), the Department of Health and Human Services (DHHS), the National Oceanic and Atmospheric Administration (NOAA), and the Department of Defense (DOD). The Program includes international organizations and activities with appropriate U.S. partners. The Public Health Program's activities relate to the Air Quality, Coastal Management, Ecological Forecasting, Homeland Security, and Water Management Program Elements. Through its activities, the Program provides results that support the White House National Science and Technology Council's (NSTC) Subcommittee on Environment and Health. The Subcommittee reports to three major NSTC committees, including the Committees on Science, Environment

and Natural Resources, and Homeland Security. The Program strongly supports interagency programs on Climate Change Science and Technology (CCSP, CCTP).

Priority Earth-Sun science measurements for the Public Health Program include those derived from sensors on: Aura, Terra, Aqua, EO-1, Landsat 7, TOMS-EP, SRTM, and SeaWiFS. NASA research has meaningful information on environmental factors associated with disease phenomena. The project plans associated with the Public Health Program identify specific sensors, measurements, and models, and state specific activities with the partners to extend Earth-Sun science results.

Scope within NASA and Applied Sciences Program

The Public Health Program Element is managed in accordance with, and is guided by, the NASA Strategic Plan and Earth Science Enterprise Strategy. The program element benefits from Earth-Sun system science results and capabilities including Operation System Simulation Experiments (OSSEs), Project Columbia, the Joint Center for Satellite Data Assimilation (JCSDA), the Earth-Sun System Gateway (ESG), and the Transition from Research to Operations (R2O). The program element utilizes initiatives such as the Global Information Grid (GIG) and Federal Enterprise Architecture (FEA) and cooperates with national Earth-Sun laboratories and international programs.

The FY05 President's Budget for the NASA Applied Sciences Program* specifies \$54M annually for FY05-FY09 for the National Applications (\$24M) and Crosscutting Solutions (\$30M) activities. While directly managing a subset of the \$24M National Applications budget, the Public Health Program Element (and each of the national applications) benefits from the performance results of the \$30M budget for Crosscutting Solutions (see Crosscutting Solutions Program Element Plan). The Public Health Program Element leverages and extends research results from the approximately \$2.1B per year supporting Earth-Sun system science research and development of innovative aerospace science and technology.

Additional information about the NASA Applied Sciences Program can be found at <http://science.hq.nasa.gov/earth-sun/applications>.

** The National Applications and Crosscutting Solutions components of the Earth Science Applications Theme in the NASA FY05 Integrated Budget & Performance Document*

This plan covers projects, objectives, and activities for FY05-09. In FY05, the Public Health Program Element's activities continue to focus on evaluation, verification, and validation of environmental health, infectious disease, and bioterrorism-related decision support tool requirements. The Program engages in the capacity for NASA observations and predictions to be extended to serve risk management and network development activities such as studying safeguards for confidentiality of personal medical information when integrated with Earth-Sun science observations. In FY06-09, the Program's priorities focus on: evolving observation and prediction products for an identified suite of decision support tools, identifying and evaluating

new Public Health decision support tools, and implementing risk management and network development plans.

II. Goals and Objectives

The goal of the Public Health Program Element is to:

Enable partners' beneficial use of NASA Earth-Sun science observations, models, and technologies to enhance decision support capabilities that serve the core functions of public health practice - assessment, policy development, and assurance.

Objectives

The NASA Public Health Program Element is relevant to NASA Strategic Plan Objectives 1.2 and 1.3. The application contributes to Objectives 3.1, 6.4, 7.2, 7.3, and 10.3. The application directly addresses FY05 NASA Integrated Budget and Performance Document (IBPD) Performance Measure 5ESA2, 5ESA4, 5ESA7, and 5ESA8.

Specifically, the NASA Public Health Program Element pursues the following short and near term objectives (see Section IV for other details):

Short-Term Objectives (FY05)

<i>Date</i>	<i>Objective</i>	<i>Outcome</i>
May 2005	Establish formal collaborative agreements with two federal Public Health partners. Publish evaluation reports on DOD GSAT and DHHS SCC by end of FY05.	<i>Planned Agreements:</i> <i>DOD GSAT, DHHS/SCC, MS DoH</i>
August 2005	Submit and publish at least one article on public health applications of Earth-Sun science in a peer reviewed or trade journal	<i>Publication</i>
August 2005	Verify and validate assimilation of Applied Sciences enhancements to at least one additional Public Health decision support tools	<i>Priority Candidates: HELIX</i>
September 2005	Complete at least one benchmark report and schedule results conferences on Applied Sciences support to Public Health decision support tools (FY05 IBPD metric).	<i>Priority Candidates: HELIX, RSVP</i>

Near-Term Objectives (FY06-FY08)

March 2006	Complete evaluation reports on Applied Sciences support to at least 2 additional research results in Public Health decision support and/or policy tools.	<i>Priority Candidates: HELIX inputs, other tools to be identified</i>
September 2006	Verify and validate assimilation of Earth-Sun science enhancements to at least one additional Public Health decision support tools (FY06 IBPD metric identifies the DHHS SCC)	<i>Priority Candidates: Malaria/GSAT, Arbonet/Plague, DHHS/SCC</i>
March 2007	Complete at least 3 benchmark reports and schedule results conferences on Applied Sciences support to Public Health decision support tools.	<i>Priority Candidates: HELIX, Arbonet / PSS, Malaria</i>
March 2008	Submit and publish at least one additional article on public health applications of Earth-Sun science in a peer reviewed or trade journal	<i>Journal article</i>

III. Program Management and Partners

Program Management

Public Health Program Manager: *John Haynes, NASA Headquarters*

- Program development, strategy, plans, and budgets
- Program representation and advocate issues to Science Mission Directorate management and beyond
- Communication of Science Mission Directorate priorities and directives to Program team/network
- Represent program on inter-agency organizations (CCSP, CENR, IWGEO)
- Implementation of interagency agreements and partnerships
- Monitoring metrics and performance evaluation

Public Health Deputy Program Manager: *Robert Venezia (Acting), NASA Stennis Space Center*

- Leadership on project plans, development, performance, and partnership relationships
- Communication of project metrics, performance, status, and issues to Program Manager
- Leadership and communication to team and network
- Coordination between NASA Centers on Public Health activities
- Management of tasks at NASA John C. Stennis Space Center (SSC)

Public Health Network and Partners

NASA Headquarters Science Mission Directorate

- Atmospheric Composition Theme..... Phil DeCola, NASA HQ
- Carbon Cycle and Ecosystems Theme Diane Wickland, NASA HQ
- Climate Variability and Change Theme Waleed Abdalati, NASA HQ
- Business and Budget..... Joan Haas, NASA HQ
- Geosciences Interoperability Office Myra Bambacus, NASA GSFC
- Earth Science Technology Office..... Azita Valinia, NASA GSFC

NASA Headquarters Exploration Mission Directorate

- Fundamental Space Biology..... Terry Lomax

NASA Headquarters Administration

- Chief Health and Medical Officer Richard Williams
- Chief Scientist John Grunsfeld

NASA Centers

- Ames Research Center (ARC) Louisa Beck
- Goddard Space Flight Center (GSFC) Shahid Habib
- Marshall Space Flight Center (MSFC) Dale Quattrochi
- Langley Research Center (LaRC) Richard Eckman
- Stennis Space Center (SSC) Timi Vann, Robert Venezia

NASA Distributed Active Archive Centers and Earth-Sun science Science Laboratories

- GSFC Earth Science DAAC (GES DISC DAAC) Steve Kempler
- SEDAC..... Robert Chen

Federal Partners

Center for Disease Control (CDC)

- National Center for Environmental Health Judith Qualters, Amanda Niskar
- National Center for Infectious Diseases John Roehrer, Ken Gage
- National Center for Health Statistics Charles Croner

EPA

- Heat Island Reduction Initiative Eva Wong

NIH

- Fogarty International Center Joshua Rosenthal

- National Institute for Biomedical Imaging
and Bioengineering Roderic Pettigrew
- National Instit. of Environmental Health Sciences... Allen Deary

Department of Defense

- Armed Forces Pest Management Board Richard Johnson
- Air Force Strategic Operations Command..... Steve Lufkin, Mike Applegate

Department of Energy

- Sandia National Laboratories Al Zelicoff
- Oak Ridge National Laboratories.....Budhendra Bhaduri

Department of Commerce

- NOAA Office of Global Programs..... Juli Trtanj

Department of Health and Human Services, Secretary's Command Center

- Geospatial Public Health Program.....CDR William Henriques

Department of State

- Bureau of Oceans and International
- Environmental Affairs Fernando R. Echavarria

USGS..... Steve Guptill

National Science and Technology Council

- Committee on Environment and Natural Resources
- Committee on Homeland Security
- Committee on Science
- Subcommittee on Environment and Health Ann Carlson

National Academy of Sciences

- National Research Council - Board on Earth Sciences
and Resources.....David Feary

National and Organizations and Professional Societies

- American Public Health Association (APHA)..... Lynn Schoen
- Association of State and Territorial
Health Officials (ASTHO)
- Association of Schools of Public Health (ASPH) Allison Foster
- Council of State and Territorial Epidemiologists (CSTE)
- International City / County
Management Association (ICMA)..... Elizabeth Stasiak
- National Association of City and County
Health Officials (NACCHO)

International Organizations

- World Health Organization

IV. Decision Support Tools/Application Activities

A. Projects

The Public Health Program Element and its partners have identified four decision support tools to integrate Earth science results into during FY05-09. Those DSTs are addressed in the following four projects. Each of the DST projects addresses a major issue for the Program Element and its community of practice.

Project: EPHTN/HELIX

CDC has statutory responsibility for developing and managing EPHTN / HELIX. The system is designed to establish a national network of local, state, and federal public health agencies that tracks trends in priority chronic diseases. Around 2009, when fully functional, the EPHTN will be a national early warning system for the rapid identification of health threats, such as toxic chemical releases, including long-term data collection on harmful exposures to be used in future studies of new environment-disease correlations. Earth-Sun System science results provide available information on the environmental contribution to chronic disease and predictive value based on coupled Earth system-chronic disease models.

Project: EPHTN / HELIX					
The goal of this project is to verify, validate and benchmark Earth-Sun science measurements for routine use in EPHTN/HELIX. FY05: Verification and validation of MODIS and ASTER requirements, initial benchmark. FY06-beyond: Benchmarking data and modeling inputs. Expand number and scope of Earth science inputs.				<i>Budget</i>	
				FY05	210K
<i>Project Manager</i>	<i>Centers</i>	<i>Timeframe</i>	<i>Partners</i>	FY06	210
Dale Quattrochi-MSFC	MSFC	FY05-09	CDC	FY07	210
				FY08	210
				FY09	210
<i>Earth-Sun Products</i>	<i>Science</i>	Aqua - MODIS = surface temp; Terra - ASTER, MODIS = surface temp; Models = Large Scale Eddy Simulation Model (LES)			<i>Other Apps.</i>
<i>Deliverables</i>	Verification and validation report, contact network, benchmark report, OSSEs for future observations (NPP, NPOESS)				N/A

Strategic Relevance

NASA Strategic Plan : Goal 1.1, 1.2

Project: ArboNET / Plague Surveillance System

Plague is an infectious disease caused by the bacteria, *Yersinia pestis*. Plague surveillance is a CDC priority because it is a Class A disease and, by law, all occurrence of cases or suspected cases must be reported. Plague is also monitored for its potential as a bioterrorist agent. Plague prevention and response efforts are underway at regional, state and local levels through the CDC-sponsored ArboNET / Plague Surveillance System.

ArboNET is a passive surveillance system managed by the CDC to collect and archive data to study and operationally monitor regional and national arthropod-borne viral disease trends. The CDC, participating health departments, Department of Defense (DOD) and the US Geological Survey (USGS) are primary users of ArboNET. Earth-Sun System science models (*e.g.*, the GHCN, the GMAO, and the GSFC Plague Algorithm) have the potential to provide information on plague vector habitats that enhance ArboNET forecasts of outbreak conditions.

NASA's efforts to date on this project have matured to the point where technical project activities could be assumed by an external entity such as a qualified university. This topic is a focal point for the public health component of the upcoming Decisions solicitation sponsored by the NASA Applied Sciences Program. If a proposal to Decisions is selected on this topic, the programmatic support and funding may be modified.

Project: Arbonet / Plague				
The goal of this project is to benchmark Earth-Sun science measurements and models output for routine use in ArboNET. FY05: V&V activities on use of MODIS NDVI for use in plague. FY06 and beyond: Expand the number and scope of Earth-Sun science data products and disease surveillance targets.				Budget
				FY05 125K*
Project Manager	Centers	Timeframe	Partners	FY06 125
Compton Tucker-GSFC	GSFC	FY05-09	CDC	FY07 125
				FY08 125
				FY09 125
Earth-Sun science Products	Aqua, Terra - MODIS = surface temp (MOD11), veg. index (MOD13), fractional tree cover (MOD44B); SRTM = land surface topography; Landsat 4,5,7 = land cover; Models = GSFC Plague Algorithm, GMAO, GHCN			Other Apps.
Deliverables	Benchmark reports			

* Program will be competed through solicitation in FY05

Strategic Relevance

NASA Strategic Plan: Goal 1.1, 1.2, 3.1

Project: Malaria Modeling and Surveillance

The CDC and DOD are interested in utilizing new technologies and in developing methodologies for monitoring and modeling infectious diseases. Malaria is a high priority infectious disease target for domestic agencies, such as CDC and DOD, as well as international health entities, such as the World Health Organization and the Pan American Health Organization. Malaria affects nearly 1,600 Americans each year and kills an estimated 3 million people worldwide, many of whom are children. In addition, malaria costs African nations approximately \$12 billion in economic productivity losses. The health and economic consequences of malaria make it a destabilizing phenomenon. Both CDC and DOD currently are developing decision support tools to better predict and respond to malaria. Earth science data and modeling have the potential to enhance these tools by providing new information on vector habitats and environmental conditions that precede malaria outbreaks.

The Global Situational Awareness Tool (GSAT) is an environmental planning tool owned and operated by the U.S. Air Force Strategic Operations Command (AFSOC). It is designed to assist military decision makers with global troop deployments by reducing time and coordination burdens. It provides environmental safety and health information to AFSOC planners and decision makers. Malaria is a disease of significant interest to the GSAT operators specifically, and military decision makers in general.

NASA's efforts to date on this project have matured to the point where systems project activities can be conducted by a successful proposing organization. This topic is a focal point for the public health component of the upcoming Decisions solicitation sponsored by the NASA Applied Sciences Program. If a proposal to Decisions is selected on this topic, the programmatic support and funding may be modified.

Project: Malaria				
The goal of this project is to benchmark Earth science measurements for use in malaria habitat, transmission, and risk models destined for use in infectious disease surveillance systems such as GSAT. FY05 and beyond: Benchmarking Earth-Sun science system models for use in GSAT.				Budget
				FY05 165K*
Project Manager	Centers	Timeframe	Partners	FY06 165
Richard Kiang-GSFC	GSFC	FY05-09	CDC, DOD	FY07 165
				FY08 165
				FY09 165
Earth-Sun science Products	EO1= radiance values; Terra - ASTER = radiance values; Landsat 7 = land cover; Aqua, Terra - MODIS = radiance values; GMAO Atmosphere Model; Global Historical Climatology Network Model (GHCN)			Other Apps.
Deliverables	contact network, agreement/joint development plan, partner meetings, results conferences, benchmark reports			

* Program will be competed through solicitation in FY05

Strategic Relevance

NASA Strategic Plan :

Goals 1.1, 1.2, 3.1

Project: Department of Health and Human Services -- Secretary's Command Center

Completed in December 2002, the Secretary's Command Center (SCC) was created to provide a focal point for public health information and intelligence to the Secretary of the Department of Health and Human Services (DHHS). The SCC coordinates the activities of DHHS with international, local, state and federal public health authorities. Since its establishment, the SCC's innovative design, information architecture and business plan have become the benchmarks for similar operations centers being developed for international and federal agencies.

The SCC has workstations dedicated for the Secretary, Deputy Secretary, Assistant Secretary for Public Health Preparedness, the Surgeon General, other division leaders and liaisons from other agencies. The use of the Internet protocol system creates a system of computers, radios and telephones that are interoperable. Geospatial systems allow tracking and plotting of events and incidents and relating them to HHS preparedness and response activities. Through the SCC, DHHS monitors developing public health emergencies through as many as 4,000 news media outlets across North, Central and South America, Europe and the Middle East. The SCC can monitor local television stations from up to ten (10) cities at a time to observe how breaking events are being reported across the country.

The CDC operates a similar center called the "Marcus Emergency Operations Center" (MEOC) to track and respond to infectious disease outbreaks of all types and causes. The MEOC supports, organizes and manages all emergency operations at CDC and allows for immediate communication between CDC, the Department of Health and Human Services, as well as federal intelligence and emergency response officials, the Department of Homeland Security, and state and local public health officials.

Project: DHHS SCC				
The goal of this project is to benchmark Earth-Sun System science products for use in the DHHS SCC decision support systems. FY05: Evaluate linkage to DHHS SCC and CDC MEOC. Sign MOU with DHHS. Document the value of Earth-Sun System science results through a special edition, peer reviewed, public health journal. FY06-beyond: V&V and benchmark linkages with DHHS SCC and CDC MEOC.				Budget
Project Manager	Centers	Timeframe	Partners	FY05 150K
Timi Vann	SSC	FY05-09	DHHS	FY06 150
				FY07 150
				FY08 150
				FY09 150
Applied Sciences Products	To be identified in evaluation effort.			Other Apps.
Deliverables	Evaluation reports, contact network, agreement/joint development plan, benchmark reports, results conferences			N/A

B. Competitively Selected Programs

Project: REASoN - University of New Mexico / Sandia National Laboratory - Rapid Syndrome Validation Project (RSVP)

The RSVP is surveillance system that tracks disease syndromes and is sponsored by the Sandia National Laboratory. The system is operated in conjunction with local and state health departments and other public health entities. RSVP is designed to identify infectious disease outbreaks in the earliest possible stages and to alert public health officials to these events. Earth-Sun System science observations and modeling have the capacity to provide predictive value to the system by identifying environmental conditions that precede naturally occurring, chronic and infectious disease events.

Project: REASoN (RSVP)				
The goal of this project is to evaluate, verify, validate and benchmark Earth-Sun science measurements for use in an existing public health syndromic surveillance system. FY05: verify and validate dust measurements and models for use in respiratory diseases addressed by RSVP, initial benchmark. FY06 and beyond: Benchmark dust measurements and models and extend RSVP by integrating additional Earth-Sun System science results.				Budget
Project Manager	Centers	Timeframe	Partners	FY05 600K
Robert Venezia	SSC	FY05-09	DOE/Univ. of NM/Univ. of AZ	FY06 700
				FY07 700
				FY08 300
				FY09 N/A
Earth-Sun science Products	Terra, Aqua, ACRIMSAT, ERBS, Landsat-7, TOMS-EP, TRMM, and EO-1 data on incoming solar radiation, surface temperature, atmospheric constituents, air quality, soil moisture, NDVI, wind speed, and direction, trace gas concentration in the troposphere, aerosol concentration, rain rate and amount. Models: MAESTRO/MAESTRA, Catchment Land Surface Model, NCEP/ETA, DREAM, NARAC/ERS, HOTMAC/RAPTAD, COAMPS			Other Apps.
Deliverables	Reference CA NNS04AA19A. Includes Evaluation, V and V and benchmark reports, SEEDS metrics, Quarterly written reports, monthly metrics reports.			N/A

Strategic Relevance

NASA Strategic Plan: Goals 1.1, 1.2, 3.1

Additionally, the Public Health program participates in the "Decision Support through Earth Science Results" joint solicitation to be issued in FY05.

C. Congressionally Directed Activities

Virginia Access (VAccess) / Middle Atlantic Geospatial Information Consortium

The Public Health Program Element sought support from the Virginia Access Middle Atlantic Geospatial Information Consortium for the Project Malaria activities of this program plan. The VAccess Consortium is uniquely suited to assist the Program in coordinating the various partners in this Project. VAccess is an extensive partnership of one state agency and academic institutions with experience in managing multi-state environmental and public health-related initiatives with geospatial data requirements. The Virginia Access partners include:

- George Mason University, Center for Earth Observing and Space Research
- Old Dominion University
- Hampton University
- Virginia Space Grant Consortium
- Virginia Tech
- Virginia Institute of Marine Science
- University of Maryland
- University of Virginia

This Congressionally Directed activity is contractually placed through NASA SSC.

D. Program Management

Activity: *The introduction of Earth-Sun System science data into public health surveillance and research increases the amount of identifying information belonging to people on whom data is recorded in public and private databases, thus increasing the risk of a breach of medical confidentiality.*

This issue presents obstacles to the Public Health Program Element. It is a common source of administrative and legal concern that delays the establishment of agreements with public health agencies and slows the pace of interagency collaboration. To ensure public trust in their purpose and abilities, public health officials guard carefully the confidentiality of data on human health status and risks and are reluctant to share it with researchers without clear protocols for its use. The nature and magnitude of these issues are relatively unfamiliar territory for NASA administrative, legal, scientific and technical personnel.

E. Additional Activities and Linkages

The Crosscutting Solutions Program—The program consists of functional elements that contribute to all of the National Applications activities. The intention is to have the performance of these functions leverage accomplishment, and therefore the apparent resource investment, to the greatest extent possible into the National Applications partnerships. These functions are: Geoscience Standards and Interoperability, Human Capital Development, Integrated Benchmark Systems, and Solutions Networks. Examples of leveraged activities are:

- *The Earth-Sun System Gateway* is a “portal of portals” providing an access point through an Internet interface to all web-enabled NASA research results.
- *A Rapid Prototyping Center* is a proposed center at Stennis to support NASA and partners in testing and verification of Earth science results in decision support tools.
- *Transition from Research to Operations Network (R2O)* is a network that focuses on systematically transitioning the results of research to operational uses.
- *DEVELOP* is a student-based program for rapidly prototyping solutions for state and local applications and helping students develop capabilities related to applied Earth-Sun science.

Activity: IBS Engineering Support				
<div>1. Refine technical requirements related to the geospatial components associated with NASA Earth observing data products for RSVP and EPHTN / HELIX.</div> <div>2. Advise on the selection of NASA Earth-Sun science data products for incorporation into RSVP.</div> <div>3. Perform V&V of NASA products through use of in situ measurements and ground networks and benchmark product performance through technical publication/memoranda.</div> <div>4. Leverage studies of surface roughness and use of NASA and other data sets to derive surface roughness measurements for incorporation into wind and transport models.</div> <div>5. Investigate and develop data fusion products that combine local-scale high-resolution data with global-scale NASA data products.</div> <div>6. Develop a “checklist” of model attributes that should be examined when comparing and evaluating models for incorporation into RSVP.</div> <div>7. Identify ground truthing sites for V&V of weather models that support RSVP. Perform ground truthing using these areas as V&V sites for coarse scale data and models. Ground truthing can also serve as V&V of high resolution data that is used in data fusion.</div> <div>8. Investigation of OSSE opportunities and connections to the Earth Science Gateway, GIO, the GIG, and DEVELOP.</div>				<div>Budget requested from Crosscutting Solutions Program</div>
Project Manager	Centers	Timeframe	Partners	FY05 200K
Timi Vann-SSC	SSC	FY04-FY09	N/A	FY06 200
				FY07 200
				FY08-9 200
Earth-Sun science Products	Identified through REASoN project RSVP and evaluation efforts with DHHS SCC. Support to other projects as appropriate.			Other Apps.
Deliverables	List of in situ sites, checklist of model attributes, data fusion products, formal recommendations for action, technical memoranda			Air Quality

NASA and Science Mission Directorate Priorities

- *Federal Enterprise Architecture (FEA)* is a business and performance-based framework to support cross-agency collaboration, transformation, and government-wide improvement.
- *The Global Information Grid (GIG)* is the first stage of a U.S. military global, high-bandwidth, Internet protocol-based communications network (a.k.a., ‘the Internet in space’).
- *The Joint Center for Satellite Data Assimilation (JCSDA)* is a multi-agency collaboration to accelerate and improve the quantitative use of research and operational observational spacecraft data in weather and climate prediction models. NOAA (NESDIS, NWS, OAR), NASA, Navy, Air Force, and NSF (through UCAR) collaborate in JCSDA.
- *Metis* is a visual modeling software tool for planning, developing, and analyzing agencies' enterprise architectures. The Applied Sciences Program is using Metis to identify possible linkages between observations, models, and decision support tools to support the IWGEO and NASA/NOAA R2O activities.
- *Observing System Simulation Experiments (OSSEs)* use simulated observations to assess the impacts of future observational spacecraft instruments on weather and climate prediction and provide opportunities to test new designs and methodologies for data gathering and assimilation.
- *Project Columbia* is a NASA-wide project to develop a new, fast supercomputer (using an integrated cluster of interconnected processor systems) to support the Agency's mission and science goals, including enhanced predictions of weather, climate, and natural hazards.

VI. Budget: Fiscal Year 2005

The following table lists the Public Health Program budget (procurement) for FY2005:

Public Health	
Project	FY05 Procurement Allocation (\$K)
CDC: EPHTN/HELIX	\$210
CDC: Arbonet/Plague	\$125
USAF: GSAT (Malaria)	\$165
DHHS: SCC	\$150
Program Management Activities	\$75
Total	\$725

Appendix C lists program-wide budget allocations for FY2005.

VII. Schedule and Milestones

March 2005	NAS study report
May 2005	Establish formal collaborative agreements with DOD/GSAT and DHHS/SCC
May 2005	Establish interagency working group on Public Health
August 2005	Article on public health applications of Earth science in a peer reviewed or trade journal
August 2005	Verify and validate Earth-Sun System science enhancements to HELIX
Sept 2005	Initial EPHTN/HELIX and RSVP benchmark reports
Sept 2006	Verify and validate Earth-Sun System science enhancements to DHHS SCC
March 2007	Benchmark reports on HELIX, ArboNET/Plague Surveillance System, Malaria
March 2008	Article on public health applications of Earth science in a peer reviewed or trade journal

VIII. Performance Measures

The Public Health Program Management Team uses performance measures to track progress, identify issues, evaluate projects, make adjustments, and establish results of the program element. The Program's goals and objectives state what the Program intends to achieve. These measures help monitor progress within and across specific activities to ensure the Program meets its goals and objectives. The Management Team analyzes these measures retrospectively in order to made adjustments proscriptively to the Program approach and objectives.

The measures are in two categories: Program Management measures are internally focused to assess the activities within the Program. Performance measures are externally focused to assess if the program activities are serving their intended purpose. In general, the Public Health Program Manager uses these measures to evaluate the performance of activities conducted and sponsored by the Program, especially the projects. In addition, the Applied Sciences Program uses this information in preparing IBPD directions and PART responses.

Program Management Measures (Internal):

Inputs	Potential issues and DST identified for public health – <i>number, type, range</i> Eligible partners to collaborate with – <i>number, type, range</i> Potential results/products identified to serve public health – <i>number, type, range</i>
Outputs	Assessments or evaluations of DST – <i>number, range</i> Assessments of Earth science results/products to serve DST – <i>number, range</i> Agreements with partners – <i>presence</i> Reports (evaluation, validation, benchmark) – <i>number, type</i>
Quality and Efficiency	Earth-Sun System science results/products – <i>number used per DST, ratio of utilized to potential</i> Agreements – <i>ratio of agreements to committed partners</i> Reports – <i>partner satisfaction, timeliness, time to develop</i> Reports – <i>ratio of validations to potential products, ratio of benchmarks to validations</i>

Performance and Results Measures (External):

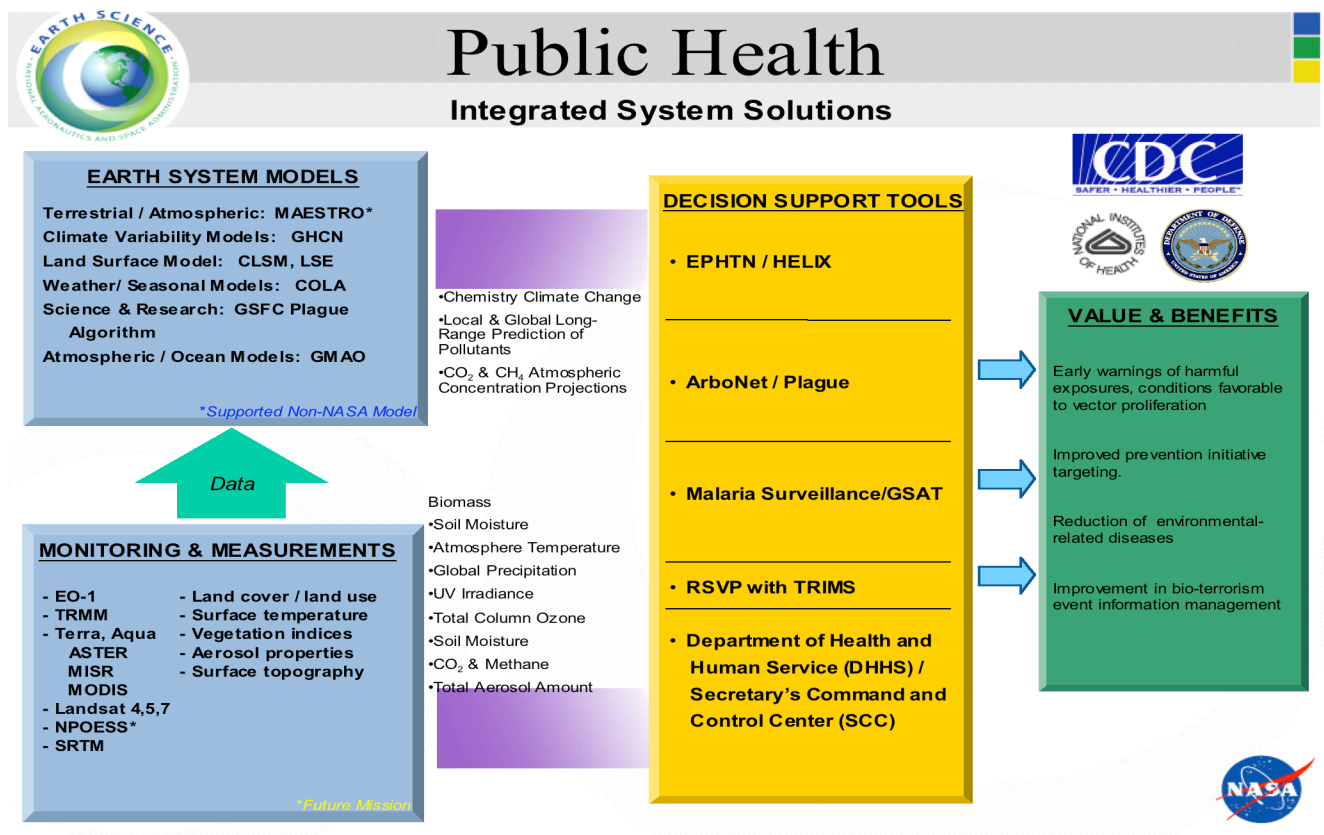
Outcomes	Earth science products adopted in DST – <i>number, type, range; use in DST over time</i> Earth science products in use – <i>ratio of products used by partners to reports produced</i> Partner & DST performance – <i>change in partner DST performance, number and type of public recognition of use and value of Earth science data in DST</i>
Impacts	Partner value – <i>change in partner metrics (improvements in value of partner decisions)</i>

In addition to the stated measures, the Public Health Program Manager periodically requests an assessment of its plans, goals, priorities, and activities through external review. The Public Health Program Team uses these measures along with comparisons to programmatic benchmarks to support assessments of the Earth Science Applications Program (e.g. internal NASA reviews and OMB PART). In specific, the Public Health Program Manager uses comparisons to similar activities (i.e. program benchmarks) to evaluate its progress and achievements.

IX. Appendices

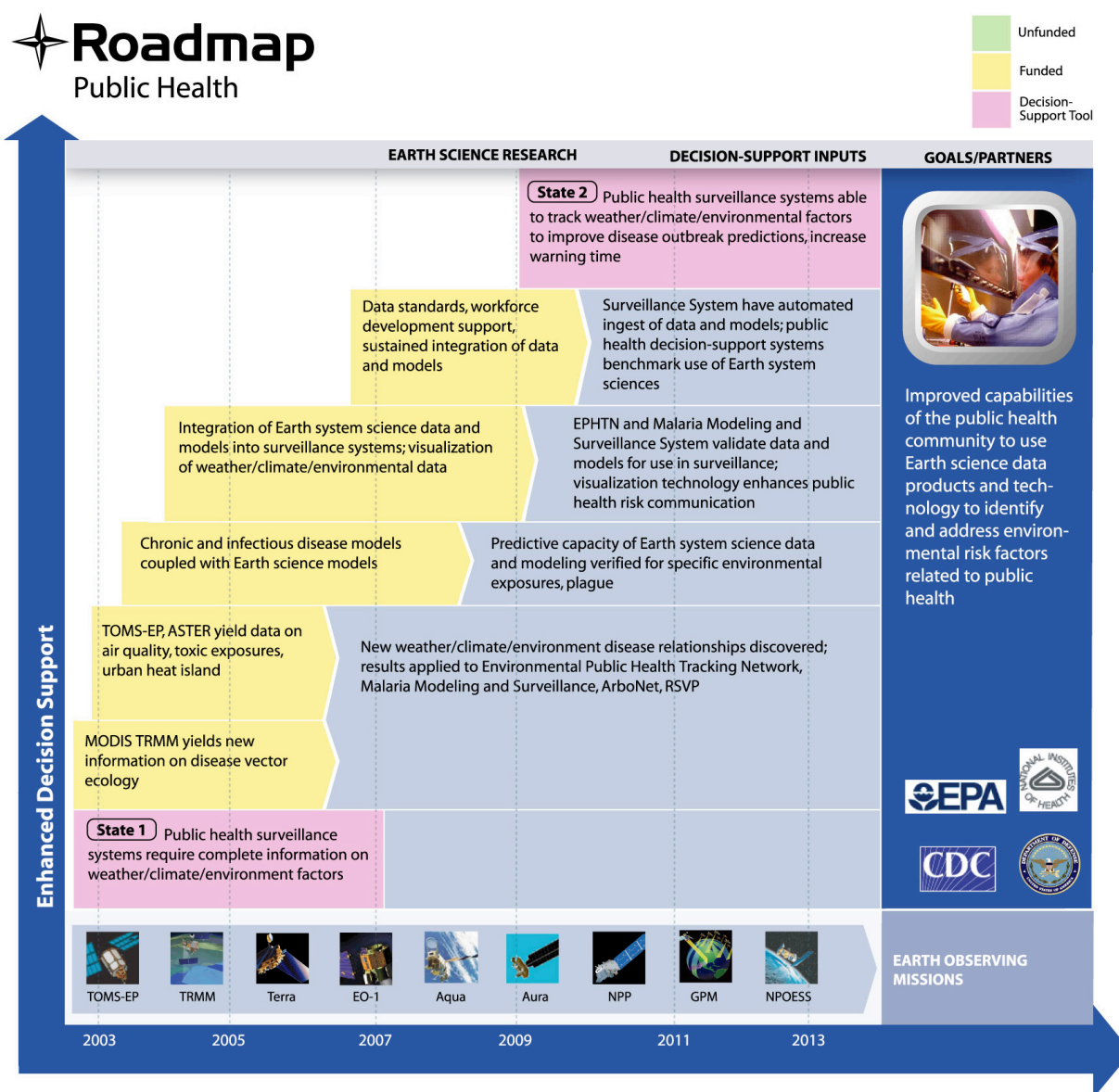
Appendix A. Integrated System Solutions Diagram

This figure illustrates the extension of Applied Sciences measurements, model products, and data fusion techniques to support the Public Health Program partners, their decision support tools, and the value and benefits of Earth science to society.



Appendix B. Roadmap

The Public Health Program draws upon technology and data from Earth-Sun system science missions such as Aqua, Landsat 7, NOAA-POES, Terra, TOMS, and TRMM. These and other systems provide information on environmental features that are correlated with disease risk factors or are risk factors themselves. The incorporation of Earth-Sun science research and models into public health surveillance systems enhances their ability to assimilate the role of weather, climate and environmental risk factors – in place and time – to predict disease events.



Appendix C. Applied Sciences Program Budget FY2005

The overall program budget allocations are given below to provide the context in which this National Application is conducted. The allocations are based on Agency and program priorities and are subject to change according to the availability of funds and programmatic strategies. All values are in \$ thousands.

*NOTE: Allocations include full utilization of the Applied Sciences FY04 carryover of approximately \$2.7 million.

Table 1: Applied Sciences Procurement Allocation – FY05

Program Element	FY05 Procurement Allocation
National Applications	
Agricultural Efficiency	\$ 467
Air Quality Management	\$ 995
Aviation	\$ 750
Carbon Management	\$ 653
Coastal Management	\$ 550
Disaster Management	\$ 545
SENH	\$ 1,429
Ecological Forecasting	\$ 610
Energy Management	\$ 775
Homeland Security	\$ 205
Invasive Species	\$ 205
Public Health	\$ 725
Water Management	\$ 870
Program Director Discretionary Fund	\$ 588
Center Director Discretionary Fund Tax	\$ 2,485
National Applications Total	\$ 11,852
Crosscutting Solutions	
Integrated Benchmarked Systems	\$ 3,529
Solutions Networks	\$ 1,200
Competitive Solicitations	\$ 7,600
Human Capital Development	\$ 700
Geoscience Standards & Interoperability	\$ 2,000
Crosscutting Solutions Total	\$ 15,029
Applied Sciences Program Procurement Total	\$ 26,881

Table 2: Applied Sciences Program NASA Institutional Allocations – FY05

NASA Center	FY05 Institutional Cost / National Applications	FY05 Institutional Cost / Crosscutting Solutions	Institutional Total
HQ	\$3,773	\$7,351	\$11,124
ARC	\$1,108		\$1,108
GSFC	\$1,009	\$1,094	\$2,103
JPL			
LaRC	\$1,517	\$444	\$1,961
MSFC	\$1,251	\$183	\$1,434
SSC	\$3,194	\$8,689	\$11,883
Total	\$11,852	\$17,761	\$29,613

Appendix D. Acronyms and Websites

ACRONYMS:

ACRIMSAT	Active Cavity Radiometer Irradiance Monitor Satellite
AFSOC	Air Force Strategic Operations Command
AIWG	Applications Implementation Working Group
APHA	American Public Health Association
Arbonet	Passive Surveillance System (CDC Plague Surveillance System)
ARC	Ames Research Center
ASPH	Association of Schools of Public Health
ASTER	Advanced Spaceborne Thermal Emission and Reflectance Radiometer
ASTHO	Association of State and Territorial Health Officials
CCSP	Climate Change Science Program
CCTP	Climate Change Technology Program
CDC	Centers for Disease Control and Prevention
CENR	Committee on Environment and Natural Resources
CLSM	Catchment Land Surface Model
CSTE	Council of State and Territorial Epidemiologists
DAAC	Distributed Active Archive Center (Data Active Archive Center)
DEVELOP	No longer an acronym
DHHS	Department of Health and Human Services
DOC	US Department of Commerce
DOD	US Department of Defense
DOE	US Department of Energy
DREAM	Distance Routing Effect Algorithm for Mobility
DST	Decision Support Tool
EO-1	Earth Observing-1
EPA	US Environmental Protection Agency
EPHTN	Environmental Public Health Tracking Network
ERBS	Earth Radiation Budget Satellite
ERS	Emergency Response System
ESG	Earth-Sun System Gateway
ETA	Event Tree Analysis
FEA	Federal Enterprise Architecture
FY	Fiscal Year
GES	Geospatial Extension Service
GEO	ad hoc Group on Earth Observations
GHCN	Global Historical Climatology Network Model
GIG	Global Information Grid
GMAO	Global Modeling and Assimilation Office
GSAT	Global Satellite Data Acquisition Team/Global Situational Awareness Tool
GSFC	Goddard Space Flight Center
HELIX	(High Energy Laser Iodine Extraction Code) Health and Environment Linked Information Exchange System
HOTMAC	High Order Turbulence Model For Atmospheric Circulations
IBPD	Integrated Budget and Performance Document
ICMA	International City/County Management Association
IWGEO	Interagency Working Group on Earth Observations

JCSDA	Joint Center for Satellite Data Assimilation
LaRC	Langley Research Center
LES	Large Scale Eddy Simulation Model
MAESTRA	European Spacecraft
MAESTRO	European Spacecraft
MEOC	Marine Emergency Operation Center /Marcus Emergency Operations Center
MODIS	Moderate Resolution Imaging Spectroradiometer
MS DoH	Mississippi Department of Health
MSFC	Marshall Space Flight Center
NACCHO	National Association of City and County Health Officials
NARAC	National Atmospheric Release Advisory Center
NAS	National Academy of Sciences
NASA HQ	NASA Headquarters
NASA	National Aeronautics and Space Administration
NCAR	National Center for Atmospheric Research
NCEP	National Centers for Environmental Prediction
NDVI	Normalized Difference Vegetation Index
NESDIS	National Environmental Satellite Data Information Service
NIH	National Institute of Health
NOAA	National Oceanic and Atmospheric Administration
NPOESS	National Polar-Orbiting Operational Environmental Satellite System
NSF	National Science Foundation
NSTC	National Science and Technology Council's
NWS	National Weather Service
OAR	Office of Oceanic and Atmospheric Research
OMB	Office of Management and Budget
OSSE	Observing System Simulation Experiment
OSTP	Office of Science and Technology Policy
PART	Program Assessment Rating Tool
POES	Polar Orbiting Environmental Satellites
PSS	Plague Surveillance System
R2O	Research to Operations Network
RAPTAD	Random Particle Transport and Diffusion
REASoN	Research, Education, and Applications Solutions Network
RSVP	Rapid Syndrome Validation Project
SCC	Secretary's Command Center
SeaWiFS	Sea-viewing Wide-Field-of-View Sensor
SEDAC	Socio Economic Data and Application Center
SEEDS	Strategic Evolution of ESE Data Systems
SRTM	Shuttle Radar Topography Mission
SSC	Stennis Space Center
THORPEX	The Observing-System Research and Predictability Experiment
TOMS	Total Ozone Mapping Spectrometer
TOMS-EP	Total Ozone Mapping Spectrometer – Earth Probe
TRMM	Tropical Rainfall Measurement Mission
UCAR	University Corporation for Atmospheric Research
USGS	United States Geological Survey
VAccess	Virginia Access
WHO	World Health Organization
WMO	World Meteorological Organization

WEBSITES:

AIWG: <http://aiwg.gsfc.nasa.gov/>

Applied Sciences Program: <http://science.hq.nasa.gov/earth-sun/applications>

DEVELOP: <http://develop.larc.nasa.gov>

Earth-Sun System Gateway (ESG): <http://esg.gsfc.nasa.gov/>

Earth-Sun Science System Components: <http://www.asd.ssc.nasa.gov/m2m>

NASA FY2005 Budget: <http://www.ifmp.nasa.gov/codeb/budget2005>

Research and Analysis Program: <http://science.hq.nasa.gov/earth-sun/science/>

Science Mission Directorate: <http://science.hq.nasa.gov>

Science Strategies: <http://science.hq.nasa.gov/strategy/>

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