

**NASA EARTH AND SPACE SCIENCE FELLOWSHIP (NESSF) PROGRAM  
2009/2010 ACADEMIC YEAR**

Call for proposals.....	November 3, 2008
Proposals due (new applications).....	February 2, 2009
Proposals due (renewal applications).....	March 16, 2009
Announcement of new fellowships.....	May 15, 2009 (target)
Announcement of renewal fellowships.....	June 12, 2009 (target)
Start date of fellowships.....	September 1, 2009

**1. Introduction**

The National Aeronautics and Space Administration’s (NASA) Mission,

*To pioneer the future in space exploration, scientific discovery, and aeronautics research,*

and the Vision for Space Exploration, whose fundamental goal is

*To advance U.S. scientific, security, and economic interests through a robust space exploration program,*

allow the science objectives of the NASA Science Mission Directorate (SMD) to be clearly defined as the orderly pursuit of the agency’s strategic goals. Specifically, SMD endeavors to:

- *Study planet Earth from space to advance scientific understanding and meet societal needs;*
- *Understand the Sun and its effects on Earth and the solar system;*
- *Advance scientific knowledge of the origin and evolution of the solar system, the potential for life elsewhere, and the hazards and resources present as humans explore space; and*
- *Discover the origin, structure, evolution, and destiny of the universe and search for Earth-like planets.*

This call for graduate fellowship proposals, entitled *NASA Earth and Space Science Fellowship (NESSF) Program – 2009/2010 Academic Year*, solicits applications from accredited U.S. Universities on behalf of individuals pursuing Masters or Doctoral (Ph.D.) degrees in Earth and space sciences, or related disciplines, at respective institutions. The purpose of NESSF is to ensure continued training of a highly qualified workforce in disciplines needed to achieve NASA’s scientific goals outlined above. Awards resulting from the competitive selection will be made in the form of training grants to the respective universities with the advisor serving as the principal investigator.

The financial support for the NESSF Program comes from SMD’s four science divisions: Earth Science, Heliophysics, Planetary Science, and Astrophysics. For the 2009/2010

academic year, NASA expects to award approximately 42 new graduate fellowships in Earth Science, 3 in Heliophysics, 10 in Planetary Science, and 3 in Astrophysics.

## **2. SMD Overview**

The NASA Science Mission Directorate (SMD) supports basic and applied research in Earth and space science. The SMD research program includes the development of major space flight missions; analysis of data from prior missions; conduct of major field campaigns; and the Supporting Research and Technology (SR&T) program which includes development of instruments for suborbital flights and potential missions, detector development, complementary laboratory research, and theoretical studies. The SMD also supports the development of decision-making tools for science-based policy and management decisions.

The fundamental questions and goals for NASA's Earth and space science research activities are given in a series of Strategic Plans and Science Roadmaps; these documents can be accessed at <http://science.hq.nasa.gov/strategy/> and <http://science.hq.nasa.gov/strategy/roadmaps/>.

Interested proposers are advised that a key criterion for proposal evaluation and selection is the relevance of the proposed investigation to the NASA mission as described in the Strategic Plans and Science Roadmaps. Therefore, regardless of the quality of their academic records, students should consider applying to this program only if they can present valid lines of reasoning that their intended research is clearly relevant to NASA SMD science research programs and/or missions and/or strategic objectives. Programmatic factors may also affect selection (for example, see specific priorities in the Divisions listed below). The proposal should present a well-defined problem and justification of its scientific significance, as well as a detailed approach for its solution.

Research that exploits analysis of data collected by spacecraft-borne instruments, relevant ground-based data (including aircraft- and balloon-based data) and laboratory experiments, and theoretical modeling is solicited. Emphasis is placed on the development and implementation of a multifaceted program of space-based and suborbital (airborne, sounding rocket, and balloons) missions, and the development and use of computational models that utilize these observations for initialization, verification, process representation, and/or assimilation. Investigations that support instrumentation development relevant to future missions in the above areas, the analysis of data from ongoing and past missions, and laboratory and theoretical investigations that support the interpretation of relevant space-based observations are invited. Individuals are strongly encouraged to make their proposals directly relevant to the mission of the SMD science divisions and to clearly indicate to which division they are proposing.

## **3. Scientific Areas of Support**

All applications to NESSF must address the goals and objectives of one of the four SMD research programs as outlined below. The student shall have the primary initiative in

defining the proposed research to NESSF, with input or supervision from his or her advisor, as appropriate. In cases when the advisor already has an ongoing research award from NASA, it is not a problem for the research proposed under NESSF to address a similar scientific problem.

## I. Earth Science Research Program

The Earth Science Research Program, managed by the Earth Science Division, fulfills NASA's mission *to advance U.S. scientific, security, and economic interests through a robust space exploration program* and, in particular, strategic goal 3A, *to study Earth from space to advance scientific understanding and meet societal needs*. This strategic goal is motivated by the fundamental question: *“How is the Earth system changing, and what are the consequences for life on Earth?”* Within this goal, the Earth Science Division has two primary strategic objectives: (1) Earth System Science – understand how the Earth is changing to better predict change and understand the consequences of change for life on Earth; and (2) Earth Science Applications – expand and accelerate the realization of economic and societal benefits from Earth science, information, and technology.

The frontier of the interdisciplinary field of Earth system science seeks to:

- (1) explore interactions among the major components of the Earth system – continents, oceans, atmosphere, ice, and life;
- (2) distinguish natural from human-induced causes of change;
- (3) understand and predict the consequences of change; and

The continuum from *science* to *applications* is traversed through a logical progression of observation, research and data analysis, modeling, and scientific assessment. NASA supports both basic and applied research, leveraging its scientific capabilities into valuable decision support tools that benefit society.

The complexity of the Earth system, in which spatial and temporal variability exists on a range of scales, requires an organized approach for addressing the interdisciplinary problems. The basic and applied research in the Earth Science Division is organized by six interdisciplinary Science Focus Areas:

- 1) Climate Variability and Change – Understand the role of oceans, atmosphere, and ice in the climate system and in improving predictive capability for its future evolution.
- 2) Atmospheric Composition – Understand and improve predictive capability for changes in the ozone layer, climate forcing, and air quality associated with changes in atmospheric composition.
- 3) Carbon Cycle and Ecosystems – Quantify global land cover change and terrestrial and marine productivity, and improve carbon cycle and ecosystem models and our understanding of biodiversity.

- 4) Water and Energy Cycle – Quantify the key reservoirs and fluxes in the global water cycle and improve models of water cycle change and fresh water availability.
- 5) Weather – Enable improved predictive capability for weather and extreme weather events.
- 6) Earth Surface and Interior – Characterize and understand Earth surface changes and variability of the Earth’s gravitational and magnetic fields.

The outcomes that NASA projects from its research and development in these six Science Focus Areas are summarized in detail in Chapter 4 of the SMD Science Plan 2007–2016 (<http://science.hq.nasa.gov/strategy>).

The Earth Science component of NESSF encourages applications that place particular emphasis on the integration of satellite-, aircraft-, and surface-based measurements, in conjunction with models and simulations, as well as submissions linking scientific research with innovative engineering in the areas of space geodetic, geopotential field, and remote sensing technologies. The Earth Science component also encourages submissions from individuals pursuing interdisciplinary degrees linking NASA Earth science research with policy and management studies, including examination of the application of the research results to specific policy and management areas (e.g., natural resource management, environmental policy, public health, disaster management, land or marine ecosystem planning, etc.) and analysis of related issues in decision-making (e.g., uncertainty, risk, alternatives, valuation, implications, costs, benefits, etc.).

The Earth Science component of NESSF discourages submission of paleo-climate, paleo-ecology, and paleo-hydrology related applications. Proposals that address the molecular biology, biochemistry, development, physiology, or evolution of living organisms, without a direct utilization of remote sensing approaches or global/regional modeling which makes use of remote sensing data, are encouraged to seek other applicable components in NESSF (e.g., astrobiology in the Planetary Science Research Program) or other Federal graduate research opportunities.

## II. Heliophysics Research Program

The Heliophysics Research Program, managed by the Heliophysics Division, concentrates on the Sun, its effects on the Earth and the other planets of the solar system, and the Heliosphere (the Sun’s atmosphere). Planetary magnetospheres and the ionized portions of upper atmospheres (ionosphere, mesosphere, etc.) are also part of the Heliophysics research portfolio. Heliophysics also includes Space Weather, in the magnetospheres of the Earth and other planets, and in interplanetary space.

Heliophysics uses remote sensing and in situ measurements from a fleet of targeted missions that are integrated into a synergistic Great Observatory, suborbital rockets, balloons, ground-based instruments, theory, and modeling to acquire insight into the complex interactions of this interconnected system.

The Heliophysics research program and missions are described in Chapter 6 of the SMD Science Plan 2007-2016 available at <http://science.hq.nasa.gov/strategy>.

### III. Planetary Science Research Program

The Planetary Science Research Program, managed by the Planetary Science Division, concentrates on research that enables, and is enabled, by the robotic exploration of the Solar System. Its broad goals are to discover the nature and origin of the celestial bodies among which we live and to explore whether life exists beyond Earth. The quest to understand our origins is universal. How did we get here? Are we alone? What does the future hold? These grand themes are captured in five fundamental science questions:

- How did the Sun's family of planets and minor bodies originate?
- How did the Solar System evolve to its current diverse state?
- What are the characteristics of the Solar System that led to the origin of life?
- How did life begin and evolve on Earth and has it evolved elsewhere in the Solar System?
- What are the hazards and resources in the Solar System environment that will affect the extension of human presence in space?

The Planetary Science Research Program supports theoretical and laboratory research, field work at analogue sites, and the analysis of samples and data returned by Planetary Science Division missions. Topics may range from basic lunar science to analysis of mission generated data to planetary protection. Please refer to the SMD Science Plan indicated below for subject areas relevant to the Planetary Science Research Program.

The Planetary Science research program and missions are described in Chapter 5 of the SMD Science Plan 2007-2016 available at <http://science.hq.nasa.gov/strategy>.

### IV. Astrophysics Research Program

The Astrophysics Research Program, managed by the Astrophysics Division, explores the universe beyond our solar system: from the search for planets and life in other stellar systems to the origin, evolution, structure, and destiny of the universe itself. The broad themes of the Astrophysics Research Program are:

#### (i) Physics of the Cosmos:

to discover how the universe works at the most fundamental level; to explore the behavior and interactions of the particles and fundamental forces of nature, especially their behavior under the extreme conditions found in astrophysical situations; and to explore the processes that shape the structure and composition of the universe as a whole, including the forces which drove the Big Bang and continue to drive the accelerated expansion of the universe.

(ii) Cosmic Origins:

to discover how the universe expanded and evolved from an extremely hot and dense state into the galaxies of stars, gas, and dust that we observe around us today; to discover how dark matter clumped under gravity into the tapestry of large-scale filaments and structures which formed the cosmic web for the formation of galaxies and clusters of galaxies; to discover how stars and planetary systems form within the galaxies; and to discover how these complex systems create and shape the structure and composition of the universe on all scales.

(iii) Exoplanet Exploration:

to search for Earth-like planets orbiting nearby stars in our Galaxy: to determine the percentage of terrestrial and larger planets that are in or near the habitable zone of a wide variety of stars and to measure their orbits; to determine the properties of those stars that harbor planetary systems; and, as a future goal, to search for evidence of life on those planets, especially those in habitable zones. For the most favorable giant planet cases, the initial discovery can be followed by studies of the chemical composition of their atmospheres and the search for signs of water, oxygen, and more complex molecules associated with life.

(iv) Research Analysis and Technology Development:

a vital component of the astrophysics program is the development of new techniques that can be applied to future major missions: the test-beds for these new techniques are the balloons and rockets that are developed and launched from NASA's launch range facilities. These technological developments include instruments that cover all wavelengths and fundamental particles.

The Research and Analysis program also supports laboratory detector development and laboratory astrophysics, in which the properties of, e.g., plasmas are explored in conditions approximating those of astrophysical situations.

NASA funding allows scientists to transform data into knowledge and knowledge into further technology; it allows for the creation of conceptual and mathematical tools that are needed for the design of science programs and missions. Within the Research and Analysis program, NASA funds the interpretation of data and results from all of the astrophysics missions that are currently operating – from the Hubble Space Telescope to the Small Explorer satellites.

The Astrophysics research program and missions are described in Chapter 7 of the SMD Science Plan 2007-2016 available at <http://science.hq.nasa.gov/strategy>.

#### **4. Terms and Conditions**

NESSF awards are made initially for one year and may be renewed for no more than two additional years, contingent upon satisfactory progress (as reflected in academic performance, research progress, and recommendation by the faculty advisor) and the

availability of funds. The three-year period is the maximum length a student may receive support from the NESSF Program in pursuing a Masters or Ph.D. For example, a student supported by a NESSF award for three years prior to obtaining her/his Masters degree cannot apply to the NESSF Program for an additional three years of Ph.D. support. However, a student in the second or third year of a Masters program may use the three years of support to complete the Masters and initiate Ph.D. research.

The maximum amount of a NESSF award is \$30,000 per annum. Not all awards will require \$30,000 per year. The stipend for the student should be comparable with the prevailing stipend rate on their campus. Maximum amounts for the student and the university allowances remain at \$3,000 each. Students are encouraged to work with the advisor and the university Office of Sponsored Research in determining the appropriate allocation in each budget category.

The fellowship may be used to defray a student's stipend; tuition; fees; travel in support of the research investigation to conferences, symposia, or collaborative meetings; books; expendable laboratory supplies; page charges for journal articles; printing of a thesis; health insurance; and similar charges. Equipment, including computers, may NOT be purchased with NESSF funds. Government furnished equipment will not be provided. A NESSF budget should include itemization of the anticipated use of the grant funding. See item 16 in the 2009 NESSF Program Specific Questions.

The NESSF supports graduate education and does not provide University overhead.

## **5. Eligibility**

This call for graduate fellowship proposals, entitled *NASA Earth and Space Science Fellowship (NESSF) Program – 2009/2010 Academic Year*, solicits applications from accredited U.S. universities on behalf of individuals pursuing Masters or Ph.D. degrees in Earth and space sciences, or related disciplines, at respective institutions. Students admitted to, or already enrolled in, a full-time Masters and/or Ph.D. program at accredited U.S. universities are eligible to apply. Students may enter the fellowship program at any time during their graduate work. Students may also apply in their senior year prior to receiving their baccalaureate degree, but must be admitted and enrolled in a Masters and/or Ph.D. program at a U.S. university at the time of the award.

An individual accepting this award may not concurrently receive any other Federal fellowship or traineeship. If the annual cost on campus is more than the amount of the NASA fellowship, the NESSF may be partially supplemented by other forms of employment other than by another Federal fellowship or traineeship. However, NASA may allow an applicant to receive supplements from other U.S. Federal agencies to cover expenses not covered by NASA's graduate fellowships; for example, the purchase of equipment, which is not permitted through a NASA fellowship.

The NESSF Program is open to all students enrolled full-time at accredited U.S. institutions; however, U.S. citizens and permanent residents will be given preference

when two or more proposals are of equal scientific merit. Students with disabilities and/or from underrepresented minority groups are urged to apply. No applicant shall be denied consideration or appointment as a NASA Earth and Space Science Fellow on the grounds of race, creed, color, national origin, age, or sex.

## **6. Obligation to the Government**

A student receiving support under the NESSF Program does not thereby incur any formal obligation to the Government of the United States. However, the objectives of this program will clearly be best served if the student actively pursues research or teaching in the field of Earth or space science after completion of graduate studies.

## **7. Disposition of Unused Funds**

In case a student or faculty advisor ceases to participate in the program for any reason, the university, with prior NASA approval, may appoint another student or faculty advisor to complete the remaining portion of the current grant year only, provided the area of research remains the same. It should be noted: By NESSF policy, if tenure of less than 12 months is anticipated, prorated stipend and allowances are required for a renewal budget. Beyond the current grant year, the substitute recipient must submit a complete application to NASA to be evaluated with other new applicants in the next announcement cycle in the following year.

## **8. Proposal Evaluation and Selection**

The Directors of the science divisions of the Science Mission Directorate at NASA Headquarters will make respective selection of applications for award on a competitive basis. Criteria for evaluation include: (a) the scientific merit of the proposed research; (b) the relevance of the proposed research to NASA's objectives in Earth or space science as outlined above; and (c) academic excellence based upon an applicant's transcripts, the signed letter of recommendation by the student's academic advisor, the degree to which it supports the proposed research, and curriculum vitae. Evaluation will be conducted by community-based reviewers via either mail or panel review, or both, or by the relevant NASA-based program managers in the science divisions of SMD.

## **9. Application Procedures for New and Renewal Applicants**

All proposals must be submitted in electronic format only. Instructions for submitting electronic proposals are located at <http://nspires.nasaprs.com> - click on "Solicitations," then click on "Open Solicitations," and then select the NESSF 09 announcement. Also refer to "Proposal Submission Instructions" listed under "Other Documents."

New Applications must include:

1. NSPIRES generated proposal cover page to be completed on line, which includes a proposal summary/abstract and responses to the NESSF Program Specific Data questions, **which includes the proposal budget;**

2. A description of the proposed research, totaling no more than 6 single-spaced uploaded pages; the research plan should be presented with a clear scientific hypothesis or question(s) to be addressed by the proposed work;
3. A schedule stating the proposed start and completion dates of the applicant's degree program;
4. Curriculum Vitae of the faculty advisor and student, limited to one page each;
5. A signed letter of recommendation from the student's academic advisor which must include the name of the student, the name of the proposing institution, and the NESSF proposal title; and
6. Unofficial, legible, and clearly unaltered undergraduate and graduate transcripts (provide an explanation if the transcripts are not current or recent).

Please Note: All required proposal elements which are not part of the NSPIRES cover page form must be combined into as a single .pdf document and uploaded on the NSPIRES site as a single .pdf document for submission.

**NO MAIL-IN MATERIALS WILL BE ACCEPTED**

Renewal Applications must include:

1. NSPIRES generated proposal cover page to be completed on line, which includes a proposal summary/abstract and responses to the NESSF Program Specific Data questions, **which includes the proposal budget;**
2. A progress report, of approximately 3 to 6 uploaded pages, which summarizes the work accomplished during the previous year, relating the actual accomplishments with the plan originally outlined in the proposal and/or including any unanticipated opportunities, surprises, or unusual developments; and a description of plans for the coming year, including explanations of any substantial deviation from the plan originally outlined in the proposal. Preprints or reprints may be uploaded, as appropriate;
3. An updated schedule for completing the degree program;
4. A signed letter of recommendation from the student's academic advisor which must include the name of the student, the name of the proposing institution, and the NESSF proposal title; and
5. Unofficial, legible, and clearly unaltered transcripts for any classes taken during the previous year.

Please Note: All required proposal elements which are not part of the NSPIRES cover page form must be combined into a single .pdf document and uploaded on the NSPIRES site as a single .pdf document for submission.

**NO MAIL-IN MATERIALS WILL BE ACCEPTED**

The general conditions described in the NASA Federal Acquisition Regulation Supplement Part 1852.235-72 (See Appendix B at <http://www.hq.nasa.gov/office/procurement/nraguidebook/proposer2007.pdf>: Guidebook

for Proposers Responding to NASA Research Announcements, January 2007) are applicable, except the special instructions provided herein pertaining to NESSF (e.g., NESSF evaluation criterion (c), page limit for description of the proposed research, maximum award amount, NESSF application form, supporting documents, etc.).

Submission Deadlines:

Deadline for receipt of NEW applications: 11:59 p.m. ET, February 2, 2009

Deadline for receipt of RENEWAL applications: 11:59 p.m. ET, March 16, 2009

Announcement of Selections:

The target date to announce selection of new applications for award is May 15, 2009, with **the start date of the all new fellowship awards of September 1, 2009**. The target date to notify renewal students concerning the continuation of the fellowship award applicants is June 12, 2009.

At the conclusion of the review process, notification letters will be sent to the student and faculty advisor at the university address entered on NSPIRES. New selections will be posted at <http://nspires.nasaprs.com>,

Inquiries:

For further information contact:

Program Administrator for NESSF Earth Science Research – Anne Crouch at (202) 358-0855 or by E-mail at [hq-nessf-Earth@nasa.gov](mailto:hq-nessf-Earth@nasa.gov).

Program Administrator for NESSF Heliophysics Research, Planetary Science Research, and Astrophysics Research – Dolores Holland at (202) 358-0734 or by E-mail at [hq-nessf-Space@nasa.gov](mailto:hq-nessf-Space@nasa.gov).

## Privacy Act Statement

### General

Pursuant to Public Law 93-579, Privacy Act of 1974, as amended (5 U.S.C. 552a), the following information is being provided to persons who are asked to provide information to obtain a NASA graduate student fellowship.

### Authority

This information is collected under the authority of the National Aeronautics and Space Act. Publication 85-568, as amended, 42 U.S.C. 2451, et. seq.

### Purpose and Uses

The information requested on the application form will be used to determine your eligibility for participation in the NASA graduate student fellowship program. The information requested regarding your disability status will be used to determine the degree to which members of each ethnic/racial/disability group are being reached by NASA's announcement of this program, and will not affect your application. Additionally, NASA may disclose this information to other organizations or individuals having relationships with NASA, including but not limited to academic organizations, nonprofit organizations, and other governmental agencies, as well as Congressional offices in response to an inquiry made on your behalf. Disclosure may also be made to concerned parties in the course of litigation, to law enforcement agencies, and to other Federal agencies in exchanging information pertinent to an agency decision.

### Effects of Nondisclosure

Furnishing the information on the application form is voluntary, but failure to do so may result in NASA's inability to determine eligibility for participation and selection for award in the Graduate Student Fellowship Program. However, your application will not be affected if you choose not to provide information on your ethnic, racial, or disability status.

### Definitions for Applicant Background - Section VI

- American Native or Alaskan American: A Person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.
- Hispanic or Latino: A person of Mexican, Puerto Rican, Cuban, or South American or other Spanish culture or origin, regardless of race.
- Asian: A person having origins in any of the original peoples of East Asia, Southeast Asia or the Indian subcontinent. This area includes, for example, China, India, Indonesian, Japan, Korea and Vietnam.
- Pacific Islander/Native Hawaiian: A person having origins in any of the original peoples of Hawaii; the U.S. Pacific territories of Guam, American Samoa, and the

Northern Marianas; the U.S. Trust Territory of Palau; the islands of Micronesia and Melanesia; or the Philippines.

- African American, not of Hispanic origin: A person having origins in any of the black racial groups of Africa.
- White, not of Hispanic Origin: A person having origins in any of the original peoples of Europe, North Africa, or the Middle East.
- Individuals with Disabilities: An individual having a physical or mental impairment that substantially limits one or more major life activities; who has a record of such impairment; or who is regarded as having such impairment.