

## A.40 EARTH SCIENCE FOR DECISION MAKING: GULF OF MEXICO REGION

### 1. Scope of Program

#### 1.1 Overview

The NASA Earth Science Division Applied Sciences Program solicits proposals that develop and demonstrate innovative and practicable applications of NASA Earth science observations, models, and research to support resource management, planning, and decision making activities in the broad Gulf of Mexico region.

The Gulf of Mexico is the world's ninth largest water body and the location of seven out of ten top ports in the United States. The U.S. Gulf of Mexico coast maintains a \$20 B annual tourism industry. Hundreds of oil and gas platforms and drilling operations throughout the Gulf potentially affect the environmental health of the region. Additionally, four NASA centers and one NASA assembly facility are located in states bordering the Gulf of Mexico.

The overall objective of this solicitation is to create a suite of projects that will enhance the Gulf of Mexico region's ability to use NASA Earth science observations and research in decision making activities. This solicitation has a special emphasis on climate adaptation and climate change impacts in the Gulf region and southeast United States. The recent report "Global Climate Change Impacts in the United States" (U.S. Global Change Research Program, 2009 <sup>1</sup>) outlines expected climate change impacts to US coastal communities: "Sea-level rise and storm surge will increase threats to homes and infrastructure including water, sewer, transportation, and communications systems. Many barrier islands and coastal marshes that protect the coastline and support healthy ecosystems will be lost."

Proposals will also be accepted across six of the Applied Sciences Program's eight application areas:

Agriculture	Air Quality
Ecological Forecasting	Public Health
Weather	Climate

For overall program balance of the Applied Sciences Gulf activities, proposals in the other two areas (Disaster Management and Water Resources) are not eligible for this solicitation; proposals received in these two areas will be considered noncompliant.

#### 1.2 Program Objectives

The Applied Sciences Program discovers and demonstrates innovative applications of NASA Earth science research and technology to extend the benefits to society of the

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<sup>1</sup> <http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts>

nation's investments in NASA Earth science research.<sup>2</sup> To this end, the program develops practical applications of NASA Earth science observations and research through demonstration projects carried out in partnership with end-user organizations.<sup>3</sup> The Applied Sciences Program thus serves as a bridge between the Earth science research community and the information and tools required by organizations, agencies, and businesses.

The Applied Sciences Program employs an “end-to-end” approach to extend Earth science research results as inputs to decision-making activities. The Program works in partnership with organizations that develop, own, and employ decision support tools, systems, assessments, etc. to serve and support their management, business, and policy-making activities. On the other side, the Program works with the research community to test the feasibility of new ideas and to provide knowledge needed to enable applications. The Program allows and encourages all sectors, including the private sector, to submit proposals and/or be involved in project teams.

The Applied Sciences Program manages according to eight applications areas:

Agriculture	Air Quality	Disaster Management
Ecological Forecasting	Public Health	Water Resources
Weather	Climate	

Points of contact for each of these application areas are listed in Section 6 of this appendix.

## 2. Project Proposal Information

The Applied Sciences Program supports projects that create knowledge that enables applications, assess feasibility of potential applications, and/or integrate NASA Earth science observations and research directly into decision making activities through this solicitation.

### 2.1 Project Scope and Purpose

The Applied Sciences Program seeks results-oriented projects focused on a feasibility assessment and/or full integration of Earth science products into decision making activities for topics in Section 2.2. This solicitation will accept proposals at various stages

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<sup>2</sup> The NASA Earth Science Division serves NASA's goal to “Study Earth from space to advance scientific understanding and meet societal needs” (NASA Strategic Subgoal 3A). To that goal, the NASA Applied Sciences Program serves the NASA objective “to expand and accelerate the realization of societal benefits from Earth system science” (NASA Strategic Outcome 3A.7). Section I (a) and Table 1 of the *Summary of Solicitation* of this NRA have references to the *2006 NASA Strategic Plan* and the *NASA Science Plan*.

<sup>3</sup> The term “end-user” here means the organization(s) that will ultimately use and operate the improved decision-making activity.

of maturity. However, projects that propose to conduct substantially new research investigations for the sole purpose of improving scientific understanding will be considered noncompliant for this solicitation, as these are solicited through other ROSES appendices.

Proposals may:

- perform a feasibility study of a concept(s) for potential application(s) of specific NASA Earth science research results to improve decision-making activities; and/or,
- conduct a project focused on the integration, transition, and sustained use of Earth science research results in decision making activities.

Applicants are encouraged to submit proposals in partnership with user organization and at a minimum must clearly define the societal need and identify potential end-users for the proposed application.

NASA Earth science research results (a.k.a., products) *must* be utilized in proposed projects and can include Earth science measurements (particularly NASA spacecraft observations, both in orbit and planned), outputs and predictive capabilities of Earth science models (especially ones that use NASA spacecraft observations or are NASA-sponsored), algorithms, visualizations, new knowledge about the Earth system, and other techniques and geosciences products. Applicants are strongly encouraged to use an integrated array of Earth science products in their projects. Proposals may blend commercial remote sensing and geospatial information with NASA Earth science measurements to integrate into and improve decision making. Proposal teams may use observations, measurements, models, etc. from other organizations (including foreign) provided the team uses them in conjunction with some NASA Earth science products.

## 2.2 Project Topics

In this announcement, the Applied Sciences Program particularly encourages proposals related to climate adaptation and climate change impacts in the Gulf of Mexico region and southeast United States.

The Program encourages proposals that support decision making activities (e.g., scenario planning, policy analysis, alternatives analysis) and management actions related to climate adaptation. Adaptation consists of initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change hazards and impacts. Some adaptation strategies may leverage climate change ‘benefits,’ such as lengthening the construction season in the expectation of fewer frost events. Adaptation strategies generally fall under the categories of policy, new infrastructure investment, and maintenance and operations.

Proposals should address issues of uncertainty relative to climate-related policy analysis, decision making, impacts, and implementation approaches. The Program also encourages proposals focused on assessments of climate change impacts in the region, which support adaptation decisions and actions.

The Program encourages proposals that support public and private organizations to use NASA climate observations, climate records, model predictions, and predictive capabilities in a sustained, ongoing basis. The Program encourages proposals that support private industry to develop products and services based on NASA Earth science products. In addition to climate adaptation, proposals may address topics related to energy management, renewable energy, and carbon management if they are related to climate applications.

Multidisciplinary project teams are strongly encouraged as are proposals that incorporate Earth science predictions and model predictive capabilities into decision-making activities at regional-to-local levels, including the forecasting of climate impacts. In developing a project, proposal teams might consider enlisting approaches for scaling global climate model simulations to regional levels. Proposal teams might consider the use of Intergovernmental Panel on Climate Change scenarios in prediction of regional impacts that may require adaptation. Proposal teams may also want to familiarize themselves with results from the Earth Science Division's Modeling Analysis and Prediction program, including the Modern Era Retrospective-Analysis for Research and Applications. Proposal teams may want to utilize the U.S. Global Change Research Program's Synthesis and Assessment Products (SAP), especially SAP 4.7 and SAP 5.1.<sup>4</sup>

The solicitation encourages proposals related to climate adaptation and impacts facing coastal cities in the Gulf of Mexico region. Likewise, proposals may address climate adaptation and impacts to major national assets, such as NASA centers in the region, particularly Kennedy Space Center, Stennis Space Center, Johnson Space Center, and the Michoud Assembly Plant. Proposal teams may want to collaborate with planning personnel at NASA centers and the Environmental Management Division in NASA's Office of Infrastructure.

Applicants may also propose projects in any of the following five applications areas:

### *2.2.1 Agriculture*

The Agriculture application area focuses on Earth science applications for land resources management, especially issues associated with agriculture, forestry, rangeland, and food security. The application emphasizes the use of satellite observations; model predictions, model interoperability; and the downscaling of global climate models to support agricultural yield forecasts; manage invasive species; assess the carbon effects of agriculture; and examine policy, management, and programmatic alternatives.

### *2.2.2 Air Quality*

The Air Quality application area facilitates the application of Earth Science satellite products and models to air quality management and policy issues, particularly issues

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<sup>4</sup> <http://www.globalchange.gov>

associated with the implementation of air quality standards, policy, and regulation for environmental, economic, and human welfare. The program is organized around themes of Air Quality Planning, Compliance, Forecasting, Emissions Inventories, and Climate.

### 2.2.3 Ecosystems

The Ecosystems application area focuses on Earth science applications to support partners' efforts for integrated, ecosystem management, particularly to conserve biodiversity, manage living marine resources and invasive species, and promote sustainable development. The application emphasizes the use of climate predictions, model forecasting, and model interoperability to examine policy and management alternatives. The application is organized around themes of Sustainable Development, Biodiversity Conservation, and Marine Fisheries.

### 2.2.4 Public Health

The Public Health application area focuses on Earth science applications to public health and safety, particularly regarding infectious disease, emergency preparedness and response, and environmental health issues. The application explores issues of toxic and pathogenic exposure, as well as natural and man-made hazards and their effects, for risk characterization/mitigation and improvements to health and safety.

### 2.2.5 Weather

The Weather application focuses on Earth science applications to support weather-affected economic interests, currently including aviation and space weather. The application is particularly focused on applications to support the Next Generation Air Transportation System. As appropriate, the application may expand to support other specific weather-affected economic interests to improve the global mobility of people and material.

## 2.3 Other Information and Requirements

Proposals that quantify and document improvements to decision making and benefit to society will receive preference. The Program also encourages projects that promote benefits that can be accrued broadly by society.

The Program requires proposals to include a transition plan that describes how and when the application will be transitioned to the end-user; "transition" means that the end-user is utilizing the capability *independent of NASA support*. (Note: It is not expected that full transition will necessarily occur within the period of these projects; rather that a clear path for transition is outlined and that barriers to transition are identified upfront and plausible approaches are identified).

Proposed projects can be performed at any geographic level related to the Gulf of Mexico region. For this solicitation, this region encompasses the five Gulf of Mexico states as

well as inland areas for those states, as well as coastal (for example, the Atlantic coast of Florida) and open-water areas.

The Program encourages multiorganizational and multidisciplinary teams. The Program strongly encourages direct involvement of the end-user organizations as part of the proposal team and project. Proposals should demonstrate a strong interest and commitment by the end-users to adopt the results from the proposed work in their decision making.

The solicitation strongly encourages proposing teams to partner with organizations, universities, and institutes in the Gulf of Mexico region and throughout the country, especially those with expertise in Earth science research and applications.

Proposal teams may want to familiarize themselves with the needs identified by the Gulf of Mexico Alliance<sup>5</sup> (GOMA), the Governors’ Action Plans and other documents on the GOMA webpage, and documents of the Gulf of Mexico Regional Partnership Federal Workgroup. Proposal teams may want to consult these documents in developing ideas for project partners and end-users.

The Program encourages proposals team to have a dual project leadership team - one person to lead the technical and scientific aspects, and one person to lead the end-user engagement and decision-making improvement aspects. However, NASA requires that a proposal team designate a single PI who will take authority and responsibility for the proper conduct of the project, including the appropriate use of funds and administrative requirements such as the submission of progress reports. A second project leader may be designated as the “Co-I/Science PI” or “Co-I/Institutional PI,” and the project management arrangements should be articulated in the appropriate section of the proposal.

### 3. Programmatic Information

Total Amount of Funding	~\$5M total
Anticipated Number of Awards	10 – 20 projects
Expected Range of Award per project	Up to 400K total *
Period of Performance	up to 24 months
Expected Project Start Date	circa March 1, 2010
Contributions from Partner Organizations	Strongly encouraged. Partner funding does not count toward funding level guidelines.

<sup>5</sup> <http://gulfofmexicoalliance.org/>

\* These figures are total funding for the entire project; the figures are not *per annum*. NASA will distribute *all funds* at the beginning of the project. The project teams have up to 24 months to complete the project.

4. Amendments and Clarifications to the *Summary of Solicitation*

The following information provides clarifications or amendments to the *Summary of Solicitation* of this NRA. The information below supersedes direction provided in the respective sections of the *Summary of Solicitation*.

4.1 Cost Sharing or Matching: Changes to Section III(c) of the *Summary of Solicitation*

Contributions and cost sharing from proposing institutions and partner organizations are highly encouraged (see Section 4.3). The Program accepts in-kind contributions during the course of the project as cost sharing. Relevant past work, prior results, or previous support and accomplishments can be described, but the Program does not consider these as cost sharing or in-kind contributions for proposals to this solicitation.

Cost sharing is not part of the proposal evaluation criteria. At the time of project selection, when deciding between proposals of otherwise equal merit, NASA will consider the extent to which the proposed project includes funds or in-kind contributions, consistent with Section 4.1 of this appendix and Section III(c) of the *Summary of Solicitation*.

4.2 Proposal Format and Contents: Changes to Section IV (b) (ii) of the *Summary of Solicitation*

Proposals should adhere to the following page guidelines and order. Content descriptions, if specified below, modify Section 2.3 of the *NASA Guidebook for Proposers*.

Proposal Cover Page .....	As found on NSPIRES site or Grants.gov (includes budget summary)
Proposal Summary .....	300 words (included in cover page)
Table of Contents .....	1
Decision-making Activity .....	1
Earth Science Products and Results .....	1
Technical Approach (including figures/tables) .....	8
- Figures and Tables (as appropriate; integrated into text if possible)	
Transition Approach.....	1
Performance Measures .....	1
Anticipated Results.....	1
Project Management.....	1
Schedule .....	1
Statements of Commitment – Co-Is .....	as needed
Letters from End-User Organizations .....	up to 4 one-page letters
Budget Justification: Narrative and Details.....	as needed

Facilities and Equipment (if applicable) .....	1
Curriculum Vitae: Principal Investigator(s) .....	2
Each Co-Investigator .....	1
Current/Pending Support .....	as needed
References and citations .....	as needed

*Proposal Summary*

In addition to the information listed in the *NASA Guidebook for Proposers*, this section must explicitly state which of the eight application areas the proposal relates to (if more than 2, then only identify the top 3). For the primary application(s) related to the project, this section should state how the project responds and relates to the priority topics identified in Section 1.3 of this appendix.

*Decision Support Overview/Baseline*

This section must explicitly identify and describe the decision-making activity to be enhanced (or created) in the project. The description should describe the management, business, or policy topic or issue that it serves, including any quantitative information regarding its use. This section must identify and describe the end-user organization(s) and their responsibility and/or mandate to address the topic/issue.

This section should answer the following questions: What is the end-users' current basis for decision-making? What is the decision-making activity? Who uses it and how do they use it in their decision-making process? What analyses does (will) it support and what actions and decisions are (will be) made? What measures/metrics do (will) its users employ to determine the value or quality of their decision-making? What are the reasons and needs for improving (creating) it?

This section must quantify the preproject, baseline performance of the decision-making activity, using the end-users' measures, as well as other quantitative measures the team plans to employ throughout the project to track progress. Proposals seeking to create a decision-making activity must quantify the baseline performance of the end users' decision-making process/capability without a formal decision-making activity.

*Earth Science Research Results*

This section must identify the array of Earth science research results (Section 1.2 of this appendix) that the proposal will utilize. Proposals must be specific. For spacecraft observations, proposals should include the spacecraft, sensor, data product, and other specific information. For proposals involving Earth science models, this section should identify the inputs to the models, as well as the predictions, forecast products, or other products from the models. For proposals involving NASA Earth science research results produced with commercial remote sensing data and geospatial information, proposals must identify the commercial inputs and sources. For proposals blending commercial products with NASA products, proposals should identify all the data and products.

*Technical Approach*

As the main body of the proposal, this section should cover the following material:

- Objectives of the proposed activity and relevance to NASA’s *Strategic Goals and Outcomes* given in Table 1 in the *Summary of Solicitation* of this NRA;
- Methodology to be employed, including discussion of the innovative aspects and rationale for NASA Earth research results to be integrated;
- Systematic approach to integrate Earth science results into the decision-making activity (existing or new) and to develop and test the integrated system and address integration problems (technical, computational, organizational, etc.);
- Approach to quantify improvements in the system performance, including characterization of risk and uncertainties;
- Approach to quantify (or quantitatively estimate) the socioeconomic value and benefits from the resulting improvements in decision-making;
- Challenges and risks affecting project success (technical, policy, operations, management, etc.) and the approach to address the challenges and risks; and
- Relevant tables/figures that demonstrate key points of the proposal.
- Proposals seeking to create a new decision-making activity should describe the tool, system, assessment, etc. in detail, including the decision analysis, factors, unique roles for Earth science research results, and other pertinent information.

*Transition Approach/Activities*

This section should articulate the transition plan, including specific activities to enable the end-users to adopt the enhancements to the decision support activity (or new decision support activity) and sustain their use of the Earth science products within the timeframe of the project.

*Performance Measures*

This section must articulate the measures (both quantitative and qualitative) the team will use to determine the outcomes, results, and value of the project. The measures should establish the potential improved performance achieved through integration of the Earth science research results. The measures should include those that the decision makers employ, as well as those used to establish the baseline performance.

*Anticipated Results*

This section must describe the expected results from the project. This section must state the team’s hypothesis for the expected quantitative improvement(s) over the “baseline” performance. This section should estimate the expected improvement(s) in decision-making enabled from the enhanced (new) decision-making activity and the associated socioeconomic benefits from the improved decision-making. This section should be as specific and quantitative as possible.

This section should identify how the expected results will contribute to the specific goals and objectives of the related application area(s).

*Project Management*

This section should articulate the management approach and structure; plan of work; partnership arrangements; and the expected contribution, roles, and responsibilities of the

team members. Project schedule and milestones must be included. Note: Meetings (number of, frequency of, etc.) do not qualify as project management milestones.

#### *Statements of Commitment*

In addition to the brief statements from Co-Is required per Section 2.3.10 of the *NASA Guidebook for Proposers*, this section may include up to 4, one-page letters from the end-user organizations that will benefit from the proposed project. The letters may include input from the community and beneficiaries served by the end user organizations. All statements or letters must be addressed to the PI and included in the proposal.

#### *Budget*

NASA encourages the use of commercially available data sets by Principal Investigators, as long as they meet the scientific requirements and are cost effective. In addition to the budget guidance in the *Summary of Solicitation*, the proposal should identify the commercial data sources intended for use and details on the associated cost.

#### 4.3 Evaluation Criteria: Subfactors for Section V (a) of the *Summary of Solicitation* and Section C.2 of the *NASA Guidebook for Proposers*

In addition to the factors given in the *NASA Guidebook for Proposers*, the evaluation criterion “relevance to NASA's strategic goals and objectives” specifically includes the following factors:

- Overall intent and ability to demonstrate the utility of NASA Earth science products to improve decision making activities in the Gulf of Mexico region;
- Overall intent and ability to address one or more of the priority topics in Section 2.2;
- Overall intent and ability to demonstrate societal benefits of NASA Earth science data and/or products; and
- Breadth and potential impact of the project.

In addition to the factors given in the *NASA Guidebook for Proposers*, the evaluation criterion "intrinsic merit" specifically includes the following factors:

- Technical and scientific ability to apply appropriate Earth science results that make substantive improvements to resource management and decision making;
- Overall potential contribution to society;
- Overall intent and ability to characterize and quantify the improvements in performance of the decision making and related societal benefits; and
- The strength of partnerships with and support by end-user organizations.

In addition to the factors given in the *NASA Guidebook for Proposers*, the evaluation criterion “cost realism” specifically includes the following factors:

- Overall approach and ability to manage the project and achieve stated objectives;
- Quality of performance measures and overall plan and ability to use them; and
- Overall ability of the proposed work to cost-effectively meet identified needs and enable sustained results following completion of the project.

Cost sharing is not part of the proposal evaluation criteria. At the time of project selection when deciding between proposals of otherwise equal merit, NASA will consider the extent to which the proposed project includes funds or in-kind contributions, consistent with Section 4.1 of this appendix and Section III(c) of the *Summary of Solicitation*.

#### 4.4 Award Reporting Requirements: Changes to Section VI(c) of the *Summary of Solicitation*

The following reports will be required of awarded proposals. In cases where teams of organizations or subcontracts exist, consolidated project reports, including financial records, must be submitted and is the responsibility of the lead organization. The proposed budget should provide for these reporting requirements.

The required reports are:

- Semiannual Reports – Performance and Financial;
- Demonstrations and Prototypes;
- Final Report / Application Report; and
- Final Project Review and Workshop.

##### *Semiannual Reports – Performance and Financial*

Brief semiannual reports are required that provide information on the following: major activities and accomplishments of preceding six months, schedule status, financial activity, and performance measures. The report should be approximately 1-2 written pages, with the actual length depending on the level of activity. The first report must identify changes made during the award negotiations. The Program will work with the project team on an appropriate format.

##### *Demonstrations and Prototypes*

Projects should plan for at least two demonstrations to show technical results and project status: One or more demonstrations to provide proof of concept and feasibility/potential benefit of the approach, and at least one demonstration to show the use and performance of the enhanced (or new) decision-making activity in the end users' operational environment. Plans for delivery of project results, algorithms, etc. to NASA and partner agencies should be consistent with the *NASA Data and Information Policy*. This policy is available at <http://nasascience.nasa.gov/earth-science/earth-science-data-centers/data-and-information-policy/>.

##### *Final Report / Application Report*

The final report should address the following:

- Documentation of procedures;
- Discussion of major technical issues and problems encountered and how resolved (e.g., integration, interoperability) and discussion of other issues and problems encountered and how resolved (e.g., management, organizational)
- Quantitative and qualitative enhancements to the decision support activity and related decision-making;

- Resource estimate for the end user organizations’ sustained use of the Earth science products;
- Quantitative and qualitative socioeconomic benefits (actual or estimated) from the improved decision-making enabled by the project; and,
- Lessons learned, recommendations, and remaining issues facing the sustained use of the Earth science data in the enhanced decision-making activity by the partner agency and end users.

The *Grant and Cooperative Agreement Handbook - Exhibit G*

([http://prod.nais.nasa.gov/pub/pub\\_library/grcover.htm](http://prod.nais.nasa.gov/pub/pub_library/grcover.htm)) references the standard required reports for cooperative agreements; specific reporting requirements, if different from above, will be articulated in the cooperative agreement.

#### Final Report Review and Workshop

Project representative(s) should plan to travel and participate in one Program-sponsored results workshop/conference and annual program reviews. The Applied Sciences Program will coordinate this activity with the project team during the course of the project; however, the project should budget accordingly to attend these events.

#### Distribution of Reports and Presentation Packages

During award negotiation, NASA representatives will discuss methods, including electronic reporting, to transmit the reports and presentation packages. The NASA Shared Services Center (NSSC) will solicit the annual progress report and the final report.

### 5. Summary of Key Information

Expected annual program budget for new awards	See Section 3 of this appendix.
Number of new awards pending adequate proposals of merit	See Section 3 of this appendix.
Maximum duration of awards	See Section 3 of this appendix.
Due date for Notice of Intent to propose (NOI)	Not applicable.
Due date for Proposals	November 19, 2009
Planning date for start of investigation	See Section 3 of this appendix.
Page limit for the central Science-Technical-Management section of proposal	See Section 4.2 of this appendix and also Chapter 2 of the <i>NASA Guidebook for Proposers</i> .
Relevance to NASA	This program is relevant to the Earth science strategic goals and subgoals in NASA’s <i>Strategic Plan</i> ; see Table 1 and the references therein. Proposals that are relevant to this program are, by definition, relevant to NASA.
General information and overview of this solicitation	See the <i>ROSES Summary of Solicitation</i>

Detailed instructions for the preparation and submission of proposals	See the <i>NASA Guidebook for Proposers</i> at <a href="http://www.hq.nasa.gov/office/procurement/nraguidebook/">http://www.hq.nasa.gov/office/procurement/nraguidebook/</a> . See also Section 4.2 of this appendix for content guidance and amendments.
Submission medium	Electronic proposal submission is required; no hard copy is required or permitted. See also Section IV of the <i>ROSES Summary of Solicitation</i> and Chapter 3 of the <i>NASA Guidebook for Proposers</i> .
Web site for submission of proposal via NSPIRES:	<a href="http://nspires.nasaprs.com">http://nspires.nasaprs.com</a> (help desk available at <a href="mailto:nspires-help@nasaprs.com">nspires-help@nasaprs.com</a> or (202) 479-9376)
Web site for submission of proposal via Grants.gov:	Option not available
Point of contact concerning this program and general questions	Mr. John Haynes Applied Sciences Program Earth Science Division Science Mission Directorate NASA Headquarters Washington, DC 20546-0001 Telephone: (202) 358-4665 E-mail: <a href="mailto:JHaynes@nasa.gov">JHaynes@nasa.gov</a>
Additional points of contact for the eight applications areas	<u>Agriculture, Water Resources</u> Dr. Brad Doorn Telephone: (202) 358-2187 E-mail: <a href="mailto:bradley.doorn@nasa.gov">bradley.doorn@nasa.gov</a>  <u>Air Quality, Climate</u> Mr. Lawrence Friedl Telephone: (202) 358-1599 E-mail: <a href="mailto:LFriedl@nasa.gov">LFriedl@nasa.gov</a>  <u>Ecological Forecasting</u> Mr. Woody Turner Telephone: (202) 358-1662 E-mail: <a href="mailto:Woody.Turner@nasa.gov">Woody.Turner@nasa.gov</a>  <u>Disaster Management</u> Dr. H. Michael Goodman Telephone: (202) 358-1909 E-mail: <a href="mailto:michael.goodman@nasa.gov">michael.goodman@nasa.gov</a>  <u>Public Health, Weather</u> Mr. John Haynes Telephone: (202) 358-4665 E-mail: <a href="mailto:JHaynes@nasa.gov">JHaynes@nasa.gov</a>