

Arkansas NASA EPSCoR Office

**In Anticipation of Imminent Release of  
FY 2011 NASA Cooperative Agreement Notice (CAN)**

**Experimental Program to Stimulate  
Competitive Research  
(EPSCoR)**

**Release Date:**

**May 14, 2010**

**Pre-Proposals Due:**

**September 1, 2010**

**Selection Announcement**

**September 17, 2010**

**Full Proposal Due:**

**TBA**

*Arkansas NASA EPSCoR reserves the right alter dates if  
NASA acts prior to these deadlines*

Arkansas NASA EPSCOR Office  
University of Arkansas at Little Rock  
Little Rock, Arkansas

## Summary and Key Information

Program: NASA EPSCoR Research 2011 (NEP 2011)

Funds: \$215,000 per year for three (3) years. Total funding \$645,000. (Note: Arkansas NASA EPSCoR Office has removed \$30,000 per year/\$90,000 total for the program period for administration expenses - the Administration office will supply 2:1 match on this portion)

Cost-sharing is required at a level of at least 50% or 2:1 match, two federal for every one state match.

Indirect Cost: Indirects are allowed, but are limited to 21% on salary, wages and fringes only. IDC may be collected at the institution where work is performed only, ie, no IDC on sub-contracts. Uncollected or waived IDC should be used towards match. To calculate the waived IDC use the formula below:

1. Calculate based on your IDC rate and clearly rate and show calculation
2. Calculate based on 21% of salary and wages and clearly show calculation
3. Step 1 minus Step 2 equals waived indirect cost. It is strongly suggested this be applied to matching.

Collaboration: Collaboration is required, consisting of a research institution (PhD granting) and at least one other institution in the state.

Eligibility:

- PI's from previously funded EPSCoR Research awards may serve as a Senior Advisor with no salary expense on the future NEP Research awards.
- Faculty and students at all Arkansas institutes of higher education are eligible (U. S. citizenship does not apply to NASA EPSCoR Research awards).

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**Pre- Proposals Due: September 1, 2010**

Principal investigators (PI) will need to submit a pre-proposal containing the following information:

Cover Page (1 page)

- Title
- PI, Institution, and contact information
- Co-PI(s), Institutions, and contact information
- Synopsis – No more than two paragraphs of the research and interest to NASA
- Jurisdiction economical impact (Arkansas)

Project Description (3-5 pages)

- NASA Relevance
- NASA Contact
- Duties of participating members
- Project Text

Budget Narrative (2 page)

- Salaries with justification (separate salary and fringe for each person)
- Student stipend(s)
- Major Equipment
- Material
- Travel: Domestic
- Indirect Cost

Appendix

- Commitment Letter of Matching Funds

CV (1 page each) (additional Co-PI CV's are except from page count)

Principal investigators must submit a pre-proposal that contains the following information; Cover page, Project Description, Budget, CV's, and Appendices if needed. This should be no more than 10 pages. Pre-Proposals should be submitted by the proposal's principal investigator to [asgc@ualr.edu](mailto:asgc@ualr.edu) by 5:00p.m. September 14, 2010. Please set filename as `researchppPI'slastname.pdf`. (example: `researchppHUDSON.pdf`)

NOTE: All pre-proposals will be review by the Arkansas EPSCOR Technical Advisory Committee (TAC) on a date TBA. The pre-proposals selected to move forward will be announced September 17, 2010.

**Full Proposal Due: TBA (page count subject to NASA final NEP CAN)**

Cover (1 page)

- Title
- PI, Institution, and contact information
- Co-PI, Institution, and contact information
- Table of Contents (1 page)
- Abstract (1 page)

Project Description (14 pages)

- Proposed Research
- Relevance to NASA
- NASA Contacts/Interactions
- Any existing research
- Project Text
- Jurisdiction economical impact (Arkansas)

Personnel

- PI Curriculum Vita (1-2 pages)
- Co-PI(s) Curriculum Vita (1 page each)

Budget (4-5 pages) the budget section should include a detailed budget for each of the three (3) years and a cumulative budget for the full award. Explanatory note for each line item is required. Must give a separate line item for each individual salary and separate line for each fringe.

- Salaries with justification
- Student stipend(s)
- Fringe (separate for each person)
- Major Equipment
- Tuition
- Material
- Travel: Domestic
- Indirect Cost
- \*Matching (cash & in-kind from campus or other match)

Excel Spread sheet –The budget section should include a detailed budget for each of the three (3) years, with breakdown of funds by person/campus (separate salary and fringe), and a cumulative budget for the full award. Explanatory note for each line item is required. Please email Laura Holland at [ldholland@ualr.edu](mailto:ldholland@ualr.edu) for an example of this Excel Spreadsheet.

## **I. Description of Opportunity (Taken from 2010 NASA CAN – may change for full proposal)**

### **A. Technical Description:**

NASA's Office of Education, in cooperation with NASA's four Mission Directorates –Aeronautics Research, Exploration Systems, Science, and Space Operations– and NASA's ten (10) field Centers solicit proposals for the NASA Experimental Program to Stimulate Competitive Research (EPSCoR). Each funded NASA EPSCoR proposal is expected to establish research activities that will make significant contributions to the strategic research and technology development priorities of one or more of the Mission Directorates and contribute to the overall research infrastructure, science and technology capabilities, higher education, and economic development of the jurisdiction.

The program parameters are:

- The maximum funding request per proposal is \$675,000. This amount is to be expended over a three-year period.
- All NASA EPSCoR monies must be cost-shared at a level of at least 50% or 2:1 with non-federal monies. In-kind cost-sharing is allowable. (See note on AR NEP requirements on page 2)

### **B. National and Agency Priorities**

On Thursday, April 15, 2010, at the Kennedy Space Center in Florida, the President outlined a bold strategy for human spaceflight that increases the NASA budget by \$6 billion over the next five years. His plan represents an ambitious effort to foster the development of path-breaking technologies, increase the number, scope and pace of manned and unmanned space missions; make human spaceflight safer and more efficient; and help create thousands of jobs. The President laid out the goals and strategies in this new vision for NASA, including a sequence of deep-space destinations matched to growing capabilities, progressing step-by-step until we are able to reach Mars. He provided new information about specific elements of the plan, including proceeding with a scaled-down variant of the Orion space-capsule technology developed in the Constellation program (to support crew escape requirements of the International Space Station) and setting a decision date for moving from research to development and production of a heavy-lift launch vehicle. In addition, he spoke about the new technologies, new jobs, and new industries this will create along the way.

This new strategy means more money for NASA, more jobs for the country, more astronaut time in space, and more investments in innovation. It will result in a longer operating lifetime for the International Space Station, new launch capabilities becoming available sooner, and fundamentally more ambitious space strategy to take us to an increased number of destinations and to new frontiers in space. By undertaking this strategy, we will no longer rely on our past achievements, and instead embrace a new and bold course of innovation and discovery.

**This new plan:**

- Advances America's commitment to human spaceflight and exploration of the solar system, with a bold new vision and timetable for reaching new frontiers deeper in space.
- Increases NASA's budget by \$6 billion over 5 years.
- Leads to more than 2,500 additional jobs in Florida's Kennedy Space Center area by 2012, as compared to the prior path.
- Begins major work on building a new heavy lift rocket sooner, with a commitment to decide in 2015 on the specific heavy-lift rocket that will take us deeper into space.
- Initiates a vigorous new technology development and test program to increase the capabilities and reduce the cost of future exploration activities.
- Launches a steady stream of precursor robotic exploration missions to scout locations and demonstrate technologies to increase the safety and capability of future human missions, while also providing scientific dividends.
- Restructures Constellation and directs NASA to develop the Orion crew capsule effort in order to provide stand-by emergency escape capabilities for the Space Station – thereby reducing our reliance on foreign providers.
- Establishes the technological foundation for future crew spacecraft needed for missions beyond low Earth orbit.
- Increases the number of astronaut days in space by 3,500 over the next decade, extends the life of the International Space Station (likely beyond 2020) and enables the launching of astronauts on new vehicles from the Kennedy Space Center 1-2 years sooner.
- Jumpstarts a new commercial space transportation industry to provide safe and efficient crew and cargo transportation to the Space Station, projected to create over 10,000 jobs nationally over the next five years.
- Invests in Florida, adding \$3 billion more for the Kennedy Space Center to manage – a 60 percent increase.
- Makes strategic investments to develop critical knowledge, technologies, and capabilities to expand long-duration human exploration into deep space in a more efficient and safe manner, thus getting us to more destinations in deep space sooner.
- And puts the space program on a more ambitious trajectory that pushes the frontiers of innovation to propel us on a new journey of innovation and discovery deeper into space.

**Specific New Elements of the President's Plan:**

**Outlining a Bold New Vision for Reaching New Frontiers in Space:** Building on the announcement of a new heavy-lift rocket decision date and the restructuring of Orion, the President outlined a broad vision and timetable for unlocking our ambitions and expanding our frontiers in space, until ultimately we can meet the challenge of sending humans to Mars.

The President's vision for NASA space exploration enables:

- a set of stepping-stone achievements in space that will take us further and faster into space, allowing us to reach a range of destinations including lunar orbit, Lagrange points, near-Earth asteroids, and the moons of Mars, and eventually Mars itself. This sequence of missions will begin with a set of crewed flights to prove the capabilities required for exploration beyond low Earth orbit. After these initial missions, our long-duration human spaceflight technologies will enable human explorers to conduct the first-ever crewed mission into deep space to an asteroid, thereby achieving an historical first; venture into deep space locations such as the Lagrange points (potential sites for fuel depots that would enable more capable future missions to the Moon, Mars, and other destinations); and then send humans to orbit Mars and return them safely to Earth.
- increasing investments in ground-breaking technologies that will allow astronauts to reach space faster and more often, to travel further distances for less cost, and to stay in space for longer periods of time.
- systematically tackling the hard problems of space exploration – from protecting our astronauts from radiation to developing advanced in-space propulsion – so that we can push the boundaries not only of where we can go in space, but also what we can do there to improve our lives here on Earth.

**Developing a Heavy Lift Rocket, with a Specific Decision in 2015, to Expand Our Reach in Space:** To demonstrate a concrete timetable and commitment for expanding human exploration further, the President announced that, in addition to investing in transformative heavy-lift technologies, he will commit to making a specific decision in 2015 on the development of a new heavy-lift rocket architecture. This new rocket would eventually lift future deep-space spacecraft to enable humans to expand our reach toward Mars and the rest of the Solar System. This new rocket would take advantage of the new technology investments proposed in the budget – primarily a \$3.1 billion investment over five years on heavy-lift R&D. This propulsion R&D effort will include development of a U.S. first-stage hydrocarbon engine for potential use in future heavy lift (and other) launch systems, as well as basic research in areas such as new propellants, advanced propulsion materials manufacturing techniques, combustion processes, and engine health monitoring, all of which are expected to shorten the development time for any future heavy-lift rocket. The new rocket also will benefit from the budget's proposed R&D on other breakthrough technologies in our new strategy for human exploration (such as in-space refueling), which should make possible a more cost-effective and optimized heavy lift capability as part of future exploration architectures. A decision in 2015 means that major work on building a new heavy lift rocket will likely begin two years sooner than under the troubled Constellation program.

**Restructuring the Orion Crew Capsule:** Our goal is to take advantage of the best work undertaken in the Constellation program. The President announced that NASA will restructure the Orion crew exploration vehicle program to a simpler and more efficient design that will be focused on crew emergency escape from the International Space Station. Under the Constellation program, the Orion crew capsule was intended to house astronauts during their travel to the International Space Station and later missions to the

Moon. It also was to be capable of docking at the Space Station for six months and returning crews to the Earth. As part of the President's new plan for NASA, the development work already performed on this capability will be re-oriented to meet the important safety requirement of providing stand-by emergency escape capabilities for astronauts on the Space Station. We will be able to launch this vehicle within the next few years, creating an American crew escape capability that will increase the safety of our crews on the Space Station, reduce our dependence on foreign providers, and simplify requirements for other commercial crew providers. This effort will also help establish a technological foundation for future exploration spacecraft needed for human missions beyond low Earth orbit, and will preserve some critical high-tech contractor jobs in Colorado, Texas, and Florida.

## **II. Project Overview and Guidelines**

### **A. Funding and Cost-Sharing/Matching**

The maximum amount that can be requested is \$645,000 per research proposal to be expended over three years, in accordance with the budget and budget narrative in the approved research proposal. Cost-sharing is required at a level of at least 50% or 2:1. Although the method of cost-sharing is flexible, NASA encourages the EPSCoR jurisdiction committees to consider methods that would add value to the jurisdiction's existing research capabilities. All contributions, including cash or in-kind, shall meet the criteria contained in the *NASA Grant and Cooperative Agreement Handbook*, Section 1260.123.

*The following restrictions exist on the use of the federally provided NASA EPSCoR funds:*

- Award funds may not be used to fund research carried out by non-U.S. institutions. U.S. research award recipients may, however, directly purchase supplies and/or services that do not constitute research from non-U.S. sources. For additional guidance on foreign participation, see Section 1.6 of the *NASA Guidebook for Proposers* and NASA FAR Supplement Part 1835.016-70.
- No international travel is allowed. No exceptions or allowances will be granted. Conference attendance may be funded only in the United States' jurisdiction. Note that domestic travel does not have a limit, but travel should be appropriate and reasonable to conduct the proposed research.
- The construction of facilities is not an allowed activity for this CAN. For further information on allowable costs, refer to the cost principles cited in the *Grant and Cooperative Agreement Handbook*, 14 Code of Federal Regulations (CFR), Section 1260.127 or contact Laura Holland at 501-569-8212.
- NASA EPSCoR funding cannot be used to purchase general purpose equipment, e.g. desktop workstations, office furnishings, reproduction and printing equipment, etc. as a direct charge. Special purpose equipment purchases (i.e.

equipment that is used only for research, scientific, and technical activities directly related to the proposed research activities) are allowed and can be reflected as a direct charge as per NASA Grants and Cooperative Agreement Handbook, Section A 1260.27. A detailed justification must be in the Budget Narrative.

## **B. NASA Research Areas of Interest**

NASA EPSCoR research priorities are defined by the Mission Directorates—Aeronautics Research, Exploration Systems, Science, and Space Operations. Each Mission Directorate 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 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>
- Research Opportunities in Aeronautics (ROA) <http://nspires.nasaprs.com> (select “Solicitations” and then “Open Solicitations”)

### **Exploration Systems Mission Directorate (ESMD)**

General priorities of ESMD can be found at <http://www.nasa.gov/directorates/esmd>.

### **Science Research Interests:**

- Research and Technology Development to Support Crew Health and Performance in Space Exploration Missions, NASA Human Research Program and The National Space Biomedical Research Institute  
<http://nspires.nasaprs.com/external/viewrepositorydocument/cmdocumentid=154870/NNJ08ZSA002N.pdf>
- Ground-Based Studies in Space Radiobiology, NASA Space Radiation Program Element  
<http://nspires.nasaprs.com/external/viewrepositorydocument/cmdocumentid=179575/NNJ09ZSA001N.pdf>

## **Engineering Research Interests:**

- **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.
- **Lunar and Planetary Surface Systems:** Precision landing hardware, software, in-situ resource utilization (ISRU), navigation systems, extended surface operations, robotics, (specifically environmental scouting prior to human arrival, outpost maintenance with and without humans present, and assist astronaut with geologic exploration) environmental analysis, radiation protection, spacesuits, life support, power systems. ESMD also has an extensive program to develop and test models of lunar surface systems in realistic analog environments on Earth. Information on the Analog Tests is available on the Web by visiting: <http://www.nasa.gov/exploration/home/analog.html>.
- **Ground Operations:** Pre-launch, launch, mission operations, command and control software systems, communications, landing and recovery.

## **Science Mission Directorate (SMD)**

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

- NASA Science Plan 2007: <http://science.hq.nasa.gov/strategy/> and [http://nasascience.nasa.gov/about-us/science-strategy/Science\\_Plan\\_07.pdf](http://nasascience.nasa.gov/about-us/science-strategy/Science_Plan_07.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) – 2009”.
- In addition, proposer can visit the following URL: <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.

## **Space Operations Mission Directorate (SOMD)**

The primary research and technology development areas in SOMD 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:

- 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 (Kennedy Space Center (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))
- Processing and Operations
  - Crew Health and Safety Including Medical Operations (JSC)
  - In-helmet Speech Audio Systems and Technologies (GRC)
  - Vehicle Integration and Ground Processing (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))

### **C. Research Student Support**

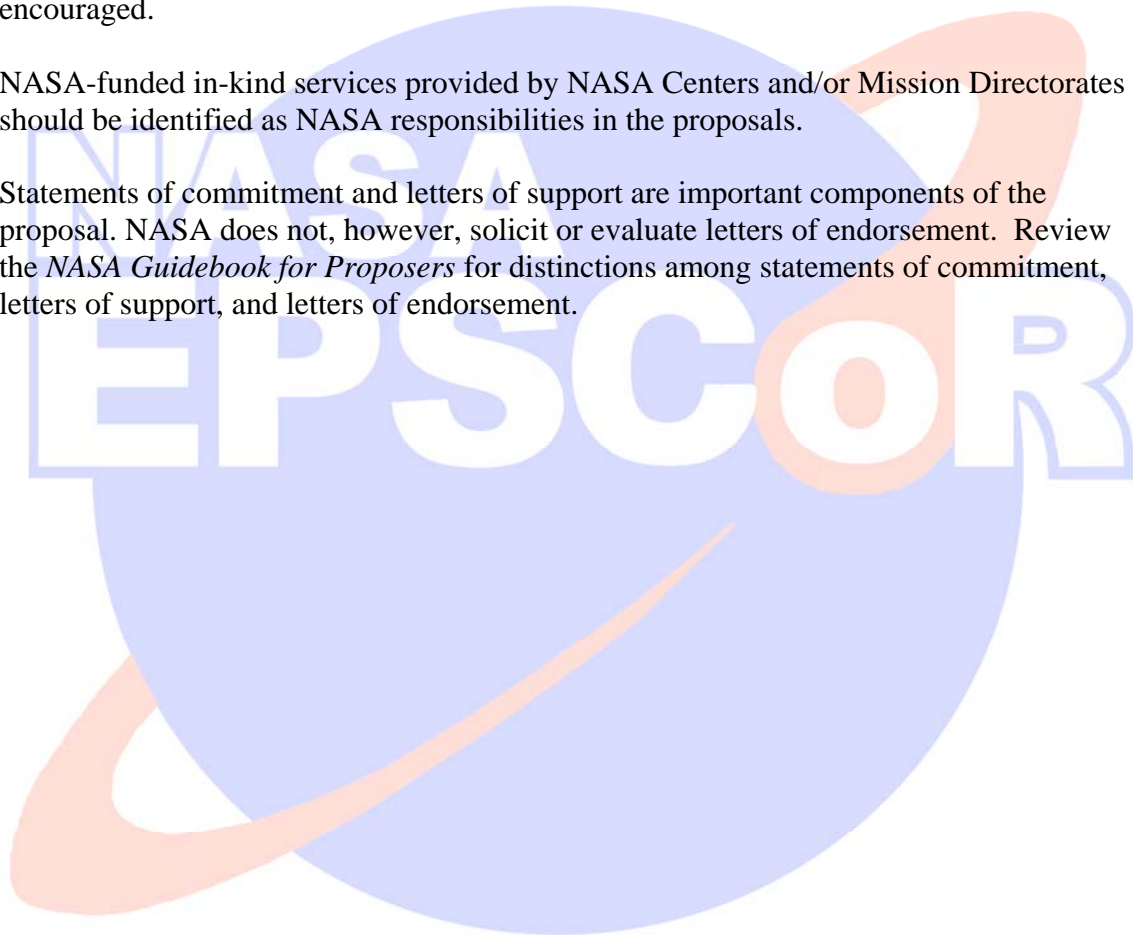
The use of NASA EPSCoR funds for support of research students is allowable, and must be detailed in the Budget Justification and described in the Evaluation Section of the proposal as well (see Section VIII. Proposal Evaluation Criteria and Selection Process).

#### **D. Partnerships and Interactions**

All institutions of higher education within the jurisdiction should be given the opportunity and must be made aware of the Arkansas NASA EPSCoR CAN 2011. All proposals must be submitted through the jurisdiction's NASA EPSCoR office. Dr. Keith Hudson as ASGC/NEP Director will be the over all Primary Investigator. Jurisdictions are strongly encouraged to submit proposals that demonstrate partnerships or cooperative agreements among academia, government agencies, business and industry, private research foundations, jurisdiction agencies, and local agencies. It is required to have a cooperative agreements with at least two campuses of higher education in the state. Partnerships with minority-serving institutions are strongly encouraged. Inclusion of faculty and students from underrepresented/underserved groups are also strongly encouraged.

NASA-funded in-kind services provided by NASA Centers and/or Mission Directorates should be identified as NASA responsibilities in the proposals.

Statements of commitment and letters of support are important components of the proposal. NASA does not, however, solicit or evaluate letters of endorsement. Review the *NASA Guidebook for Proposers* for distinctions among statements of commitment, letters of support, and letters of endorsement.



### III. Proposal Preparation and Submission

The required elements of the proposal as described below must be submitted as one PDF document to asgc@ualr.edu by 5:00pm on September 1, 2010.

Pre-Proposal Content	Page Guideline	Section and Appendix References
1. Table of Contents	1	Electronic Submission
2. <b>Project Description:</b> Provide a detailed description of the proposed research plan.	3-5	Electronic Submission
5. <b>Personnel:</b> Submit Principal Investigator's and Co-Investigator's (if proposal includes a co-investigator) vitae. Principal Investigator: 1-2 pages Co-Investigator : 1 page		Electronic Submission
<b>Proposed Cost Detail/Budget Narrative:</b> The budget section of the proposal cover page includes a budget breakdown for each year of the proposed work, on which total yearly budget figures and total budget figures shall be entered. In addition to the budget figure on the proposal cover page, a budget narrative by year for each of the 3 years should accompany the proposal. Include explanatory notes for each line item in the budget.	1-2	For Cost Narrative, Consult the "Notes on Budget" (page 14)

### IV. Proposal Evaluation Criteria and Selection Process

Successful research proposals are likely to be those that provide sound contributions to both immediate and long-term scientific and technical needs of NASA as explicitly expressed in current NASA documents and communications. It should also include pragmatic plans for generation of sustained non-EPSCoR support. Arkansas NASA EPSCoR will conduct initial review of the pre-proposals. We reserve the right to alter dates if NASA acts prior to these deadlines. State review will be conducted by the Technical Advisory Committee (TAC). Arkansas NEP expects to request full proposals from the top teams. This is subject to NASA's announcement. We reserve the right to change dollar amounts, award dates, number of selections, or any other items subject to NASA 2011 CAN.

## A. Evaluation Criteria

Evaluation criteria for EPSCoR are based on NASA's Education Operating Principles as described in *NASA Education Strategic Coordination Framework*. All NASA education programs are evaluated according to these principles:

- Relevance
- Content
- Diversity
- Evaluation
- Continuity
- Partnership/Sustainability

A detailed budget is required for all three years. A suggested format to use in preparing the proposed budget can be found at <http://genesis.gsfc.nasa.gov/grants/grants.htm#Grant> (click on Grant Budget Outline). All sources of matching should be carefully described and documented. A letter of commitment for match should accompany the pre-proposal. The budget will be evaluated based upon the clarity and reasonableness of the funding request. A short budget narrative should be included that discusses other budgetary issues such as the extent and level of jurisdiction, industrial, and institutional commitment and financial support, including resources (staff, facilities, laboratories, indirect support, waiver of indirect costs, etc.)

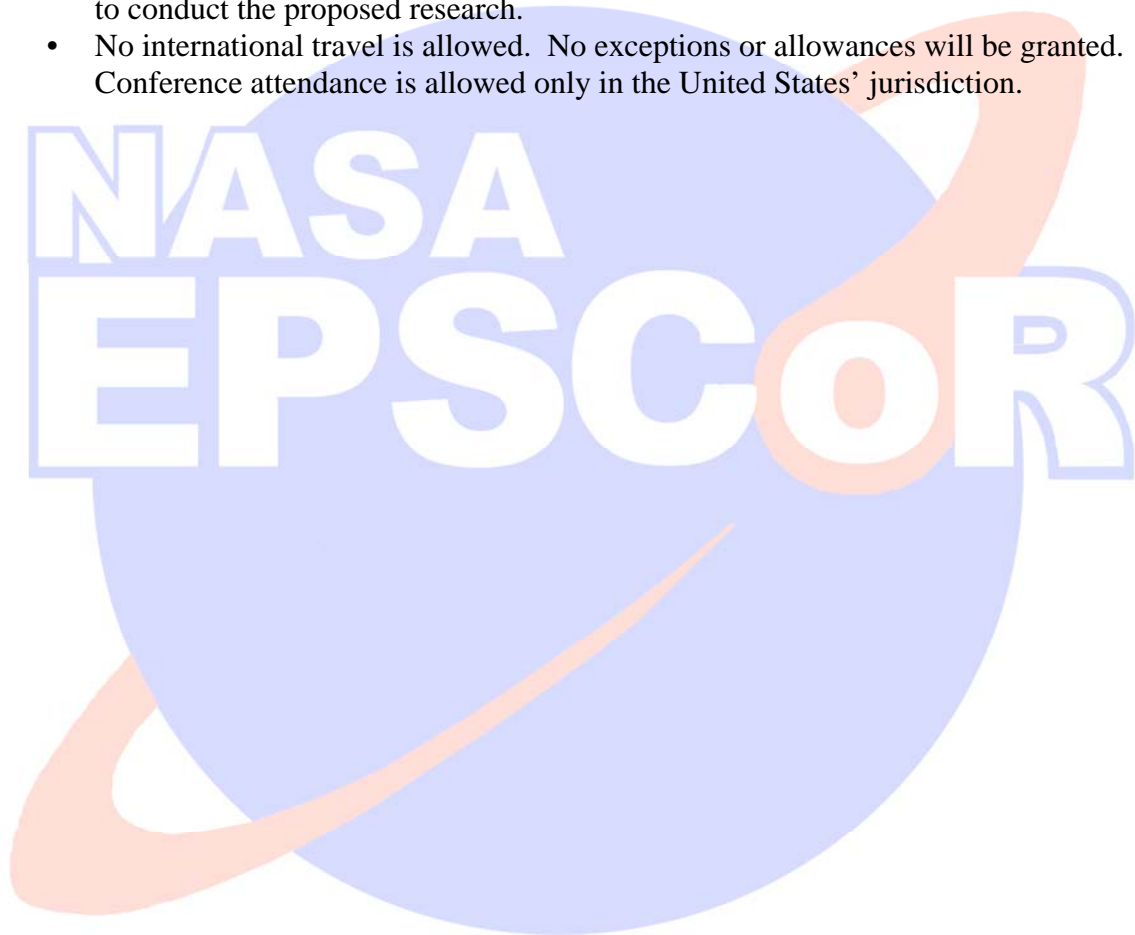
The proposed budget should be adequate, appropriate, reasonable, and realistic, and demonstrate the effective use of funds in alignment with the proposed program. This section should include detailed budgets for the three years of the \$645,000 research funding and a summary budget for all three years. All sources of matching should be described and documented. The proposed budget should reflect clear alignment with the content and text of the proposal. The budget should contain sufficient cost detail and supporting information to facilitate evaluation.

## B. Notes on Budget:

- The annual funding request for each research proposal should reflect a year-to-year distribution of funds that will give the project a strong start, but also sustain it at an effective level for the three-year period.
- There is no cap on the funds for individual sub-task areas. However, the total funds requested for the proposed research areas must be no greater than \$750,000 less \$90,000 for administration expenses.
- The proposed budget should contain sufficient cost detail and supporting information to facilitate a speedy evaluation and award. Dollar amounts proposed with no explanation (e.g., Equipment: \$12,000, or Labor: \$35,000) may reduce proposal acceptability, or cause delays in funding should the proposal be selected. Each item should be explained in reasonable detail.
- Direct labor costs should be separated by titles or disciplines (e.g., Principals Investigator, graduate research assistant, clerical support, etc.) with estimated

hours, hourly rates, and total amounts of each. Indirect costs should be sufficiently explained such that evaluators can understand the basis of the proposed costs.

- Other Costs (with each significant category detailed) should be explained in reasonable detail, and substantiated whenever possible. For example, proposed equipment purchases should specify the type of equipment, number of units, and unit cost. Requested domestic travel allowances should include the number of trips and expected location, duration of each trip, airfare, and per diem.
- Requested domestic travel should include purpose, the number of trips and expected location, duration of each trip, airfare, and per diem. There is no limit placed on domestic travel. Domestic travel should be appropriate and reasonable to conduct the proposed research.
- No international travel is allowed. No exceptions or allowances will be granted. Conference attendance is allowed only in the United States' jurisdiction.



## Appendix A

### NASA Mission Directorate and Center Contacts

Technical and scientific questions about research opportunities in this announcement may be directed to the appropriate contact below. Discussions of research with appropriate NASA Center or JPL personnel are strongly encouraged.

#### NASA Mission Directorate Contacts

<p>Aeronautics Research Mission Directorate          Tony Springer          Education Liaison          NASA Headquarters          Phone: (202) 358-0848          Tony.Springer@nasa.gov</p>	<p>Science Mission Directorate          Ming-Ying Wei          Program Manager          NASA Headquarters          Phone: (202) 358-0771          ming-ying.wei-1@nasa.gov</p>
<p>Exploration Systems Mission Directorate          Jerry Hartman          Education Lead          NASA Headquarters          Phone: (202) 358-1451          Jerry.G.Hartman@nasa.gov</p>	<p>Space Operations Mission Directorate          Carla Rosenberg          Education Liaison          NASA Headquarters          Phone: (202) 358-1734          carla.b.rosenberg@nasa.gov</p>

#### NASA Center Contacts

<p>Ames Research Center          Brenda Collins          University Affairs Officer          Phone: (650) 604-354          Brenda.J.Collins@nasa.gov</p>	<p>Kennedy Space Center          Hortense Burt          Education Projects Manager          Phone: (321) 867-8768          Hortense.B.Burt@nasa.gov</p>
<p>Dryden Flight Research Center          Miriam Rodón-Naveira          Education Lead          Phone: (661) 276-3647          Miriam.M.Rodon@nasa.gov</p>	<p>Langley Research Center          Lloyd Evans          University Affairs Officer          Phone: (757) 864-5209          Lloyd.B.Evans@nasa.gov</p>
<p>Goddard Space Flight Center          Vigdor (Vic) Teplitz          University Affairs Officer          Phone: (301) 286-0345          Vigdor.L.Teplitz@nasa.gov</p>	<p>Glenn Research Center          David Kankam          University Affairs Officer          Phone: (216) 433-6143          Mark.D.Kankam@nasa.gov</p>

<p>Jet Propulsion Laboratory  Linda Rodgers  University Programs Administrator  Phone: (818) 354-3274  linda.rodgers@jpl.nasa.gov</p>	<p>Marshall Space Flight Center  Frank Six  University Affairs Officer  Office of Academic Affairs (HS30)  Phone: (256) 961-7701  Norman.F.Six@nasa.gov</p>
<p>Johnson Space Center  Robert Musgrove  Manager, Higher Education and Student  Programs  Phone: (281) 483-3065  Robert.P.Musgrove@nasa.gov</p>	<p>Stennis Space Center  Nathan Sovik  University Affairs Officer  Phone: (228) 688-7355  Nathan.A.Sovik@nasa.gov</p>

