



NASA EPSCoR Call for Proposals FY 2013

INTRODUCTION

NASA released the Cooperative Agreement Notice (CAN) for the 2013 EPSCoR Competition on February 13th. Oklahoma is eligible to submit one proposal. It is anticipated that 5-8 awards, \$750,000 each to be expended over a three-year period of performance, will be made. All information needed to respond to this solicitation is contained in this announcement and in the companion document entitled *Guidebook for Proposers Responding to a NASA Research Announcement (NRA) or Cooperative Agreement Notice (CAN) January 2013 Edition*. The PDF version is available at: <http://www.hq.nasa.gov/office/procurement/nraguidebook/proposer2013.pdf>

Within this competition, twenty eight jurisdictions are eligible to submit proposals. **Jurisdictions are strongly encouraged to submit proposals that demonstrate partnerships or cooperative arrangements among academia, government agencies, business and industry, private research foundations, jurisdiction agencies, and local agencies. Partnerships with minority-serving institutions are strongly encouraged. Inclusion of faculty and students from underrepresented/underserved groups is also strongly encouraged.**

NASA RESEARCH AREAS OF INTEREST

NASA EPSCoR research priorities are defined by the **Mission Directorates (Aeronautics Research, Human Exploration and Operations and Science)**, the Office of the Chief Technologist and NASA's ten Centers. Each Mission Directorate and the Office of the Chief Technologist covers a major area of the Agency's research and technology development efforts.

Information about current NASA research solicitations can be found on NSPIRES at <http://nspires.nasaprs.com> (select "Solicitations" and then "Open Solicitations").

Research priorities for each of the Mission Directorates (includes Centers) and the Office of the Chief Technologist are summarized below and can be found at the following locations:

Aeronautics Research Mission Directorate (ARMD)

Researchers responding to the ARMD should propose research that is aligned with one or more of the ARMD programs. Proposers are directed to the following:

- ARMD Programs: <http://www.aeronautics.nasa.gov/programs.htm>
- The National Aeronautics and Space Administration (NASA), Headquarters, Aeronautics Research Mission Directorate (ARMD) Fiscal Year (FY) 2013 version of the NASA Research Announcement (NRA) entitled, "Research Opportunities in Aeronautics

(ROA)” has been posted on the NSPIRES web site at <http://nspires.nasaprs.com> (select “Solicitations” and then “Open Solicitations”).

Detailed requirements, including proposal due dates are stated in appendices that address individual thrust areas. These appendices will be posted as amendments to the ROA NRA and will be published as requirements materialize throughout the year.

Human Exploration & Operations Mission Directorate (HEOMD)

Human Research Program

The Human Research Program (HRP) is focused on investigating and mitigating the highest risks to human health and performance in order to enable safe, reliable, and productive human space exploration. The HRP budget enables NASA to resolve health risks in order for humans to safely live and work on missions in the inner solar system. HRP conducts research, develops countermeasures, and undertakes technology development to address human health risks in space and ensure compliance with NASA's health, medical, human performance, and environmental standards.

The Human Research Roadmap (<http://humanresearchroadmap.nasa.gov>) is a web-based document that allows users to search HRP risks, gaps, and tasks.

Space Life Sciences

The Space Life Sciences, Space Biology Program has three primary goals:

- To effectively use microgravity and the other characteristics of the space environment to enhance our understanding of fundamental biological processes;
- To develop the scientific and technological foundations for a safe, productive human presence in space for extended periods and in preparation for exploration;
- To apply this knowledge and technology to improve our nation's competitiveness, education, and the quality of life on Earth.

These goals will be achieved by soliciting research using its three program elements:

- Cell and Molecular Biology and Microbial Biology - studies of the effect of gravity and the space environment on cellular, microbial and molecular processes;
- Organismal & Comparative Biology - studies and comparisons of responses of whole organisms and their systems; and
- Developmental Biology – studies of how spaceflight affects reproduction, development, maturation and aging of multi-cellular organisms, as described in NASA's [Fundamental Space Biology Science Plan \(PDF, 7.4 MB\)](#).

Further details about ongoing activities specific to Space Biology are available: [Space Biosciences website](#)

Physical Science Research

The Physical Science Research Program, along with its predecessors, has conducted significant fundamental and applied research, both which have led to improved space systems and produced new products offering benefits on Earth. NASA's experiments in various disciplines of physical science reveal how physical systems respond to the near absence of gravity. They also reveal how other forces that on Earth are small compared to gravity, can dominate system behavior in space.

The Physical Science Research Program also benefits from collaborations with several of the International Space Station international partners—Europe, Russia, Japan, and Canada—and foreign governments with space programs, such as France, Germany and Italy. The scale of this research enterprise promises new possibilities in the physical sciences, some of which are already being realized both in the form of innovations for space exploration and in new ways to improve the quality of life on Earth.

Research in physical sciences spans from basic and applied research in the areas of:

- Fluid physics: two-phase flow, phase change, boiling, condensation and capillary and interfacial phenomena;
- Combustion science: spacecraft fire safety, solids, liquids and gasses, supercritical reacting fluids, and soot formation;
- Materials science: solidification in metal and alloys, crystal growth, electronic materials, glasses and ceramics;
- Complex Fluids: colloidal systems, liquid crystals, polymer flows, foams and granular flows;
- Fundamental Physics: critical point phenomena, atom interferometry and atomic clocks in space

Implementing Centers: NASA's Physical Sciences Research Program is carried out at the Glenn Research Center (GRC), Jet Propulsion Laboratory (JPL) and Marshall Space Flight Center (MSFC).

Further information on physical sciences research is available at <http://issresearchproject.nasa.gov/>

Engineering Research

- Spacecraft: Guidance, navigation and control; thermal; electrical; structures; software; avionics; displays; high speed re-entry; modeling; power systems;

interoperability/commonality; advanced spacecraft materials; crew/vehicle health monitoring; life support.

- Propulsion: Propulsion methods that will utilize materials found on the moon or Mars, “green” propellants, on-orbit propellant storage, motors, testing, fuels, manufacturing, soft landing, throttle-able propellants, high performance, and descent.
- Robotic Systems for Precursor Near Earth Asteroid (NEA) Missions: Navigation and proximity operations systems; hazard detection; techniques for interacting and anchoring with Near Earth Asteroids; methods of remote and interactive characterization of Near Earth Asteroid (NEA) environments, composition and structural properties; robotics (specifically environmental scouting prior to human arrival and later to assist astronauts with NEA exploration); environmental analysis; radiation protection; spacecraft autonomy, enhanced methods of NEA characterization from earth-based observation.
- Robotic Systems for Lunar Precursor Missions: Precision landing and hazard avoidance hardware and software; high-bandwidth communication; in-situ resource utilization (ISRU) and prospecting; navigation systems; robotics (specifically environmental scouting prior to human arrival, and to assist astronaut with surface exploration); environmental analysis, radiation protection.
- Data and Visualization Systems for Exploration: Area focus on turning precursor mission data into meaningful engineering knowledge for system design and mission planning of lunar surface and NEAs. Visualization and data display; interactive data manipulation and sharing; mapping and data layering including coordinate transformations for irregular shaped NEAs; modeling of lighting and thermal environments; simulation of environmental interactions including proximity operations in irregular micro-G gravity fields and physical stability of weakly bound NEAs.
- Research and technology development areas in HEOMD support launch vehicles, space communications, and the International Space Station. Examples of research and technology development areas (and the associated lead NASA Center) with great potential include:
 - *Processing and Operations*
 - Crew Health and Safety Including Medical Operations (Johnson Space Center (JSC))
 - In-helmet Speech Audio Systems and Technologies (Glenn Research Center (GRC))
 - Vehicle Integration and Ground Processing (Kennedy Space Center (KSC))
 - Mission Operations (Ames Research Center (ARC))
 - Portable Life Support Systems (JSC)

- Pressure Garments and Gloves (JSC)
 - Air Revitalization Technologies (ARC)
 - In-Space Waste Processing Technologies (JSC)
 - Cryogenic Fluids Management Systems (GRC)
- *Space Communications and Navigation*
- Coding, Modulation, and Compression (Goddard Spaceflight Center (GSFC))
 - Precision Spacecraft and Lunar/Planetary Surface Navigation and Tracking (GSFC)
 - Communication for Space-Based Range (GSFC)
 - Antenna Technology (Glenn Research Center (GRC))
 - Reconfigurable/Reprogrammable Communication Systems (GRC)
 - Miniaturized Digital EVA Radio (Johnson Space Center (JSC))
 - Transformational Communications Technology (GRC)
 - Long Range Optical Telecommunications (Jet Propulsion Laboratory (JPL))
 - Long Range Space RF Telecommunications (JPL)
 - Surface Networks and Orbit Access Links (GRC)
 - Software for Space Communications Infrastructure Operations (JPL)
 - TDRS transponders for launch vehicle applications that support space communication and launch services (GRC)
- *Space Transportation*
- Optical Tracking and Image Analysis (KSC)
 - Space Transportation Propulsion System and Test Facility Requirements and Instrumentation (Stennis Space Center (SSC))
 - Automated Collection and Transfer of Launch Range Surveillance/Intrusion Data (KSC)
 - Technology tools to assess secondary payload capability with launch vehicles (KSC)
 - Spacecraft Charging/Plasma Interactions (Environment definition & arcing mitigation) (Marshall Space Flight Center (MSFC))

Science Mission Directorate (SMD)

Detailed information on SMD research priorities is available at the following URLs:

- NASA Science: <http://science.nasa.gov>
- NASA Science Plan 2010: <http://science.hq.nasa.gov/strategy/> and <http://science.nasa.gov/media/medialibrary/2010/08/10/2010SciencePlan.pdf>.
- NASA's Plan for a Climate-Centric Architecture for Earth Observations and Applications from Space: http://science.nasa.gov/media/medialibrary/2010/07/01/Climate_Architecture_Final.pdf.

- Research Opportunities in Space and Earth Science (ROSES):
<http://nspires.nasaprs.com/external/> . Select “Solicitations”, “Open Solicitations”, and then “Research Opportunities in Space and Earth Sciences (ROSES) – 2010”.
- In addition, proposers can visit the following URLs:
<http://nasascience.nasa.gov/big-questions> which summarizes the research questions across all four SMD divisions and links to their respective 2007-2016 science strategy.
<http://science.nasa.gov/researchers/sara/advisory-committees/> which provides information on a new planetary decadal survey that was released in the spring of 2011.

Office of the Chief Technologist (OCT)/Space Technology Program (STP)

NASA's Chief Technologist serves as the NASA Administrator's principal advisor and advocate on matters concerning agency-wide technology policy and programs, and coordination and tracking of all technology investments across the agency. The Space Technology Program (STP) consists of nine programs, representing all levels of technology readiness from early stage innovations to mission-ready projects. The Nation's investments in space technology enable NASA to make a difference in the world. By investing in high payoff, disruptive technology that industry cannot tackle today, the STP matures the technology required for NASA's future missions in science and exploration while proving the capabilities and lowering the cost for other government agencies and commercial space activities. By pushing the boundaries of aerospace technology and seizing opportunities, space technology allows NASA and our Nation to remain at the cutting edge.

The nine STP programs are:

- **NASA Innovative Advanced Concepts (NIAC)**
- **Space Technology Research Grants**
- **Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR)**
- **Centennial Challenges**
- **Center Innovation Fund**
- **Game Changing Development**
- **Small Spacecraft Technology**
- **Technology Demonstration Missions**
- **Flight Opportunities**

More information about these Space Technology Programs may be found at
<http://www.nasa.gov/offices/oct/home/index.html>

In addition, OCT is responsible for the development of the Strategic Space Technology Investment Plan (SSTIP). The SSTIP is the Agency's strategy for developing technologies essential to the pursuit of NASA's mission and achievement of National goals. The SSTIP is built upon the foundation of the NASA Space Technology Roadmaps, National Research Council (NRC) report: *NASA Space Technology Roadmaps and Priorities*, NASA technology portfolio assessments, survey of stakeholder

needs, U.S. National Space Policy, and National Science and Technology Priorities for the FY 2014.

NASA Centers

Examples of Center research interest areas include these specific areas from Goddard Spaceflight Center, POC: Danielle V. Margiotta, GSFC 5460.

- Advanced Manufacturing
- Advanced Multi-functional Systems and Structures
- Micro- and Nanotechnology-Based Detector Systems
- Ultra-miniature Spaceflight Systems
- Systems Robust to Extreme Environments
- Spacecraft Navigation Technologies
- Mission and Trajectory Design Technologies
- Spacecraft Attitude Determination and Control Technologies
- CubeSats (POC: Thomas P. Flatley, GSFC-5870)
- On-Orbit Multicore Computing (POC: Charles P. Wildermann, GSFC-5820)
- Development of Mathematical Methods

MATCH

NASA EPSCoR requires cost sharing at a level of at least 50%. This means there must be \$1.00 of match for every \$2.00 of NASA funds. **The Oklahoma State Regents for Higher Education Matching Fund will provide \$50,000 per year in match for each funded project. The remaining matching funds will be the responsibility of the participating institutions.**

PIs should work with their campus research administration offices in preparing a preliminary budget for their pre-proposals and indicate how the campus portion of the match would be funded (i.e., from department, college, and/or central funds). PIs may also seek cost matching from other sources. Possible sources for campus cost match include the 1) unrecovered F&A (indirect costs) on the State Regents' match, 2) direct dollar match from the campuses and 3) indirect costs on the campus match. **Please direct all questions regarding matching funds to your campus Office of Research Administration rather than to the EPSCoR Office.** All white paper submissions in response to this call must be reviewed and approved by the Responsible Official on your campus (i.e., routed through your Research Services or Sponsored Programs office).

PROJECT SELECTION

The Oklahoma EPSCoR Committee review panel will select the project to be submitted to NASA. **Project selection will be based on review of pre-proposals using the following criteria as outlined by NASA on pages 22-26 of the CAN:** Intrinsic Merit, NASA Alignment and Partnerships, Management and Evaluation, and Budget Justification Narrative and Details.

Pre-proposals

The pre-proposals must include:

1. PI name(s), full contact information including email address, and affiliation(s).
2. Project Title.
3. Project Description (5 page maximum). Literature references may be provided if necessary and they do not count toward this page limitation.
4. Preliminary Budget (1 page) Include both NASA and matching funds in the budget request and include F&A on the NASA funds. **Please note that 15% of the direct cost budget from the Regents match AND the NASA funds must be allocated for administrative costs incurred by the NASA EPSCoR Office.**
The NASA EPSCoR office carries out longitudinal tracking of the students involved in research projects and is the liaison between the researchers and NASA for the annual reports, budgets, and on-going alignment with NASA Mission Directorates.
5. Name of the NASA Directorate and program the proposal is directed towards.
6. List of past, current and pending NASA research support.
7. Brief Vitae for PI (up to 2 pages).
8. Description (up to 2 pages) of how well the proposal addresses current NASA research needs and the prospects for future non-EPSCoR NASA research funding.
9. A letter of collaboration from a NASA scientist addressing the issue of NASA alignment and partnership, and discussing the relevance of the proposed project to NASA.
10. *Resubmissions from previous years MUST include a clear description of improvements made in the pre-proposal to improve the chances for selection/funding.*

TIMETABLE FOR FY 2013

First – Carefully, read the NASA CAN from 2013. If you receive this via email, it should be attached. If you access this via the Oklahoma EPSCoR website <http://www.okepscor.org/> (or the Oklahoma NASA website <http://okspacegrant.ou.edu/>), it will be posted there, along with this notice.

- **Friday, March 8, 2013, 5:00 p.m.** – Pre-proposals (**electronic .pdf files**) are due in the OU NASA EPSCoR office **Send files to: email address OKSG.EPSCoR@ou.edu**
- **Monday, March 18, 2013** – PI's will be notified as to which pre-proposal was selected, and given final instructions.
- **Monday, March 18, 2013: Notice of Intent to Submit via NSPIRES due to NASA**

- **Tuesday, April 9, 2013, 5:00 p.m.** - Final **non-pdf** proposals, with authorizing signatures and certifications etc. are due to the NASA EPSCoR office for internal review. Submit to OKSG.EPSCoR@ou.edu Phone: 405-325-6559.
- **Wednesday, April 10, 2013, 5:00 p.m.** Feedback from internal review returned to proposer.
- **Thursday, April 11, 2013, 5:00 p.m.** Completed proposal must be submitted to Tena Smith (tena@ou.edu), Dr. Victoria Snowden (yduca@ou.edu), and OKSG.EPSCoR@ou.edu (**NO EXCEPTIONS**)

For more information or discussion of specific project ideas, please contact NASA EPSCoR Director, Dr. Victoria Snowden at (405) 325-6559 or yduca@ou.edu.