NASA
National
Aeronautics and
Space
Administration

(AN-OSTA-78-A) APPLICATIONS NOTICE N78-21991
(National Aeronautics and Space
Administration) 43 p HC A03/MF A01 CSCL 05A
Unclas
G3/85 14300

Applications Notice

APRIL 19, 1978

National Aeronautics and
Space Administration

Washington, D.C.
20546

Reply to Attn of: AN:OSTA-78-A

APR 19 1978

Dear Colleague:

This letter calls your attention to continuing opportunities to take part in the Supporting Research and Technology (SR&T) phase of NASA's Space and Terrestrial Applications Program. Enclosure 1 gives information on the content and some examples of areas of interest of the program and its disciplines. Enclosure 1 also indicates where domestic proposals may be submitted.

The Space and Terrestrial Applications SR&T Program is open, and unsolicited proposals may be submitted at any time. To provide for sound planning, we will, however, be formulating our FY 1979 SR&T activities over the next several months. It is currently contemplated that the first evaluation of unsolicited proposals for FY 1979 SR&T activities will take place in early July 1978. Proposals received later than that will be judged in light of available funds and existing program needs.

The FY 1979 Space and Terrestrial Applications SR&T Program will be about $40M. The bulk of those funds will cover on-going efforts to which NASA is already committed. Approximately one-fourth of the total is likely to go for new work along the broad outlines of examples given in Enclosure 1. Unsolicited proposals which envision instrumentation research should call for effort of an SR&T nature (e.g., aircraft, sounding rocket, or balloon flight). We will, however, welcome proposals for the conceptual phases of instrumentation research or other investigations which may later call for space flight either on Space Shuttle, or a free flying spacecraft, or both. To aid in our planning, the proposal should indicate these longer range intentions.

Foreign proposals will be accepted only on a cooperative basis (i.e. no exchange of funds). General questions concerning the establishment of such cooperative projects should be addressed to: International Affairs Division, Code LID-18, NASA Headquarters (Reference OSTA-78-A), Washington, DC 20546.

Sincerely,

Anthony J. Calio
Associate Administrator for
Space and Terrestrial Applications

INTRODUCTION

The aim of the Space and Terrestrial Applications Program is to establish useful applications of space techniques to improve conditions here on earth. We pursue this aim through partnership efforts with responsible mission agencies and private entities. In order to establish useful applications, and develop additional techniques and capabilities, we conduct research within NASA, with other government agencies, academic institutions and private organizations. We approach the specific near-term objectives through our discipline programs: Resource Observations; Environmental Observations; Communications; Materials Processing in Space, and Applications Systems/Information Systems.

Succeeding sections of this enclosure contain short descriptions of the discipline programs and examples of research areas of current interest.

Caution: Be advised that Enclosure 2 contains important information on the preparation of unsolicited proposals. Although utilization of the proposal format set forth in Enclosure 2 is not required it is believed that its use should simplify the preparation, evaluation and review of your proposal. We urge you to review that information carefully and to retain it for future reference. If for any reason your copy of this Applications Notice does not contain Enclosure 2 you should write to:

NASA Headquarters
Code EPR-3 (Reference OSTA-78-AII)
Washington, DC 20546

and a copy of the complete Applications Notice will be mailed to you.

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EARTH RESOURCES

OBJECTIVES

The Earth Resources Survey Program has three broad objectives: (1) to increase our nation's capabilities for detecting and monitoring the earth's living and nonliving resources through the use of aerospace technology in combination with remote sensing techniques and data acquisition systems; (2) to apply these capabilities to the acquisition of information for food, fiber, and water resources management, mineral and petroleum exploration, and land use classification and assessment, and (3) to conduct the necessary scientific research to insure the understanding of the basic principles of remote sensing and provide a sound foundation for applications development. The objectives pertaining to these applications are as follows:

- Food and Fiber Production and Water Management. To monitor from space the earth's changing potential capability to produce food, fiber, and water for an increasing world population.

- Mineral and Petroleum Resources Exploration. To acquire from space specialized information on geological structures and features which, when combined with standard geophysical survey techniques into a total exploration program will significantly enhance the capability for exploration and production of the earth's mineral and energy resources.

- Land and Water Use Assessments. To provide baseline information and monitor changes from space regarding the residential patterns of the United States' urban areas, the extent of land surface disruption and reclamation due to energy and transportation related activities, and other alterations in surface features due to natural events and man's activities.

CURRENT AREAS OF INTEREST

Scientific research and technique development are areas of continuing interest to the Earth Resources Survey Program. Listed below are three examples of elements of the Program where opportunities exist for research:

1. New Concepts

   New or innovative concepts for remote sensing pattern recognition leading to new sensor definition and information extraction techniques.

2. Microwave and Thermal Infrared Remote Sensing Technology

   Information extraction techniques utilizing combinations of visible, near-infrared, thermal infrared, and microwave data acquired by remote sensors on on-going satellite missions such as Landsat-2 and 3 and upcoming satellite missions such as Seasat-A, Nimbus-G, Landsat-D, and AEM-A (Heat Capacity Mapping Mission), and on NASA aircraft.

3. Remote Sensor Instruments and Data Acquisition

Conceptual, definition and proof of concept efforts leading to the development of new or innovative remote sensors and data acquisition systems.

Any technical questions relating to the Earth Resources Survey Program portion of this Applications Notice should be addressed to Ms. Ruth Whitman, Resource Observations Division, (Code ERL-2), NASA Headquarters, Washington, D.C. 20546 or telephone (202) 755-8628. A detailed listing of research tasks in the current Five Year Plan for the various discipline areas, which includes descriptions of specific tasks indicative of new areas of interest, can be obtained by letter request to Ms. Whitman.

SUBMISSION INSTRUCTIONS

Domestic proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Resources)
600 Independence Avenue, SW
Washington, DC 20546

Use of this mailing address has been approved by the Director, University Affairs Office. It applies to this submission only, taking precedence over any other submission instructions previously issued by NASA. NASA cannot take responsibility for delay of proposals addressed in any other fashion.

You are reminded that Enclosure 2 contains guidance which will be helpful in the preparation of your proposal.

RESOURCE OBSERVATIONS PROGRAM

GEODYNAMICS

OBJECTIVES

During the last two decades, a revolution has occurred in earth sciences. Its impact is comparable to what happened in physics with the introduction of quantum theory and relativity. The unifying concept in earth dynamics is plate tectonics, which models earth structure and geodynamics in terms of a small number of almost rigid plates covering the earth's surface, and moving relative to one another. Very active international research projects are now seeking to refine the basic model of plate tectonics, to understand the dynamics of the plates, the nature of the forces that drive them, and the way the plates deform as they move in response to these forces. Since most major earthquakes occur where the plates are colliding, there now appears to be a reasonable prospect of being able to predict and to influence earthquakes and perhaps volcanic eruptions once we have sufficient understanding of the earth dynamics mechanisms on global, regional and local scales. Vertical movements, poorly explained by present models, are large in extent and are of great importance geologically and economically (many petroleum deposits are controlled by such movements). However, the locations of several types of mineral deposits are now understood in terms of their relation to ancient mid-ocean ridges and other plate-tectonic features.

The Geodynamics Program is directed towards the development and validation of methods, using space techniques, for observing the physical character and dynamic motions of the earth. Pursuit of these approaches is expected to lead to: improvement of our knowledge of the earth's gravity and magnetic field for resource assessment and study of convection in the earth's mantle: refinement of the global geoid and extension of geodetic control to inaccessible areas including the ocean floors; improvement of geodetic surveying techniques; the monitoring of local topographic changes and of the changes in the earth's strain field over regions near plate boundaries; and improvement of our knowledge of earthquake mechanisms.

AREAS OF INTEREST

To fulfill these objectives, there are several areas of potential interest for research to develop useful concepts in the geodynamics field. Among these are:

1. Developing the use of space systems for accurate geodetic mapping and identification of survey points on the earth's surface; for the monitoring of local topographic changes associated with subsidence, post-glacial uplift and large scale construction; for the detection of changes of strain infault zones; and for monitoring polar motion and changes in the rotational rate of the earth.

2. Mapping the fine structure of the earth's gravity and magnetic field to provide useful information for location of natural resources such as oil, and minerals, and to provide better knowledge of the structure and dynamics of the earth's crust and its interaction with the underlying mantle.

3. Developing and validating methods of observing the earth's dynamics motions using space techniques to make unique contributions to the knowledge of earthquake mechanisms and the development of earthquake prediction methods.

Several new space techniques provide unique capabilities for measurements of key earth dynamics parameters. For example, the only methods accurate enough to measure crustal plate motion over large distances are laser ranging to satellites, laser ranging to retroreflectors on the moon, and Very Long Baseline Interferometry (VLBI) using extra-galactic radio sources. A long-range effort to monitor crustal plate motion with these systems is required for verification of plate tectonic theory and to support the development of models of global, regional and local crustal movements. Some of these techniques also have application to improved geodetic surveying. Others, such as altimetry from satellites or techniques using aircraft, appear feasible for the mapping of terrain topography and possibly vertical crustal motions.

The high accuracy determination of the earth's gravity field and geoid using satellite laser tracking and altimetry provides the knowledge of the density distribution within the earth which is essential to interpret geophysical data relevant to geodynamics and resource location. Similarly, the global measurements of the earth's magnetic field with magnetometers in spacecraft, such as Magsat, provides global mapping of magnetic anomalies required for the development of geophysical models of regional tectonic features of the earth's crust and for the correlation with crustal resources.

RESEARCH AND TECHNOLOGY NEEDS

In support of the Geodynamics Program objectives, opportunities exist within our areas of interest for research on the conceptual, feasibility and proof-of-concept phases of technology development. To focus this research, plans have been generated which outline needed effort for the next several years. In arriving at these plans, the Geodynamics Program has been grouped into subprogram areas. In each Subprogram Plan, all related elements of the program, (e.g., SR&T, flight missions, etc.) have been included. The Subprogram areas are as follows:

Geodetic Systems Development
Topographic Mapping Techniques
Solid Earth and Geoid Modeling
Crustal Modeling for Resource Assessment
Detection and Monitoring of Crustal Deformation
Advanced Geodynamics Mission Studies

Investigations involving the use of laser ranging measurements to satellites, like Lageos, and to the moon should not be submitted. An Announcement of Opportunity will be issued later this year specifically soliciting these investigations.

FURTHER INFORMATION

Any technical questions relating to the Geodynamics Program portion of this Applications Notice should be addressed to Mr. Thomas Fischetti, Resource Observations Division, Code ERG-2, NASA Headquarters, Washington, DC 20546 or telephone (202) 755-6038. Copies of the Geodynamics Subprogram Plan are available and can be obtained by letter request to Mr. Fischetti.

SUBMISSION INSTRUCTIONS

Domestic proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Geodynamics)
600 Independence Avenue, SW
Washington, DC 20546

Use of this mailing address has been approved by the Director, University Affairs Office. It applies to this submission only, taking precedence over any other submission instructions previously issued by NASA. NASA cannot take responsibility for delay of proposals addressed in any other fashion.

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ENVIRONMENTAL OBSERVATIONS PROGRAM

Today we are becoming concerned about the state of our environment. The economic impact of unanticipated changes in both short term weather and long term climate is substantial. Last year's winter in the east and drought in the west are only two recent examples. We are also concerned about the possible impact of mans' activities on the atmosphere and ocean. The effect of Chlorofluoromethane (CFM) and various nitrogen compounds on ozone, for example, is an issue of current scientific and public debate. The problems of pollution of our lakes and oceans is of considerable concern, and the exact role of the ocean and its impact on our weather and climate is still unanswered. Agencies like NOAA and the Navy's Fleet Numerical Weather Central (FNWC) have direct responsibilities for improving operational weather forecasting capabilities and NOAA is responsible for coordinating a National Climate Research Plan. EPA on the other hand is responsible for eventual regulation of products which may have deleterious effect on the environment. We at NASA have been serving these agencies by defining and demonstrating new space techniques and systems which would facilitate their tasks and could eventually be used operationally. There are five major elements in this program: (1) Global Weather Research, (2) Climate Research, (3) Severe Storms Research, (4) Environmental Quality Monitoring Research, and (5) Oceanic Processes. The following pages present each elements' objectives and an indication of the areas in which opportunities exist for additional research.

Global Weather Research

OBJECTIVES:

The long range goal of Global Weather Research is to develop an improved space capability for global observations of meteorological parameters that will contribute to our understanding of complex processes which influence the state and large scale behavior of the atmosphere. The near-term program objectives, which serve as the framework for conducting research and development activities, are:

(1) To develop new and improved remote sensing techniques that will provide the tools for solving important problems in meteorology.

(2) To exploit the capabilities of remote sensing to better understand the dynamic and thermodynamic processes which influence the state and motions of the atmosphere.

(3) To exploit the capabilities of remote sensing in improving the accuracy and range of large-scale numerical forecasting.

CURRENT AREAS OF INTEREST:

In pursuit of the three major objectives described above, there are several areas of opportunity for conceptual studies and investigations in Global Weather Research. Examples include:

Observing Systems Development - The definition and development of improved interpretive and measurement techniques for meteorological parameters now observed operationally from space. These include atmospheric temperature and moisture profiles and horizontal wind velocity. There is particular interest in exploring new techniques for the remote sensing of winds (e.g. microwave and lidar techniques). Sea surface temperature is a critical parameter and is covered under Oceanic Processes.

Theoretical Studies - Broad scientific investigations of large scale meteorological processes utilizing remote sensing data from past and current research and operational satellites, as well as new measurements from aircraft, sounding rocket, and balloon platforms.

Forecasting Improvements - Applications of space acquired remote sensing data (including ocean data) to important problems in large scale weather forecasting through improved interpretive and analysis techniques, and a synoptic data assimilation. Particular interest exists in techniques for applications of satellite data to the quantitative forecasting of precipitation.

FURTHER INFORMATION:

Any technical questions relating to Global Weather Research should be addressed to Dr. Robert A. Schiffer, NASA Headquarters (Code ERC-2), Washington, DC 20546 or telephone (202) 755-8617.

SUBMISSION INSTRUCTIONS:

Proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Weather)
600 Independence Avenue, SW
Washington, DC 20546

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Climate Research

OBJECTIVES:

The long range goal of Climate Research is to develop a space capability for global observations of climate parameters which will contribute to our understanding of the complex processes which influence climate and climate change. The near-term program objectives, which serve as the framework for conducting research and development activities, are:

(1) To develop an evolutionary global observing system for measuring climate parameters, incorporating new measurement capabilities as they become available.

(2) To assemble climate data sets from past and current satellite measurements and promote their use by the scientific and user community in broad investigations of climate phenomena.

(3) To exploit the capabilities of remote sensing in helping to understand the physical processes which influence the state and change of climate.

CURRENT AREAS OF INTEREST:

In pursuit of the three major objectives described above there are several areas of opportunity for conceptual studies and investigations in Climate Research. Examples include:

Climate Observing Systems - The development of an adequate space observational capability for important climate parameters including precipitation, soil moisture (in the root zone), and ice sheet elevation and horizontal motions (covered in Oceanic Processes). Activities related to improving the capabilities for measuring key climate parameters now observed operationally (e.g., temperature profile in the atmosphere, and horizontal wind velocity) are considered within the scope of the Global Weather Research program. Sea surface height and temperature and ozone are critical climate parameters and are covered under Oceanic Processes and Environmental Quality, respectively.

Climate Data Sets - The assembly of uniform and consistent climate parameter data sets from the best available sources of space acquired observations, past and current, and applications of these data sets in scientific investigations of climate processes. NASA plans to establish Climate Data Set Teams for major climate areas of scientific interest (e.g. Radiation Budget, Ocean/Atmospheric Processes, Cryospheric Processes). Each team would be responsible for:

- Selecting key space acquired parameters for inclusion in data sets.
- Establishing parameter accuracy and resolution requirements.
- Assessing the utility and quality of available sources of data.

- o Establishing data set format requirements.
- o Coordination with other climate data set teams to minimize duplication.
- o Developing necessary data processing and interpretation algorithms.
- o Certifying the quality of the data sets.
- o Insuring that the data sets are suitable for general use by the scientific community.
- o Conducting individual scientific investigations using the data sets.

Once the data sets have been assembled and certified, NASA will make them generally available to the broad scientific and user community for research. Proposals, which should include a description of the potential scientific investigation planned, will be considered for team membership as appropriate.

Theoretical Studies - Research involving applications of remote sensing in scientific investigations leading to improving our understanding of the physical and chemical processes which influence the state and change of climate. Typical areas of study include precipitation over land and water, extended cloudiness and radiation budget, air/sea interactions, evapotranspiration and plant water stress, cryospheric processes, aerosol effects, and sun/weather and climate relationships.

FURTHER INFORMATION

Any technical questions relating to Climate Research should be addressed to Dr. Robert A. Schiffer, NASA Headquarters (Code ERC-2), Washington, DC, 20546 or telephone (202) 755-8617.

SUBMISSION INSTRUCTIONS:

Proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Climate)
600 Independence Avenue, SW
Washington, DC 20546

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Severe Storms Research

GOAL:

To aid the responsible storm forecasting agencies in improving the accuracy and timeliness of severe storms forecasts and warnings through research and development that combines aeronautical and space-related techniques and observations with other key indicators of severe storms development.

RESEARCH AND DEVELOPMENT OBJECTIVES:

1. Improvement of basic understanding
2. Instrument development
3. Data interpretation technique development
4. Forecast model development

CURRENT AREAS OF INTEREST:

o Theoretical research leading to a better understanding of severe storm development and evolution with emphasis on research relating to the use of remotely observable characteristics.

o Development of forecast aids for NOAA and FAA severe storms forecasters involving real-time displays of current and future storm observations.

o Development and demonstration of analysis and interpretation techniques for severe storms data wherein measurements from space sensors are combined with conventional meteorological observations.

o Development of prediction capabilities for severe local storms, tropical cyclones, winter storms, and storm configurations which lead to extensive precipitation and consequent flooding.

o Identification and evaluation of new indicators of storm severity other than conventional meteorological parameters.

o Concept studies of real-time collection, integration, and graphical display of all available meteorological observations that could be of benefit to forecasters.

o Regional, mesoscale, cloud-scale, and microscale modeling.

o Development of statistical prediction models using combinations of satellite, other remote, and conventional meteorological parameters.

o Case studies of severe storms in terms of the relationships between storm severity and remote observables.

o Cloud physical research.

o Computer sensitivity studies to determine the most important combinations of storm environmental parameters for the development of the most damaging storms.

o Theoretical work relating lightning and thunderstorm dynamics.

o Experiments to interrelate cloud microphysics, cloud electrification and cumulus dynamics aimed at understanding the development of severe storms.

TECHNOLOGY NEEDS:

Research on the conceptual, feasibility, and proof-of-concept phases of technology development, including--but not limited to:

a. Techniques for the remote observation of severe storms.

b. Techniques for rapid conversion of remote-sensor data into conventional meteorological parameters or storm severity indicators.

c. Techniques for the real-time assimilation and fruitful display of all available data pertinent to storm detection and forecasting.

FURTHER INFORMATION:

Any technical questions relating to Severe Storms Research should be addressed to Dr. James C. Dodge, NASA Headquarters (Code ERC-2), Washington, DC 20546 or telephone (202) 755-8618.

SUBMISSION INSTRUCTIONS:

Proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Storms)
600 Independence Avenue, SW
Washington, DC 20546

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ENVIRONMENTAL QUALITY MONITORING RESEARCH

OBJECTIVES:

Pollution of the Earth's air and water environment occurs on local to global scales. The lower atmosphere and the water are strongly impacted by man's activities, and in both the air and water it has been shown that local problems often become regional in their extent. Global pollution effects, such as occur in the stratosphere are often related to man's activities as well. As a balance is sought between the demands placed on the environment by man's economic and social activities and the desire to maintain environmental quality, it is clear that the environment must be monitored: to determine its present state, to evaluate the effectiveness of control strategies, and to provide the understanding needed to predict more accurately the consequences of alternative choices for the future. The capability to do this is being developed through emphasis on the following basic program elements which are implemented within each monitoring problem area within Environmental Quality Monitoring Research: (1) Understand Environmental Quality Monitoring Requirements, (2) Understand Measurement Methods, (3) Technology Development, (4) Data Management, (5) Space Qualified System Demonstration, and (6) Information System Technology Transfer.

BACKGROUND:

Most pollution of the lower atmosphere (troposphere) is of localized origin. Ambient air quality standards and emission control regulations have been promulgated to protect the health and welfare of the nation. But, it has been found that many locales cannot meet ambient air standards because, in addition to their local pollution sources, they are seriously impacted by pollutant transport from adjacent regions. The required monitoring functions are now being performed almost exclusively by in-situ sensors. Remote sensors now being developed will supplement in-situ sensors both in characterizing pollution sources and in providing the synoptic coverage needed to address local and particularly regional scale problems.

At the present time, the atmospheric layer of primary concern on a global scale is the stratosphere. The technology either now exists or is being developed to detect many of the natural and man-made pollutants that enter the stratosphere either directly (e.g., from volcanoes or supersonic transports) or indirectly by diffusion from the troposphere (e.g., from organic processes or industrial activities). As a part of the NASA Upper Atmosphere Research Program coordinated by the Office of Space Science, the Office of Space and Terrestrial Applications directs its research primarily toward the instrumentation and data analyses required for remotely monitoring from satellites the stratospheric constituents of interest.

The remote detection of water pollution can be accomplished because many pollutants give rise to changes in water color, temperature, or surface characteristics. Continued basic research on the spectral properties of water pollutants, such as absorption, scattering, reflectance, dielectric change, and capillary suppression is needed to establish sensor design requirements and analytical techniques for data interpretation. In addition, studies leading to the capability for going beyond the detection of pollutants to saying how much of a specific pollutant is present are needed.

FACILITIES AVAILABLE:

The Nimbus G satellite will make a first step in providing near global coverage of a number of important stratospheric gaseous constituents and aerosols in 1978. The Atmospheric Explorer Mission B, Stratospheric Aerosol and Gas Experiment (SAGE) will be conducted in the same time frame as Nimbus G and provide complementary coverage of stratospheric aerosols and ozone. Plans are being formulated to utilize the capabilities of the Space Shuttle to extend the global monitoring program beyond Nimbus G and SAGE. In 1979, the Measurement of Air Pollution from Satellites (MAPS) experiment will fly on the second Space Shuttle Orbital Flight

Test (OFT-2) and measure interhemispheric transport of carbon monoxide in the mid-troposphere. A Shuttle-borne version (ATMOS) of the Mark II High Speed Interferometer (HSI) is under development for measurement of other constituents of environmental importance. This instrument is scheduled to fly on Spacelab 1 with reflights being considered for subsequent Shuttle missions. A Halogen Occultation Experiment (HALOE) to measure species in the stratospheric halogen cycle is under development in the AAFE program and may be approved as an FY 1979 new initiative for flight on Shuttle and also on a longer duration free-flyer satellite.

CURRENT AREAS OF INTEREST:

In support of Environmental Quality Monitoring Research objectives, opportunities exist within the program for research in the following areas:

o Understanding Environmental Quality Monitoring Requirements

- Analytical and laboratory studies of the transport and chemistry of sulfates and oxidants in the troposphere.

- Develop sampling strategies and analytical techniques to optimize the use of remotely sensed data in studies of the long-range transport of sulfates and oxidants.

- Apply analytical models to study the chemistry and transport of tropospheric pollutants on a global scale.

- Studies which show how measurements of carbon monoxide from space, such as will be obtained from the Shuttle MAPS/OFT-2 experiment, can be used to increase understanding of the geophysical and chemical role of carbon monoxide.

- Studies of chemical species sets in the stratosphere and troposphere to assist in defining species measurement requirements.

- Analyze satellite data in conjunction with multidimensional stratospheric models in order to evaluate the models and extend the models' range of application.

- Develop and apply empirical models of stratospheric ozone and other constituents to help establish monitoring requirements and test measurement strategy.

- Studies which show how measurements of ozone from space, such as those obtained from the Nimbus 4 Backscatter Ultraviolet experiment, can be used to increase understanding of the geophysical and chemical role of ozone (including polar regions) in the stratosphere and permit detection of global and zonal ozone change trends.

- Validation of dispersion models for spot-dumped materials in ocean waters.

o Understand Measurement Methods

- Basic laboratory measurements and analytical studies of the interaction of visible and microwave radiation associated with oil, toxic substances, industrial effluents, and inorganic materials in water.

- Studies of the capabilities and limitations of remote sensing techniques for measuring trace gases and particulates in the troposphere on a global scale from space.

- Studies of forward scattering and solar extinction techniques for obtaining aerosol index of refraction and size distribution of stratospheric aerosols.

o Technology Development

- New sensor concepts for remote measurement of trace species and particulates in the stratosphere with special interest in techniques capable of diurnal measurements.

- New sensor concepts for remote measurement of trace species and particulates in the troposphere and water bodies, especially for all-weather, day and night applications.

- Develop in-situ and/or remote sensor concepts for aircraft, balloon and rocket applications to measure stratospheric trace species in support of satellite remote measurement programs.

- Research on the operation and use of the electrochemical concentration cell technique for balloon ozone measurements leading to improved measurement accuracy.

- Develop a standard for ozone measurement technology; conduct systematic intercomparisons of various ozone measurement techniques against the standard.

o Data Management

- Techniques for the integration and interpretation of combinations of in-situ and remotely sensed data, including statistical considerations and monitoring strategies.

- Techniques of data analysis which will minimize the need for simultaneous supporting "truth" measurements.

- Review results of algorithm developments in terms of instrument characteristics required to accomplish specific water quality measurements from space (e.g., minimum characteristics to satisfy fisheries requirements for monitoring and mapping oceanic chlorophyll).

- Identify, develop, and validate advanced algorithms for utilizing satellite data to provide additional water quality products for both estuarine and fresh water bodies.

FURTHER INFORMATION:

Any technical questions relating to Environmental Quality Monitoring Research should be addressed to Dr. S. H. Melfi, NASA Headquarters (Code EBT-8), Washington, DC 20546 or telephone (202) 755-8619.

SUBMISSION INSTRUCTIONS:

Proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Environment)
600 Independence Avenue, SW
Washington, DC 20546

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Oceanic Processes

OBJECTIVES:

The oceans, covering seven-tenths of the world's surface area, are important to our weather, our resource needs and economic well-being, and to a scientific understanding of the nature of planetary processes. Because of their vastness, current data on the dynamic behavior of ocean areas is generally sparse and nonuniform, with global observations so widely spaced in time and dimension that synotpic evaluations are difficult. The oceans cannot be overlooked: they absorb and circulate heat in a way which strongly affects our climate; the energy exchange at the air-water interface is crucial to our weather and our ability to make credible weather predictions; they harbor a primary source of food and a virtually untapped source of mineral and petroleum resources; and the variability of ocean conditions affects the safety and economics of our shipping, fishing, off-shore oil, gas and mining operations as well as harbor, recreational and other activities in the coastal zones.

The long range goals of Oceanic Processes are: (1) the verification of the economic, social, and scientific value of ocean and ice data from satellites or aircraft; verification of measurement feasibility and information delivery timeliness in scales appropriate to economic and scientific needs; and (2) the establishment of a technology base to support cost effective operational system implementation in the mid-1980's.

The objectives of the Oceanic Processes program are: (1) the development and validation of methods for remotely observing and modeling the dynamics of mesocale ocean phenomena including air/sea interactions, surface and surface layer conditions; and (2) to determine the utility of this data for observing and modeling the general ocean circulation and the associated transports of mass, heat, and nutrients for application to scientific investigation, weather and climate research and commercial operations in the marine environment.

The Oceanic Processes research program has been planned and implemented in concert with users representing scientific, government agency and marine commerce interests. These users have been and will continue to be the architects of the NASA program.

CURRENT AREAS OF INTEREST:

To fulfill these objectives, there are several areas of potential interest for research to develop useful concepts in the oceanology field. Examples include:

- Monitoring of major current systems and global circulation patterns for regional and global climatology forecasts.

- Forecasting of ocean sea state conditions for ship routing, and offshore resource activities,

- Monitoring and forecasting of sea ice conditions and the movements of ice floes in ocean areas, and

- Development of improved techniques to observe ocean surface layer properties and model mesocale features such as ocean fronts for fisheries management and monitoring of coastal conditions.

To meet needs for the monitoring of ice conditions, studies are planned of a dedicated satellite employing active radars and microwave radiometers for all-weather surveillance of ice-prone areas. If approved, development of this system would be initiated in FY 1981 for flight in 1984.

The development of new measurement techniques and sensor concepts compatible with user requirements for ocean data will be continued and is supported by an Ocean Surface Truth program involving in-situ and aircraft measurements. These aircraft flights and Shuttle experiments will be conducted, as needed, to verify the applicability of advanced sensors for future flight missions.

FACILITIES:

Seasat-A is scheduled for launch in May 1978. As part of this mission, major governmental and commercial data-use activities are planned to demonstrate and evaluate the applicability and effectiveness of ocean data.

A follow-on Seasat mission is planned for initiation in FY 1980 and for launch in 1983. If approved, this mission will be a "Limited Operational Demonstration" consisting of two satellites in near polar orbit with an additional satellite on standby for backup replacement. Improvements in the end-to-end data system will be developed to provide near real-time data products in readily assimilable forms to system users. The system will consider sensors similar to the ones flown on Seasat-A as well as additional sensors to meet emerging user needs.

RESEARCH AND TECHNOLOGY NEEDS:

In support of the Oceanic Processes program objectives, opportunities exist for research on the conceptual, feasibility, and proof of concept phases of technology development.

To focus this research, planning documents have been generated which outline needed effort for the next several years. In arriving at these plans, the Oceanic Processes program has been divided into subprogram areas. In each subprogram plan, all related elements of the program (e.g., SRT, flight missions, etc.) have been included. The subprogram areas are as follows:

Ocean Dynamics Interactions and Modeling. A thorough understanding of the interactions between the dynamical ocean surface characteristics and electro-magnetic radiation from remote sensors is

the key to the development of remote sensing techniques as valid tools for ocean applications. In order to achieve this goal, studies of the following types are needed: wave-wave, wave-wind, and wave-current interactions; the basic physics of electromagnetic radiation backscattering; the development of algorithms for the retrieval of data from sensor signals, and the modeling of the ocean dynamic processes using remotely sensed data.

Ice Dynamics Interactions and Modeling. The scientific objectives of the ice subprogram are to determine the interactions and correlations among active and passive all-weather sensors and ice phenomena, both surface and subsurface. The long-range goals of the subprogram are to develop and characterize remote sensing methods and sensor combinations capable of measuring ice properties at the necessary temporal and spatial frequencies. The total systems which will supply the needed ice information on an operational basis could incorporate data from a combination of satellite, airborne and in-situ sensors.

Some major remote sensing areas for ice which need the benefit of basic research are: quantitative sea-ice age discrimination over wide-swath widths at fine resolutions from satellite altitudes; direct measurements of sea-ice thickness, vertical extent and roughness, due, for example, to ridges; discrimination between icebergs and ships for large swath widths; detection of small multi-year floes and icebergs in first year sea-ice, and discrimination of sea-ice age during the summer melt period; remote sensing ice algorithms which reflect seasonal variations; and determination of optimum frequencies and polarization for monitoring sea-ice and icebergs.

Ocean Surface Layer Interactions and Modeling. Research is required to develop techniques for interpreting remotely sensed data to study ocean phenomena having strong surface layer signatures. Mesoscale features of this kind include coastal upwelling fronts, river plumes, and eddies.
Large scale phenomena in this class, including the Antarctic polar front, equatorial upwelling fronts, and boundaries of major current systems, are also characterized by sharp mesoscale variations in at least one horizontal dimension. Associated mixed layer stratification and entrainment processes are also of interest in connection with this research activity. Coastal zone pollutant measurements are covered under the Environmental Quality program.

The emphasis should be on the interpretation of low and dispersion visualizations using remotely sensed distributions of natural streakline tracers such as sediments, surface temperature

(infrared and microwave radiometry), or surface salinity (microwave radiometry) to study the physical dynamics of oceanographic phenomena.

Ocean Surface Circulation and Modeling. Research is needed to develop techniques for determining the contributions of the ocean geoid, tides, and current topography to satellite measurements of sea surface geometry. A primary objective is to develop a capability for extracting dynamic height due to ocean currents from satellite altimetry. The use of in-situ data as well as correlative information such as ocean surface temperatures is anticipated. Both global and regional tide modeling methods are expected to play a role in the program. Approaches to interactive modeling of the geoid, tides, and geostrophic topography are also of interest.

Research Application of Ocean Data in Large Scale Forecasting Models. The aim of this subprogram is to improve our ability to utilize remotely sensed ocean data in numerical models for forecasting the state of the ocean and atmosphere on time scales from a day to a week, and a month to a season or more. Of particular interest are research studies on the following topics: techniques for assimilating such data into forecast models; the physics of the boundary layers on both sides of the ocean surface, with emphasis on heat and momentum transfer across that surface; and the use of boundary layer models in assimilating remotely sensed sea surface data; the application of remotely sensed data to sea state forecasting; ocean circulation processes, with emphasis on understanding and parameterizing those that influence sea surface temperature; the interactions of the ocean and the atmosphere affecting climate, with emphasis on data studies and on simple models that will aid in devising and interpreting General Circulation Model (GCM) experiments.

Advanced Sensor and Sensor Systems Development. The Advanced Sensor System Development subprogram aims at establishing an advanced sensor system definition and development base for future missions. Activities include advanced sensor system studies, proof-of-concept efforts and investigations involving ground-based, airborne, and shuttle-borne sensor tests and evaluations. Areas of interest in connection with advanced sensor system studies include improved or new satellite concepts of modular radar altimeter, scatterometer, synthetic

aperture radar, swept aperture radar, multichannel microwave radiometer, high resolution microwave radiometer, and rain radar. Ocean color sensor development is covered under the Environmental Quality program.

Opportunities also exist for research on the conceptual, feasibility and proof-of-concept phases of technology development, including, but not limited to: an airborne, swept aperture radar addressing ocean wave motion measurements, modular additions to the existing Airborne Oceanographic Lidar (AOL) to address subsurface temperature profile measurements, and development of a surface pressure radar for demonstrating the concept in a high altitude aircraft.

Experimental investigations of interest include continued or new tests and evaluations of the AOL (supporting ocean color investigations), radar ocean wave spectrometer, short pulse radar, surface contour radar, stepped frequency microwave radiometer, multifrequency radar for ice mapping, and a dual frequency rain radar.

Advanced Marine Information Delivery System. This subprogram aims at the development of new processing techniques and systems for dealing in a more cost effective way with the large data volumes, and the user needs for real time delivery of marine information. Critical areas requiring hardware and software development include: on-board processing of location and attitude information, sensor bias correction and geophysical conversion; real time quick-look presentation: multispectral color/thermal image comparisons; full-swath SAR image correlation, and SAR point source, linear and areal pattern information extraction; low-cost dissemination links involving, terminals compatible with Marisat, APT and HRPT systems; data assimilation, archiving and accessing, and standardized formats and displays.

Advanced Ocean Mission Studies. This subprogram has the responsibility for providing the systems interface between the various ocean elements, industry and technology activities in and out of NASA; for the synthesis of missions consistent with identified user needs, available capabilities and sound cost/risk practices; and for the generation of a mission plan encompassing the full range of desirable missions. Major efforts are anticipated in planning new satellite systems for operational ocean, coastal or ice monitoring as well as for specialized small satellites, spacelab, airplane, and aerostat (stationary, lighter-than-air vehicles) missions. Special tradeoff studies are needed as to alternative sensor and platform implementations, data/information delivery alternatives, dedicated and shared relay links, refurbishment/augmentation alternatives, benefit assessment, cost model upgradings, and market strategy assessments.

FURTHER INFORMATION

Any technical questions relating to Oceanic Processes or requests for the detailed Oceanic Processes subprogram plans should be addressed to: Mr. Samuel W. McCandless, Jr., NASA Headquarters (Code EBC-8), Washington, DC 20546 or telephone (202) 755-1201.

SUBMISSION INSTRUCTIONS

Proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Ocean)
600 Independence Avenue, SW
Washington, DC 20546

Use of this mailing address has been approved by the Director, University Affairs Office. It applies to this submission only, taking precedence over any other submission instructions previously issued by NASA. NASA cannot take responsibility for delay of proposals addressed in any other fashion.

You are reminded that Enclosure 2 contains guidance which will be helpful in the preparation of your proposal.

Aircraft Support

If your proposal should require the use of NASA aircraft flight time in order to obtain required measurements, you are requested to contact Mr. Bernard T. Nolan at (202) 755-8626 in order that:

1) he can provide you with information about what specific capability is available

2) he can provide you the necessary cost information to be included in your proposal

3) NASA will have an early indication of the need for such support

4) he can obtain some information about your proposal so that NASA can make an early determination of compatibility between all proposals requiring aircraft support

Meteorological and Constituent Measurements from Rockets and Small Balloons

If your proposal should require the use of NASA sounding rockets and/or small ballons to obtain measurements of meteorological and atmospheric constituent parameters, you are requested to contact Mr. James L. Raper at (202) 755-8625 in order that:

1) he can provide you with information about specific capabilities

2) he can ascertain whether or not the measurements you require may already be available as a result of the planned rocket support for Nimbus-G and SAGE; if you have unique requirements, he can provide the necessary cost information to be included in your proposal

3) NASA will have an early indication of the need for such support

4) he can obtain information about your proposal so that NASA can determine compatibility between all proposals requiring rocket support

COMMUNICATIONS AND NAVIGATION PROGRAM OBJECTIVES

Applied research in communications technology provides high-risk, high-benefit capabilities for the eventual commercial implementation of satellite communications services. The program emphasis is on improved and widely affordable capabilities to enhance 1. the U.S. position in the world satellite communications market, 2. governmental and industrial effectiveness, 3. the utilization of limited orbit and frequency spectrum resources, 4. the availability of communications resources employed by the public. This program will continue to provide improved capabilities to use our limited frequency spectrum, and make possible new and varied essential capabilities for data, television, and voice communication to small, mobile and fixed earth terminals. As orbit and spectrum-use consultant to other government agencies, NASA conducts basic research leading to improved understanding of radio propagation, and applied research toward reducing interference and improving the efficiency of use of the radio spectrum. The large quantities of detailed data provided by advanced observation and monitoring programs require efforts toward improvements in communication, data reduction, timeliness, storage, and other elements of access. Advanced communications systems concepts are developed and investigated with a goal to provide improvements in user access at acceptable ground hardware cost, size, weight, and power.

CURRENT AREAS OF INTEREST

To fulfill the objectives, there are several areas of potential interest for studies and investigations to develop useful concepts in the communications field. Examples include:

(a) System optimization of combinations of communications techniques that could include use of terrestrial, airborne, and spaceborne platforms for definable future services such as rural communications, educational distribution, health care delivery, thin-route voice and video, teleconferencing, etc.

(b) Concepts for area surveillance and monitoring, such as might fill the needs for the U.S. Coast Guard Fisheries Coastal Zone and for other similar area coverage systems combining position location and communications techniques.

(c) Techniques and new concepts to provide significantly reduced interfering radiation from ground and space antennas while preserving desirable characteristics that permit frequency reuse and spectrum conservation.

(d) High-speed spaceborne message switching and routing concepts to determine barrier, or long-lead, technology needed and extent of experimentation required.

(e) System concepts for satellite networks which may require intersatellite relays, and definitions of network parametric requirements.

(f) Short duration experiment concepts for communications and location techniques or technologies which use the unique facilities of the Space Shuttle and Spacelab systems.

(g) System concepts for application of the Global Positioning System (GPS) to needs of the civil sector in navigation and location (reporting of position).

FACILITIES AVAILABLE

Access to currently operating NASA experimental satellites is available for communications research using a variety of frequencies, signal formats, modulations, and power levels. The Spacelab series of Shuttle flights, to be initiated in 1980, will provide unprecedented facilities for the conduct of communications research from relatively low orbits.

RESEARCH TECHNOLOGY NEEDS

In support of Communications Program objectives, opportunities exist within our areas of interest for research on the conceptual, feasibility, and proof-of-concept phases of technology development, including, but not limited to:

(a) New techniques in high-power spacecraft transmitter componentry to improve lifetime and reliability, reduce interference, simplify filtering and multiplexing, and provide agile phase and amplitude control and switching.

(b) New techniques in television to provide higher resolution within existing allocated bandwidths, research

in three-dimensional real-time imagery, and reduced-cost systems for teleconferencing and educational uses.

(c) In small ground antenna technology, significant improvements in reduction of sidelobes and spillover to permit closer orbital spacing, modest gain from low-profile, conformal shapes; and innovative concepts for low-cost mobile and portable antenna systems.

(d) New systems concepts for spectrally-efficient band use, providing variable rates and bandwidth appropriate to acceptable message and queuing delays.

(e) In large spaceborne antenna technology; research in techniques for beam contouring on command, low sidelobes, precision pointing, multibeam generation, and retention of polarization purity.

(f) New techniques to provide significantly reduced ground terminal cost by means of Large-Scale Integration and Microwave Integrated Circuitry (MIC) and for low data-rate messages and navigation, small alphanumeric keyboard/displays integral with transmit/receive terminals.

(g) Low-cost technology for the 18/30 GHz allocated satellite communication.

(h) Methods for distributing observation data in a form that suits the requestor, in the time needed and at a cost commensurate with the value.

(i) Techniques and concepts for widely affordable GPS navigation receivers for civilian needs.

FURTHER INFORMATION

Any technical questions relating to the Communications Program portion of this Applications Notice should be addressed to Mr. Bruce LeRoy (Code EC-4) NASA Headquarters, Washington, DC 20546 or Telephone (202) 755-3421.

SUBMISSION INSTRUCTIONS

Proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Communications)
600 Independence Avenue, SW
Washington, DC 20546

Use of this mailing address has been approved by the Director, University Affairs Office. It applies to this submission only, taking precedence over any other submission instructions previously issued by NASA. NASA cannot take responsibility for delay of proposals addressed in any other fashion.

You are reminded that Enclosure 2 contains guidance which will be helpful in the preparation of your proposal.

MATERIALS PROCESSING IN SPACE

PROGRAM OBJECTIVES

NASA's program in materials processing in space is dedicated to exploring the benefits of the weightlessness and ultra-high vacuum of space. The data from space experiments will provide improved understanding of the limitations imposed on earth-bound processes by gravitational forces and by mechanically or cryogenically pumped vacuum systems. In addition to this understanding, exemplary or prototype products can be produced for demonstrations of the ultimate control achievable over composition, geometry, or defect structure of materials under unique space conditions. Such studies will also allow users to learn the advantages offered by the space environment to meet needs on earth and, in particular, to produce limited quantities of products to allow assessments of their commercial market potential.

BACKGROUND

The availability of a Spacelab environment for performing materials processing experiments has stimulated an interest in basic areas of materials science and technology. All technically important processes that are used to convert materials from one form to another depend on multiple variables, and historically the scope of materials technology has always expanded significantly when means have become available to bring a group of previously uncontrolled process variables under control. Undoubtedly the two greatest contributions to the spectacular advance of materials technology in the 20th century have been the invention of accurate, automatic instrumentation for temperature measure and control, and the development of techniques to prepare materials with precisely prescribed chemical compositions. It has been shown by experiment that methods made possible by space flight can significantly extend the range and precision of process control in both of these important areas.

Space has advantages for thermal process control because an orbiting spacecraft and everything in it are essentially in free fall and therefore virtually weightless. This

condition removes the primary driving force for convective flow in molten materials as well as other liquids and gases. Uncontrollable convective flows are present in fluids on earth almost wherever any process produces a temperature gradient in a fluid, and their nature is so complex that in practical terms process temperatures on earth are only known and controlled at the locations where sensing elements happen to be placed. In orbital flight, however, one can exploit the virtual weightlessness of fluids to design processes in which convective flow is suppressed and the mathematical theories of heat conduction and radiation can be used to determine the temperatures at all points in a mass of material by measuring and/or controlling temperature at a few representative points.

As on earth, space techniques to control chemical process variables are more diverse than those for the thermal variables. However, they can be classified into three general types. In the first place, convectionless melts and other chemical systems can be engineered so that diffusion is the only available mechanism to transport chemical species; as in the case of temperature, the chemical composition of the whole system can be predicted and determined on the basis of the initial state and boundary conditions. Secondly, weightlessness makes it easy to levitate practically any kind of object without contact with any foreign material. This possibility opens a whole new field for containerless processing of chemically reactive materials, including wet chemistry as well as thermal processing. Moreover, beside eliminating the potential for chemical contamination such methods can also eliminate the uncontrolled effects that contact with containers can have on an orbiting spacecraft. Thirdly, space can be employed to produce ultra-high vacuum in large volumes and with very high effective pumping speeds behind shielding devices designed to sweep ambient gas molecules out of their paths. Such devices are expected to make large scale technical applications of ultra-clean surfaces and material preparation methods possible.

Space techniques can also be used to provide a stable quiescent environment in which highly uniform geometrical shapes such as glass microspheres can be produced and

fundamental nucleation phenomena studied. Precision over the control of shape is a natural consequence of the weightless environment and its ability to allow surface tension forces a sufficient time to overcome viscous flow forces to achieve the desired uniformity. In a similar manner, the extended periods of weightlessness allow time for fundamental nucleation studies to be performed in the absence of container effects.

It will be necessary to perform extensive supporting experiments to supply fundamental information and insights into these processes as well as to analyze the data generated from them.

CURRENT AREAS OF INTEREST

Research activities which provide support to the Materials Processing in Space program include:

1. Crystal growth of dilute binary, nonstoichiometric, and alloy solid-solution systems which are susceptible to uncontrolled compositional nonuniformities and structural defects.

2. Solidification of multiphase metallurgical systems to produce variable-density solids (monotectics, peritectics, off-eutectics, composites and foams).

3. Glass melting by containerless methods to provide high purity, bubble-free glasses, new glass systems with extended amorphous regions, and glass shells with high geometrical uniformity.

4. Measurement of molten reactive material properties using containerless techniques (viscosity, surface tension, calorimetric and emissive properties, thermochemical and phase relation properties, and mass transport properties).

5. Chemical processing sensitive to gravity effects (disperse chemical reactions, synthesis, separation, purification) in inorganic, organic and biomedical materials.

6. Fluid behavior studies including static effects (liquid surface shape stability and interactions) and dynamic effects (gravity gradient convection,

surface tension gradient convection, gravity modulate convection) in systems of interest to materials processing in space.

FURTHER INFORMATION

Any technical questions relating to the Materials Processing in Space Program should be addressed to Dr. John R. Carruthers, Director, Materials Processing in Space (Code EM-7) NASA Headquarters, Washington, DC 20546 or telephone (202) 755-2070.

SUBMISSION INSTRUCTIONS

Proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Materials Processing)
600 Independence Avenue, SW
Washington, DC 20546

Use of this mailing address has been approved by the Director, University Affairs Office. It applies to this submission only, taking precedence over any other submission instructions previously issued by NASA. NASA cannot take responsibility for delay of proposals addressed in any other fashion.

You are reminded that Enclosure 2 contains guidance which will be helpful in the preparation of your proposal.

APPLICATIONS SYSTEMS

INFORMATION SYSTEMS PROGRAM

OBJECTIVES

The objective of this program is to determine the data systems requirements associated with the use of satellite-collected applications data, to identify figure needs in Earth Observations Information Systems and to advance the technology to meet those needs. With sensors on earth orbiting observations satellites collecting data for use in improving the monitoring and management of earth resources and environment, new data systems requirements continue to be introduced because: (1) large volumes of high rates data can easily overwhelm present and projected processing capabilities; (2) the time from data acquisition to delivery of information products in a suitable form is becoming critical for more and more applications; (3) proper archiving, rapid access for retrieval, and provisions for feedback for users to data/information stores and sources are important parts of systems for truly operational, as distinguished from experimental or developmental, systems.

CURRENT AREAS OF INTEREST

In support of the Information Systems Program objectives, opportunities exist for research on the conceptual, feasibility and proof-of-concept phases of technology development, including but not limited to the following:

1. Operational System Planning. To develop operational information systems definitions, concepts, and products (key elements of total operational system planning) with results intended to establish system technology requirements and to suggest policies for delivering information at costs and prices commensurate with value. (Small-scale operational systems for local government as well as larger scale regional and operational federal data systems are needed).

2. Operational Information Processing. To demonstrate new concepts and effective techniques in software for promoting software commonality, and interchange among users and for eliminating software transfer difficulties caused by computers' structural

differences, in order to reduce information processing time and cost and to reduce total OSTA costs for software development and utilization. (Examples are commonly utilized, advanced higher-order languages, standard format, advanced algorithms in areas of multi-user interest, software engineering and technology, and parallel processing software compilers/technology.)

3. Data Technology Concepts. To establish new data technology concepts for integrating advanced electronic instruments into existing information systems, to analyze data base management systems, to develop specifications for elements (e.g., systems hardware, software modules, etc.) needed by OSTA programs, and to recommend data systems utilization methods and guidelines for integrating multi-source data and for cost-effective usage of mission required instruments.

4. New Techniques for Data Analysis. To develop new, effective techniques for analysis of remotely sensed data (including data interpretation, image classification and accurate registration) and for reduction of unneccessary data (including data selection and data compression) in order to reduce data distribution and processing costs, and to improve information accuracy.

FURTHER INFORMATION

Any technical questions relating to the Information Systems Data Management Program portion of the Applications Notice should be addressed to Mr. Fred Billingsley.(Code ERI) NASA Headquarters, Washington, DC 20546 or telephone (202) 755-8596.

SUBMISSION INSTRUCTIONS

Proposals must be mailed to:

NASA Headquarters
Code EPM-20 (Reference OSTA-78-A Appl. Systems)
600 Independence Avenue, SW
Washington, DC 20546

Use of this mailing address has been approved by the Director, University Affairs Office. It applies to this submission only, taking precedence over any other submission instructions previously issued by NASA. NASA cannot take responsibility for delay of proposals addressed in any other fashion.

You are reminded that Enclosure 2 contains guidance which will be helpful in the preparation of your proposal.

ENCLOSURE II

Guidelines for Participation in NASA's Space and Terrestrial Applications Program.

1. PURPOSE

These guidelines contain format and mailing information on submission of unsolicited proposals for research related to NASA's S&T Applications SRT Program. They are consistent with NASA's "A Guide to Policies and Procedures for Sponsored Research" (NHB 5100.3, available from University Affairs Office, Code LU, NASA Headquarters, Washington, DC 20546.)

2. GENERAL GUIDELINES

A. NASA Policy on Evaluation of Unsolicited Proposals.

Proposers should be aware of the general policy at NASA with respect to evaluation of unsolicited proposals. Specifically, the NASA Procurement Regulations, Part 4, specify that the initial receiving office, prior to making a comprehensive evaluation of a document apparently submitted as an unsolicited proposal, shall determine that the document:

(1) Contains sufficient scientific, technical, and cost information to enable meaningful evaluation;

(2) Has been approved by a responsible official of the originating or sponsoring organization or a person authorized to contractually obligate such an organization; and

(3) Does not merely offer to perform standard services or to provide "off-the-shelf" articles.

If the document does not meet these requirements, a comprehensive evaluation will not be made and the document will be handled as correspondence or advertising.

When an unsolicited proposal meets the above criteria, it is then circulated for comprehensive evaluation. Again, the NASA Procurement Regulations, Part 4, specify that the comprehensive evaluations shall consider, in addition to any other citeria, the following factors:

(1) The overall scientific, technical merit of the proposed effort;

(2) The potential contribution which the proposed effort is expected to make to NASA's specific program objective(s), if supported at this time;

(3) The unique capabilities, related experience, facilities, instrumentation, or techniques which the proposer possesses and offers, and which are considered to be integral factors for achieving the scientific, technical, or technological objective(s) of the proposal; and

(4) The unique qualifications, capabilities, and experience of the proposed principal investigator and/or key personnel.

The Office of Space and Terrestrial Applications (OSTA) intends to gain peer evaluation of these proposals so that the resulting program will be fully responsive to the needs of the Applications Community. The peer evaluation groups are likely to consist of non-government and government personnel (both NASA and non-NASA). The evaluation activity will be directed by Headquarters OSTA even though it may take place at various Field Centers. Final selection of proposals will be made by the appropriate Division Directors in the Office of Space and Terrestrial Applications.

B. Technical Data

It is NASA's policy to use the technical data contained in proposals for evaluation purposes only. Where any of such technical data constitutes a trade secret under the law and the offeror, or his proposed subcontractor, desires to maintain trade secret rights in such technical data the following "Notice" must be affixed to the cover sheet of the proposal specifying therein the pages of the proposal which contain trade secrets to be restricted in accordance with the conditions of the "Notice". Thereafter, it is NASA policy to protect such noticed technical data as a trade secret. NASA assumes no liability for use of disclosure of any technical data to which the Notice has not been applied.

"NOTICE

Data on pages___ of this proposal constitute a trade secret. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided however, in the event a contract is awarded on this proposal the Government may obtain in the contract additional rights to use and disclose this data. "

3. PROPOSAL CONTENT AND FORMAT

The content of the proposal should be in sufficient detail so as to enable a reviewer to make a judgment with respect to:

(1) The relevance of the proposed research to an element of the Space and Terrestrial Applications Program;

(2) The probability that the investigator(s) will be able to accomplish the stated objectives within the requested resources; and

(3) Its overall value as compared to that of other proposals to participate, in the same area of research, in this program.

When the work to be performed consists of two or more separate and distinct tasks, a separate proposal for each task is desirable.

It will be helpful if each proposal is limited to not more than 12 single-spaced, type-written pages (any other pertinent information such as publications, design data, etc., may be included as enclosures), and contain at least the following material assembled in the order given:

A. Cover Letter.

Each proposal should be prefaced by a cover letter signed by an official of the investigator's organization who is authorized to commit the organization to the proposal and its content. The cover letter should refer to one of the areas called out in Enclosure 1 and mailing label information should be identical with information on the cover letter.

B. Title Page.

The title page should contain the following:

(1) A short descriptive title of the proposed investigation;

(2) Name of the proposing organization(s);

(3) Names, full address, telephone numbers, and affiliations of the principal investigator and all co-investigators;

(4) Date of submission; and

(5) A brief statement regarding special needs or facilities. The statement should indicate what is needed and the appropriate time scale.

C. Abstract.

The abstract should include the following:

(1) A brief statement of the overall objective and justification of the work;

(2) Brief listing of work to be accomplished during the award period (generally 12 months) and of the approach to be used; and

(3) Bibliography of one or two recent publications by the proposer of work relevant to the proposal.

D. Description of Proposed Research

A brief introduction, background, and justification should be included; the description should be a full statement of the research proposed, identifying and relating the key elements. Address the nature and amount of experimental data involved; describe the methods or approaches to be used; as appropriate, discuss the advantages of the proposed approach over alternatives.

When it is expected that the research will require more than one year for completion, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should, of course, be on the first year of work. The description and cost plan should each distinguish clearly between the first year's work and that planned for subsequent years. NASA reserves the right to fund incrementally any contract resulting from unsolicited proposals received.

E. Data Requirements

(1) Data stored in NASA and other repositories is generally available for use by accepted investigators. The proposal should give sufficient detail on requirements and on the quantity and format of data desired, e.g., magnetic tape format compatible with your computer, microfilm or data plots, photos, etc., for NASA to determine if the data can be supplied.

(2) All proposals which request that NASA supply data must clearly demonstrate that the proposer is familiar with the material stored in NASA repositories and that the requested material can be made available for the proposed research. Sources of information on the availability of data are given in Enclosure 1 under each Discipline Area.

Before submitting a proposal, each investigator should determine that the required data can be made available.

F. Support Facilities

Laboratories, specialized equipment, etc., available for use in the research should be described. Equipment which is proposed to be purchased with NASA funds should be specified and justification for the expenditure given.

G. Scientific and Technical Personnel

A brief summary of the scientific background and relevant experience of the Principal Investigator (PI), and of each Co-Investigator (Co-I), should be given.

(1) PI - An investigator should be proposed who has primary responsibility for the accomplishment of the proposal objectives. Normally NASA will approve only a single individual as "PI".

(2) Co-I - This title should be restricted to a limited number of well-qualified, senior-level scientists who will be contributing materially to the research and would be capable of independently directing the proposed research.

(3) Scientific Collaborators - All qualified scientists whose work on the research will be sponsored by NASA funds should be listed.

H. Investigators at Other Institutions.

In those cases in which research is to be conducted by scientific collaborators who are not employed by the proposing institution, and is to be funded through this award, the nature of the anticipated contractual arrangements between the proposing institution and these investigators should be specified.

I. Sources of Outside Support.

The proposal should list other supported research conducted by the PI, name of sponsor, and title of the research. There should be a similar listing (of NASA support only) for each Co-I who is to contribute to the research.

J. Dates.

The proposal should include the date of its preparation or submission and the proposed starting and completion dates of the research.

K. Foreign Proposals.

Foreign proposers should arrange their own funding. Cost information is thus not applicable in foreign proposals. Investigators should be careful to comply with all other guidelines.

L. Cost Plan. (U.S. proposals only. Including all federal establishments).

Proposers should be aware that cost sharing by non-Federal organizations is statutorily required in any contract for basic or applied research which results from an unsolicited proposal unless the proposer certifies in writing that it has no commercial, production, educational or service activities on which to use the results of the research and that it has no means of recovering any cost sharing on such projects.

Proposals may be prepared according to the guidelines of the institution submitting the proposal and should include:

(1) Salaries and Wages _____

(2) Materials, Supplies, Miscellaneous _____

(3) Laboratory Costs (including use or rental of equipment and special services) _____

(4) Travel (Domestic and Foreign) _____

(5) Equipment _____

(6) Computer Time _____

(7) Publication and Communications Costs _____

(8) Cost of Data _____

(9) Other Direct Costs _____

(10) Overhead _____

(11) Total Operating Budget for Grant or Contract Period (generally 12 months) _____

(12) Estimated Total Operating Budget to Completion of Research _____

(13) Institutional Contribution _____

(14) Total Months to Completion of Research _____

4. PROCEDURES FOR SUBMISSION

A. Domestic Proposals.

Twelve copies of the proposal are required. All domestic proposals should be mailed directly to the address given in the appropriate discipline section of Enclosure 1.

One copy of the proposal should bear the original signatures of the PI and an authorized official of the proposer's sponsoring organization.

B. Foreign Proposals.

Responses for participation by individuals outside the United States of America should be type-written in English. These responses must be reviewed and endorsed by an appropriate sponsoring government agency in the proposer's country. Twelve copies, of which one copy bears original signatures of the endorsed responses, should be forwarded and addressed only as shown below:

National Aeronautics and Space Administration
International Affairs Division
Code LID-18 (Reference OSTA-78-A)
Washington, DC 20546
U.S.A.

Include a reference to the number of this Applications Notice. Foreign responses received by the International Affairs Division will go through the same evaluation and selection process as U.S. - originated responses. Therefore, foreign proposals should indicate the most appropriate discipline area to conduct the evaluation. Should a foreign respondent be selected, NASA will arrange with the sponsoring foreign agency for the proposed participation on a cooperative basis, in which NASA and the sponsoring agency will each bear the cost of discharging its respective responsibilities.

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Washington, D.C. 20546

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