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ANNOUNCEMENT OF FEDERAL FUNDING OPPORTUNITY

EXECUTIVE SUMMARY

Federal Agency Name(s): National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce

Funding Opportunity Title: Next Round of Research to Operations Initiative: NOAA Testbeds

Announcement Type: Initial

Funding Opportunity Number: NOAA-NWS-NWSPO-2016-2004610

Catalog of Federal Domestic Assistance (CFDA) Number: 11.468, Applied Meteorological Research

Dates: Letters of Intent (LOI) are required for this announcement. LOI's summarizing anticipated yearly budget, project scope and NOAA testbeds and/or proving grounds partners must be received by 5:00 PM EST on January 19, 2016. LOIs should be submitted by email to christopher.hedge@noaa.gov.

Full proposals must be received by www.grants.gov, postmarked, or provided to a delivery service no later than 5:00 PM EST February 29, 2016. Use of U.S. mail or another delivery service must be documented with a receipt. Facsimile or electronic mail applications will only be accepted from federal applicants. Please note: validation or rejection of your application by grants.gov may take up to 2 business days after submission. Please consider this process in developing your submission timeline.

Funding Opportunity Description: This program announcement is for projects to be conducted for a two-year period with an anticipated start date of September 1, 2016 unless otherwise directed. All public or private sources may submit to this Federal Funding Opportunity; however, partnering with universities is highly encouraged. Eligible applicants are institutions of higher education; other nonprofits; commercial organizations; state, local and Indian tribal governments; and Federal agencies.

Applicants for this opportunity must work in partnership with NOAA testbeds and proving grounds (listed under www.testbeds.noaa.gov). NOAA's testbeds and proving grounds facilitate the orderly transition of research capabilities to operational implementation through development testing in testbeds, and pre-deployment testing and operational readiness/suitability evaluation in operational proving grounds.

The purpose of the NOAA Research to Operations (R2O) Initiative is to expand and accelerate

critical weather forecasting research to operations to address growing service demands and increase the accuracy of weather forecasts. This will be achieved through: (1) accelerated development and implementation of improved global weather prediction models and inclusion of the coupling among atmosphere, ocean, wave, land surface and ice system components; (2) improved data assimilation techniques; (3) nested regional prediction capabilities; (4) improved hurricane and tropical cyclone modeling techniques; (5) improved ensemble techniques; (6) post-processing forecast tools and techniques; and (7) improved software architecture and system engineering.

The NOAA R2O Initiative is soliciting proposals for projects involving applied science, modeling and/or data assimilation that supports development of effective assimilation for environmental observations at global and regional scales, and hurricane and other high-impact weather forecast models that meet societal requirements to effectively mitigate economic disruption. This notice provides guidelines for submission of proposals. This notice also describes opportunities and application procedures to demonstrate capabilities that have the potential to be incorporated into operational NWS numerical weather prediction (NWP) analyses and forecasts. The R2O initiative addresses NOAA's Weather Ready Nation (WRN) strategic goal and supporting objectives.

The Program also represents an NOAA/NWS effort to foster a cost-effective transition from basic and applied research to operations and services through collaborative research and developmental testing between institutions which have expertise in the environmental sciences and operational forecast scientists. These activities will engage researchers in applied research of interest with the operational meteorological community and will improve the accuracy of forecasts and warnings of environmental hazards by applying scientific knowledge and information to operational products and services.

FULL ANNOUNCEMENT TEXT

I. Funding Opportunity Description

A. Program Objective

Weather-Ready Nation (WRN) seeks to ensure a society that is able to prepare for and respond to environmental events that affect safety, health, the environment, the economy, and homeland security. Recent record-breaking snowfall, temperatures, drought, flooding, tornadoes and hurricanes have combined to inflict the greatest number of multi-billion dollar weather disasters in the Nation's history. Devastating impacts of extreme events can be reduced through improved readiness, which is why NOAA's National Weather Service (NWS) has established the WRN initiative to further reduce the Nation's weather-related vulnerabilities.

Despite NWS' consistent and solid performance, further efforts are required to mitigate the loss of life and property resulting from extreme and other high-impact weather events. Investment into an integrated, holistic, and probabilistic approach to service delivery with improved accuracy, lead time and confidence will strengthen our ability to mitigate the effects of significant weather events. Incorporation of targeted scientific developments and state-of-the-art technology into service delivery will allow stakeholders to better understand the likelihood of severe environmental events and improve their ability to effectively respond.

The purpose of the NOAA Research to Operations (R2O) Initiative is to expand and accelerate critical weather forecasting research to operations to address growing service demands and increase the accuracy of weather forecasts. This will be achieved through: (1) accelerated development and implementation of improved global weather prediction models and inclusion of the coupling of atmosphere, ocean, wave, land surface and ice system components; (2) improved data assimilation techniques; (3) nested regional prediction capabilities; (4) improved hurricane and tropical cyclone modeling techniques; (5) improved ensemble techniques; (6) post-processing forecast tools and techniques; and (7) improved software architecture and system engineering.

The R2O Initiative supports the expansion and acceleration of R2O activities associated with improving weather forecasts through improvements to NOAA's operational environmental prediction suite. Targeted improvements in the suite will result in multiple weather forecast service improvements. NWS has established the following objectives to accelerate weather forecasting skill:

- A Next Generation Global Prediction System (NGGPS) that meets the evolving national

prediction requirements

- Effective assimilation of environmental observations at global and regional scales
- A software architecture and engineered system that maximizes the benefit from high performance computing (HPC) and enabling quicker transition of internal and external research to operations
- Hurricane forecast models, such as the Hurricane Weather Research and Forecast System (HWRF), that meet societal requirements to effectively mitigate economic disruption
- High-impact and storm-scale weather forecast models to meet WRN objectives to effectively mitigate impacts of severe weather, flash floods, winter weather, severe convection, aviation weather and fire weather

To achieve a world class global predication system, NOAA plans to:

- Advance physical parameterizations for multiple scales to improve deterministic and probabilistic forecast guidance and explicitly account for uncertainty in parameterization formulation and in sub grid-scale quantities to enable physically-based diversity formulation in ensemble prediction
- Increase resolution of key environmental models to improve the specificity of forecasts;
- Improve coupling between component models such as atmosphere, ocean, land surface, ice, and coastal prediction systems
- Enhance ensemble prediction systems through the development of more physically based stochastic parameterizations, and through the development of methods that facilitate the extension of NOAA's global ensemble prediction system to 30 days (e.g., treatments of the effects of land- and ocean-surface uncertainty)
- Develop advanced data assimilation methods for increased usefulness of observations of large and vortex scale circulations at global and regional scales, especially for specific storms such as hurricanes in both global and high resolution (e.g., regional) hurricane modeling systems
- Develop effective nested modeling capabilities for storm-scale forecasts, with post-processing tools and techniques to provide effective decision support for high-impact weather
- Implement advanced scale-aware and stochastic physical parameterization schemes for accurate representation of multi-scale interactions in variable resolution global-to-local scale models
- Develop advanced high resolution ensemble based hurricane prediction systems and post-processing techniques to increase utility of numerical hurricane guidance for forecast applications
- Conduct data impact studies of future observing systems such as the next-generation satellites to enable both rapid incorporation of future observing systems data and guide observing systems strategies and requirements

- Build a high-performance, flexible software infrastructure to increase ease of use, performance, and interoperability
- Investigate effective use of emerging HPC technologies; simplification of software structure; and a community-based model infrastructure which will streamline the incorporation of proven research advances into operations
- Develop, test, and apply methods for improving next-generation global reanalyses
- Refine post-processing methods for key variables such as surface temperature, winds, precipitation, and precipitation type
- Develop post-processing methods for the 15-30 day period and the data sets needed to support them (retrospective surface analyses and re-forecasts)
- Develop effective diagnostic packages that can be used as tools for model development, model evaluation, and model inter-comparison

NOAA's testbeds and proving grounds facilitate the orderly transition of research capabilities to operational implementation through development testing in testbeds, and pre-deployment testing and operational readiness/suitability evaluation in operational proving grounds. Applicants for this opportunity must work in partnership with NOAA testbeds and proving grounds (listed under www.testbeds.noaa.gov).

Successful projects are expected to demonstrate capabilities that have the potential to provide promising near term improvements to NOAA’s operational environmental prediction suite and forecaster applications. This would be accomplished by NOAA personnel through transition of applicable and transferrable research modeling and data assimilation applications into development of NGGPS, operational hurricane forecast models and/or operational assimilation of environmental observations within two-three years after completion of the funding period.

Projects to be funded will involve both research and operational environmental models and data assimilation techniques. Proposals that involve model or data assimilation development should include a plan for testing and evaluating the new capabilities. A hierarchy of testing should be proposed, ranging from demonstration of at least comparable performance to existing model capabilities, to case studies, to multi-season tests to demonstrate achievement of benchmarks in objective, subjective and engineering readiness required for transition to operations. The latter comprehensive tests can be conducted by NWS in collaboration with the Principal Investigator (PI). Preference will be given to those proposals that include interactions with NCEP, other NWS and/or NOAA scientists, demonstrate adequacy of the metrics proposed for testing and evaluation, effectively leverage and partner with NOAA testbeds/proving ground capabilities, and quantify potential impact of the project on NCEP’s operational predictions (see Evaluation Criteria 1 and 3). NCEP is currently developing

updated documentation for its global model and a preliminary version of this documentation will be made available to PIs . NCEP is developing a more user-friendly interface for running experiments with its operational models. Access to this interface will be provided to PIs as it becomes available.

B. Program Priorities

A companion Federal Funding Opportunity (FFO: NOAA-NWS-NWSPO-2016-2004713) includes a specific call for general model developments, data assimilation and ensemble/post-processing techniques, specifically for advancement in representation of atmospheric model physical processes through coupling with land, ocean, waves, sea ice and aerosols. The companion FFO includes development of physically based parameterizations for applications that span a wide range of spatial scales from cloud and convective permitting resolutions (~1 km) to horizontal resolutions used in climate applications (~100 km). The range of space and time scales covers many unique high-impact weather events for which improved predictions will serve as a basis for enhanced services/benefits to the nation.

Priorities under this funding opportunity are for testing service impacts of proposed model advances for predicting high-impact weather over several key time frames for decision support. The following specific topics are the highest priorities related to the broader themes stated in Section A for projects involving NOAA testbeds and proving grounds. Proposals are expected to have a strong promise of results supporting development of the Next Generation Global Prediction System, and improvement of forecast capabilities for high-impact weather in several time ranges critical for decision support: out to 3 days, days 6-10, and for weeks 3-4.

The priorities under this FFO are:

1. Advances in forecasts for days 6-10
NWS provides detailed weather forecasts out to 7 days. However, there is intense demand and interest in extending daily weather forecasts to ten days, with impacts for high-impact weather (e.g. winter weather, heavy precipitation, tropical cyclones, severe convective weather and other phenomena of critical importance to society) and associated mitigation decisions in that time-frame. The NGGPS investment in coupling atmospheric and oceanic models, improving data assimilation, and increasing resolution will result in extending the range of skillful model forecasts. However, even with the very best modeling system, there is a need to evaluate the new NGGPS guidance from objective and subjective perspectives in the Day 6-10 time-frame, with particular focus on high-impact weather, including intense precipitation events, winter weather, and extreme heat/cold. Further, there is a need to translate the raw model guidance into consistent, actionable products and services for

decision makers. Testing activities that leverage for example the Hydrometeorological Testbed capabilities will help close these gaps by evaluating skill and effectiveness for decision support of proposed forecast information over this time range.

1a. Advances are also needed in the hurricane and tropical storm prediction subsystem, especially forecast tools and applications that help to reduce hurricane intensity errors, including improvements in assimilation of observations and initialization procedures. Testing activities leveraging the capabilities of the Joint Hurricane Testbed to improve NOAA's actionable intelligence for decision makers will receive priority.

2. Advances in forecasts for weeks 3-4
Currently, NOAA/NWS does not issue explicit week 3 to 4 forecast products operationally, although there is great demand from a wide-variety of stakeholders for such forecasts. Forecasts for this time band lie outside our current understanding of the limit of predictability for initial weather forecasts as was initially documented by Ed Lorenz and subsequently verified in numerous studies. Forecasts for this time band also lie at the intersection between possible enhancement to forecast skill due to the representation of atmosphere-ocean coupling and possible degradation in forecast skill due to biases associated with coupled feedback between the atmospheric and oceanic models. Finally, forecasts at this time range are generally characterized as having a small signal and large noise. Therefore, there are a large number of science questions (gaps) that need to be answered in order to ultimately produce useful forecast products for our stakeholders. These include the atmosphere-ocean coupling strategy, statistical correction/calibration methods, extraction of information from ensemble forecasts and associated reforecasts via post-processing methods, and evaluation of forecast value in the context of specific decision making tools. Testing activities leveraging the capabilities of the Climate Testbed can help close these gaps by first evaluating the potential skill and proposed improvements for forecasts at these timescales to achieve reliably useful operational forecast products.

3. Advances in forecasts for high-impact weather: days 0-3
This includes advances in storm-scale, fire weather and convective/severe weather prediction. On small scales this involves applying nearly all the other aspects of NWP improvement listed here - prediction model, physics, ensembles, and data assimilation; but at the smallest scales which must push below 1 km grid spacing, and at the highest frequency possible. The latter is driven by the volatile nature of the phenomena and the need for forecast guidance to be refreshed with observations to reflect rapidly changing conditions and circumstances. Concepts of continual data assimilation (4D Hybrid Ensemble Variational but perpetually in core) and on demand predictions must be considered. Update frequency for data assimilation must be in terms of minutes and since every piece of

information will be needed, minimizing latency and improving quality control will continue to be critical challenges. Since ensembles of the highest resolution are required, the computer requirements will grow substantially and will most likely be provided centrally. This will necessitate highly efficient and portable, placeable, movable solutions within the NGGPS.

One critical need to support daily forecasts of high impact weather events, including tornado outbreaks, flash floods and major aviation disruptions due to thunderstorms, is for a rigorously formulated, operationally executed convection allowing ensemble. Investment in super computing resources will enable initial establishment of this capacity, but success will require systematic experimentation that leverages NOAA testbeds, such as the Hazardous Weather Testbed, to enable effective collaboration between model developers, specialized forecast centers, and the research community with a focus on establishment of an optimal ensemble design. Design elements include the selection and refinement of appropriate dynamic cores, scale and phenomena appropriate physics, and ensemble perturbation strategy, with appropriate coupling to and leveraging of global scale predictive systems. A key first step will be to refine and test forecast evaluations (verification) systems for measuring success on convective scales, including establishing robust metrics for diverse United States high impact weather service challenges, to support effective modeling system improvement cycles and to measure overall project success. Establishment of a storm-scale ensemble prediction system is essential to support United States goals for a Weather Ready Nation, and to enable next-generation severe storm warning capacities referred to as Warn-on-Forecast. Proposed projects that leverage testing capabilities such as the Hazardous Weather Testbed or Aviation Weather Testbed, can advance these capabilities.

C. Program Authority

Authority for this program is provided by the following: 15 U.S.C. 313; 49 U.S.C. 44720 (b); 33 U.S.C. 883d; 15 U.S.C. 2904; 15 U.S.C. 2934

II. Award Information

A. Funding Availability

The total funding amount available for all proposals is anticipated to range from $600,000 to $1,000,000. Funding is subject to availability. The maximum award that can be requested is $200,000 total cost per year per proposal. Proposals over $200,000 per year will be returned to the applicant and rejected. Individual award amounts are expected to range from $100,000 to $200,000 per year with a maximum funding request of two years. Funding amounts (including renewal amounts) and duration are subject to change based on budgetary and performance considerations. Only one proposal per principal investigator at a

given institution may be funded. The Federal Program Officer can reduce, in consultation with the R2O Project Officer, the amount allocated for any award due to budgetary or programmatic considerations. Some proposals that have not been selected for funding under this announcement of opportunity may be asked to resubmit their applications via grants.gov for other competitive NOAA funding opportunities.

B. Project/Award Period

This program announcement is for projects to be conducted for a two-year period with an anticipated start date of September 1, 2016 unless otherwise directed. When a proposal is approved, funding will initially be provided for only the first year of the program. If an application is selected for initial funding, the R2O Initiative has no obligation to provide additional funding in connection with that award for the following year. Funding for the following years is at the discretion of the R2O Initiative managers, and can be adjusted (increased or decreased) individually. It will be also be contingent upon satisfactory progress in relation to the stated goals of the proposal to address specific science needs and priorities of the R2O Initiative, and subject to the availability of funds. Applications must include a sufficiently detailed scope of work and a detailed budget for the entire multi-year award period. Semi-annual progress reports will be required from the PI's as well as a final closeout report. The project office can also request additional reports. Selected projects may be reviewed by the R2O Program Office yearly to assess progress, funding constraints, and impact on the R2O priorities listed in this funding opportunity.

Continuation review is based on the following criteria: (1) degree of progress toward meeting the original milestones in the proposal timeline; and, (2) the potential for completing testing and evaluation or providing evidence of potential contribution to development of NGGPS by the end of the second year. Given a favorable review, each project may be funded for second year. In certain situations, circumstances material to the stated objectives of the proposal may change sufficiently to require a modification to some aspect of the original proposal. The awardee may be asked by the R2O program office to address these concerns, and the program office will evaluate the adequacy of the awardees' response.

A project reaches its completion in one of two ways. A multi-year project may end after approximately one year if the R2O Program Manager (with input from the review panel) decides, as described above, that insufficient progress has been made to justify continuation of the project into year two. A funded project would end successfully with the submission by the principal investigator(s) of a final report at the conclusion of the original agreed-upon project duration that convincingly shows the potential of research to contribute to the progress of NGGPS goals, and be described in a manuscript for a peer-reviewed publication within two to three years after the completion of funding.

C. Type of Funding Instrument

The funding instrument for non-Federal applicants will be a Cooperative Agreement. NOAA cooperative research activities provide financial support to enhance the public benefits to be derived from these research activities and engage NOAA scientists and other personnel for frequent consultation and advice. Proposals must collaborate with NOAA testbed activities and include interactions with NCEP scientists and/or NOAA scientists, demonstrate adequacy of the metrics proposed for testing and evaluation, and quantify the potential impact of the project on NWS operations.

Proposals from NOAA scientists selected for funding shall be effected by an intra-agency fund transfer. Proposals from a non-NOAA Federal agency selected for funding will be funded through an inter-agency transfer. PLEASE NOTE: Before non-NOAA Federal applicants may be funded, they must demonstrate that they have legal authority to receive funds from another Federal agency in excess of their appropriation. The only exception to this is governmental research facilities for awards issued under the authority of 49 USC 44720(b). Because this announcement is not proposing to procure goods or services from applicants, the Economy Act (31 USC 1535) is not an appropriate legal basis.

NOAA collaborates on cooperative research activities and provides financial support to enhance the public benefits to be derived from these research activities. NOAA envisions that project testing and evaluation will involve close collaboration, facilitated by the NWS staff, between program-funded researchers and operational center forecasters and point(s) of contact. For example, operational forecasters may actually run or utilize output from the experimental technique during their operational shifts or at other times, and they may then provide direct feedback to the researchers for possible modifications.

If the applicant is a university that has a NOAA Joint or Cooperative Institute (CI), the institution is encouraged to submit a proposal on behalf of the CI. The proposal must specify the name of the CI, its award number, and the NOAA-approved research theme applicable to the work to be performed in the proposal's project narrative. The proposal will use the facilities and administrative rate (F&A or Indirect cost rate) associated with the main CI award.

If the proposal is selected for funding, NOAA will notify the university that a separate competitive award will be issued with its own award number. However, the competitive award will include a Special Award Condition (SAC) that evidences the link between it and the CI award. The SAC would provide that: (1) the university has submitted the proposal on behalf of the CI; (2) the existing university/NOAA Memorandum of Agreement (MOA) will

be incorporated by reference into the terms of the competitive award; and (3) any progress report(s) for the competitive award must follow the timetable of and be submitted by the CI directly to the funding program. Copies of these progress reports will be attached to the CI's performance report as an appendix.

III. Eligibility Information

A. Eligible Applicants

1. Eligible Sources

All public or private sources may submit to this Federal Funding Opportunity; however, partnering with universities is highly encouraged. Eligible applicants are institutions of higher education; other nonprofits; commercial organizations; state, local and Indian tribal governments; and federal agencies. Applicants for this opportunity must work in partnership with NOAA testbeds and proving grounds (listed under www.testbeds.noaa.gov). An eligible organization may submit more than one application (from different principal investigators per II.A).

2. Foreign Participants

Foreign participants and/or individuals may participate to the extent that such participants comply with any necessary Non-Disclosure Agreements, Security Regulations, and any other applicable statutes. Some requirements may cover export-controlled technologies. Research in these areas is limited to "U.S. persons" as defined in the International Traffic in Arms Regulations (ITAR), 22 CFR §1201.1.

3. Federally Funded Research & Development Centers (FFRDCs)

Federally Funded Research & Development Centers (FFRDCs), including Department of Energy National Laboratories, are not eligible to receive awards as lead investigators under this FFO. However, teaming arrangements between FFRDCs and eligible principal bidders are allowed to the extent that such an arrangement is permitted under the sponsoring agreement between the Government and the FFRDC.

4. Laboratories

Federal laboratories are eligible to receive awards as lead investigators under this FFO, only for proposals to work in partnership with NOAA testbeds and proving grounds. As with FFRDCs, these organizations may team with responsible sources from academia and industry that are submitting proposals under this FFO.

5. University Affiliated Research Centers (UARCs)

University Affiliated Research Centers are eligible to submit proposals under this FFO

unless precluded from doing so by their UARC contracts with the Government.

6. Teaming
Teams are also encouraged and may submit proposals in any and all areas. However, partners that are ineligible as lead investigators may not exceed 70% of the funded work. Offerors must be willing to cooperate and exchange software, data and other information in an integrated program with other project participants.

Federal/external partnerships should send only 1 proposal to grants.gov from the external partner (such as a university or Cooperative Institute) as the lead investigator. Budget proposals should detail the portion of the proposal that will fund the federal partners including staff time and equipment (including salaries). If investigators from multiple partners are listed, then the contributions and budgets for each must be clearly indicated. Government agencies must partner with a NOAA testbed to be eligible. Applications which are exclusively from Federal agencies should be submitted directly to: christopher.hedge@noaa.gov

Collaborations with PIs at different universities are allowed, but there must be a single application from a lead university with subawards to the participants from other institutions. Other arrangements will not be considered.

B. Cost Sharing or Matching Requirement

No cost sharing is required under this program.

C. Other Criteria that Affect Eligibility

none.

IV. Application and Submission Information

A. Address to Request Application Package

The standard application package is available at http://www.grants.gov. Federal applicants are asked to follow the Content and Form of Application described in section IV. B. and submit proposals by email to christopher.hedge@noaa.gov.

B. Content and Form of Application

1. Letters of Intent (LOI)
The purpose of the LOI process is to provide information to potential applicants on the relevance of their proposed project and the likelihood of it being funded in advance of

preparing a full application. An applicant must submit an LOI by the indicated LOI deadline in order to be eligible to submit a full application. Full applications will be encouraged only for LOIs deemed relevant; however, the final decision to submit a full application is made by the investigator. The LOI should summarize anticipated yearly budget, project scope and NOAA testbeds and/or proving grounds partners, and be no more than 2 pages in length. LOIs will be reviewed by the R2O Associate Program Director. Letters or emails to discourage or encourage a full proposal are scheduled to be sent about 2 weeks after the LOI due date.

2. Applications
Proposals should total no more than 25 pages in length, single spaced including the title page and abstract. The description of the project should total no more than 15 pages in length. Descriptions exceeding the 15 page limit will only be reviewed up to the page limit. Excess material will not be reviewed and may result in the proposal receiving a lower score. It is strongly recommended that Times New Roman 12 point font, or an equivalent size, be used. Federally mandated forms, tables of contents, and any letters of support are not included within the page count, but all other information is. Each proposal must be dated and contain page numbers.

Multi-year proposals up to a maximum of two years will be considered; however, funding beyond the first year will be strictly dependent upon satisfactory performance and the availability of funds. The starting date is expected to be September 1, 2016 on all proposals unless otherwise directed by the R2O Program Manager. The R2O Program Manager may delay the start of selected awards due to budgetary or other exigent circumstances.

The application elements listed below are required before an award can be made. Failure to submit elements a, d, and e by the deadline will result in the application not being reviewed if the omissions are not corrected prior to the deadline. The program office will make an effort to notify the applicant of any omissions, but there is no guarantee this can occur prior to the application deadline. Proposals not meeting the content requirements listed in this section may be rejected and returned to the applicant. The aforementioned application elements are as follows:

a. Title Page. The title page must be officially authorized by the institutional representative. The PIs and institutional representative(s) should be identified by full name, title, organization, telephone number, and address. Please include the correct email for the principal investigator and any other proposal manager. The title page should clearly indicate which priority area(s) are being addressed and the total amount of requested funding per year. Federal funds should be listed for each budget period.

b. Abstract Page. An abstract should be included and should contain an introduction of the problem, rationale, and a brief summary of work to be completed. The abstract should appear on a separate page, headed with the proposal title, institution's investigators, targeted program priority area(s) in Section I. B., total proposed cost, and budget period as well as the NOAA organizations sought for collaboration.

c. Results from Prior Research. The results of relevant projects supported by NOAA and other agencies should be described, including their relation to the currently proposed work. Prior research that demonstrated the potential to favorably impact and/or successfully transition operational environmental modeling and data assimilation system(s) should be emphasized. Reference to each prior research award should include the title, agency, award number, PIs, period of award, and total award. This section should be a brief summary and should not exceed two pages total.

d. Project Description. The proposed project must be completely described in a statement of work including identification of the problem, scientific objectives, proposed methodology that includes a testing and evaluation approach, metric(s) for success, project deliverables and a time line with key milestones. The statement of work should also include: relevance to the priorities of the R2O Initiative; maturity of science and operational applicability as described Sections I. A. and I. B.; scientific merit; proposed technology transfer (if any); and cost effectiveness of research. Benefits of the proposed project to improve operational environmental forecasts should be discussed. A year-by-year summary of proposed work milestones must be included. Specific collaboration with NOAA testbed and proving ground scientists and technical personnel should be detailed. The project description should be no more than 15 pages in length. Descriptions exceeding the 15 page limit will only be reviewed up to the page limit. Excess material will not be reviewed and may result in the proposal receiving a lower score.

e. Budget and Proposed Budget Justification. Applicants must submit a Standard Form (SF) 424, Application for Federal Assistance, including a detailed budget using the SF 424A, Budget Information--Non-Construction Programs. (The forms are available on grants.gov.) Please pay careful attention to show the yearly budget breakout on the SF 424A for two-year proposals. In addition, the body of the proposal should include a separate table showing total and annual budgets (if multi-year) corresponding with the project description. Additional text to justify expenses should be included as necessary. PIs are strongly encouraged to plan and budget during each year of the project for attendance of a yearly workshop at NCEP in College Park, Maryland to describe their work. At the time of submission, each competitive proposal application package submitted by a NOAA

Cooperative Institute (CI) PI that has been approved by the University must include a cover letter describing the intent to incorporate the terms of the CI Memorandum of Agreement (MOA). The cover letter will specify the name of the Cooperative Institute, the current CI cooperative agreement number, and the NOAA-approved research theme and task that applies to the proposal.

f. Vitae. Abbreviated curriculum vitae are sought with each proposal. Reference lists should be limited to all publications in the last three years with up to five other relevant papers.

g. Current and Pending Support. For each investigator, submit a list which includes project title, supporting agency with grant number, investigator months, dollar value, and duration. Requested values should be listed for pending support.

h. This program does not require any NEPA questions to be answered as part of the application.

i. If your proposed activities do not generate any environmental data, your application is still required to have a data sharing plan. Such a data sharing plan could include the statement that “this project will not generate any environmental data”. The data sharing plan does not count towards the 15-page maximum for the project description. For additional information, see Section VI. B. 4. for detailed administrative and national policy requirements on the data sharing plan.

j. Also required as part of the NOAA Standard Non-Construction Application Package: Standard Form 424B (Assurances - Non-Construction Programs), and Form CD-511 (Certification Regarding Lobbying). Standard Form LLL (Disclosure of Lobbying Activities) is optional.

C. Unique entity identifier and System for Award Management (SAM)

D. Submission Dates and Times

The deadline for receipt of proposals at the NOAA/NWS office is 5:00 PM EST, February 29, 2016 unless directed otherwise through a change to this announcement in grants.gov. For proposals submitted through grants.gov, a date and time receipt indication is included and will be the basis of determining timeliness. Hard copy proposals must be postmarked or provided to a delivery service no later than 5:00 PM EST, February 29, 2016. Proposals received after the deadline will be rejected and returned to the sender without further consideration.

Letters of Intent (LOI) are required for this announcement. LOIs summarizing anticipated yearly budget, project scope and NOAA testbeds and/or proving grounds partners must be received by 5:00 PM EST on January 19, 2016. LOIs should be submitted by email to christopher.hedge@noaa.gov. Full applications will be encouraged only for LOIs deemed relevant; however, the final decision to submit a full application is made by the investigator.

E. Intergovernmental Review

Applications under this program are not subject to Executive Order 12372, Intergovernmental Review of Federal Programs.

F. Funding Restrictions

Funding beyond the first year will be dependent upon satisfactory performance and the continued availability of funds. No more than one award per Principal Investigator will be awarded under this competition.

G. Other Submission Requirements

The standard application package is submitted through http://www.grants.gov. Federal applicants should submit proposals by email to christopher.hedge@noaa.gov. For organizations without internet access, proposals may be sent to: Christopher Hedge, NOAA/NWS, 1325 East-West Highway, Room 15328, Silver Spring, MD 20910, phone: 301-427-9242, email: christopher.hedge@noaa.gov. Letters of intent should be emailed to christopher.hedge@noaa.gov.

V. Application Review Information

A. Evaluation Criteria

The R2O reviewers will base their recommendations regarding each proposal upon the extent to which the following criteria (listed with assigned weights) are satisfied:

1. Importance and/or relevance and applicability of proposed project to the program goals (30 points): This criterion ascertains whether there is intrinsic value in the proposed work and/or relevance to NOAA, Federal, regional, State or local activities. For this competition, this includes the following questions:
a. What is the likelihood of the proposed science activities to improve operational environmental analyses and/or forecasts?
b. Are proposed research activities easily transitioned to development of NGGPS, to

improvement of the operational hurricane prediction subsystem or to enabling of effective operational assimilation of environmental observations in a reasonable time frame, e.g., within two to three years upon completion of funding?
c. What is the degree of collaboration with NOAA testbeds and proving grounds, and relevant operational centers throughout the project?
d. What is the level of planning by researchers to test and evaluate proposed modeling advancements to meet operational model and/or data assimilation skill standards for potential transition into operations successfully and efficiently?

2. Technical/Scientific Merit (30 points): This criterion assesses whether the approach is technically sound and innovative, if the methods are appropriate, and whether there are clear project goals and objectives. For this competition this includes:
a. What is the intrinsic scientific value and maturity of the subject and the study proposed as they relate to the specific science priorities?
b. Were focused scientific objectives and strategies, including data management considerations, and project milestones used?

3. Overall Qualification of Applicants (25 points): This criterion ascertains whether the applicant possesses the necessary education, experience, training, facilities, and administrative resources to accomplish the project. For this competition, this includes:
a. Do PIs have required expertise and experience to carry out proposed work?
b. Do PIs clearly document past scientific collaborations with operational modeling scientists or operational weather forecasters that contained potential to improve operational forecasts?
c. Have past interactions with NOAA been successful?
d. Are researchers likely to maintain effective and consistent interactions with NOAA testbeds, including NCEP, other NWS and/or NOAA modeling scientists or operational weather forecasters throughout the course of the proposed research program?
e. Have researchers demonstrated the ability to conduct successful research?

4. Project Costs (15 points): This criterion evaluates the budget to determine if it is realistic and commensurate with the project needs and time-frame. For this competition, this includes:
a. Do researchers demonstrate the ability to build upon existing expertise/capabilities?
b. Is there a high ratio of operationally useful results versus proposed costs?

5. Outreach and Education (0 points):
This criterion assesses whether the project provides a focused and effective education and outreach strategy regarding NOAA's mission to protect the Nation's natural resources. This competition does not use this criterion.

B. Review and Selection Process

An initial administrative review/screening is conducted to determine compliance with requirements and for completeness. All proposals will be evaluated and scored individually by a group of at least three professionally and technically qualified reviewers in accordance with the assigned weights of the above evaluation criteria by independent peer mail review and/or by independent peer panel reviews. Reviews will be conducted by scientific experts, primarily representing operational environmental modeling, data assimilation, service improvements and forecast communities. The merit reviewers' ratings and comments are used to produce a rank order of the proposals for final consideration by the R2O program office. The Selecting Official selects proposals after considering the peer panel reviews and selection factors listed below. In making the final selections, the Selecting Official will award in rank order unless the proposal is justified to be selected out of rank order based upon one or more of the selection factors that can be influenced by strategic imperatives of the R2O initiative.

C. Selection Factors

Merit review ratings shall provide a rank order to the Selecting Official for final funding recommendations. The Selecting Official shall award in the rank order unless the proposal is justified to be selected out of rank order based upon one or more of the following factors:
1. Availability of funding.
2. Balance/distribution of funds by (a) geographical balance, (b) type of institutions, (c) type of partners, (d) research areas, and (e) project types.
3. Duplication of other projects funded or considered for funding by NOAA/federal agencies.
4. Program priorities and policy factors.
5. Applicant's prior award performance.
6. Partnerships with and participation of targeted groups.
7. Adequacy of information necessary for NOAA staff to make a NEPA determination and draft necessary documentation before recommendations for funding are made to the Grants Officer.

D. Anticipated Announcement and Award Dates

Subject to the availability of funds, review of proposals will occur during March-April 2016, and funding should begin by September 2016 for most approved projects. Assumed start date for funded projects will be September 1, 2016, unless otherwise directed by the R2O Program Manager.

VI. Award Administration Information

A. Award Notices

Successful applicants will receive notification that their application has been recommended for funding by the NOAA Grants Management Division. This notification is not an authorization to begin performance of the project. Official notification of funding from the NOAA grants officer is the authorization that allows the project to begin. Notification will be issued to the Authorizing Official of the project either electronically or in hard copy. Unsuccessful applicants will be notified that their proposals were not selected for recommendation by the program office.

B. Administrative and National Policy Requirements

1. The Department of Commerce Pre-Award Notification Requirements for Grants and Cooperative Agreements: Administrative and national policy requirements for all Department of Commerce awards are contained in the Department of Commerce Pre-Award Notification Requirements for Grants and Cooperative Agreements contained in the Federal Register notice of December 30, 2014 (79 FR 78390). A copy of the notice may be obtained at http://www.gpoaccess.gov/fr/search.html.
2. Limitation of Liability: In no event will NOAA or the Department of Commerce be responsible for application preparation costs. Publication of this announcement does not oblige NOAA to award any specific project or to obligate any available funds.
3. National Environmental Policy Act (NEPA): NOAA must analyze the potential environmental impacts, as required by the National Environmental Policy Act (NEPA), for applicant projects or proposals which are seeking NOAA federal funding opportunities. Detailed information on NOAA compliance with NEPA can be found at the following NOAA NEPA website: http://www.nepa.noaa.gov/, including our NOAA Administrative Order 216-6 for NEPA, http://www.osec.doc.gov/bmi/daos/216-6.htm, and the Council on Environmental Quality implementation regulations, http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm. Consequently, as part of an applicant's package, and under their description of their program activities, applicants are required to provide detailed information on the activities to be conducted, locations, sites, species and habitat to be affected, possible construction activities, and any environmental concerns that may exist (e.g., the use and disposal of hazardous or toxic chemicals, introduction of non-indigenous species, impacts to endangered and threatened species, aquaculture projects, and impacts to coral reef systems). In addition to providing specific information that will serve as the basis for any required impact analyses, applicants may also be requested to assist NOAA in drafting an environmental assessment, if NOAA determines an assessment is required. Applicants will also be required to cooperate with NOAA in identifying feasible measures to reduce or avoid any identified adverse environmental impacts of their proposal. The failure to do so shall be grounds for not selecting an application. In some cases, if additional

information is required after an application is selected, funds can be withheld by the Grants Officer under a special award condition requiring the recipient to submit additional environmental compliance information sufficient to enable NOAA to make an assessment on any impacts that a project may have on the environment.

4. Data Sharing Plan: Environmental data and information collected and/or created under NOAA grants/cooperative agreements must be made visible, accessible, and independently understandable to general users, free of charge or at minimal cost, in a timely manner (typically no later than two (2) years after the data are collected or created), except where limited by law, regulation, policy or security requirements.

a. Unless otherwise noted in the federal funding announcement, a Data/Information Sharing Plan of no more than two pages shall be required. A typical plan should include descriptions of the types of environmental data and information created during the course of the project; the tentative date by which data will be shared; the standards to be used for data/metadata format and content; policies addressing data stewardship and preservation; procedures for providing access, sharing, and security; and prior experience in publishing such data. The Data/Information Sharing Plan will be reviewed as part of the NOAA Standard Evaluation Criteria, Item 1 -- Importance and/or Relevance and Applicability of Proposed Project to the Mission Goals.

b. The Data/Information Sharing Plan (and any subsequent revisions or updates) must be made publicly available at time of award and, thereafter, will be posted with the published data.

c. Failing to share environmental data and information in accordance with the submitted Data/Information Sharing Plan may lead to disallowed costs and may be considered by NOAA when making future award decisions.

5. Unpaid or Delinquent Tax Liability: In accordance with current Federal appropriations law, NOAA will provide a successful corporate applicant a form to be completed by its authorized representatives certifying that the corporation has no Federally-assessed unpaid or delinquent tax liability or recent felony criminal convictions under any Federal law.

6. Federal Funding Accountability and Transparency Act of 2006: This includes a requirement for awardees of applicable Federal grants to report information about first-tier subawards and executive compensation under Federal assistance awards issued in FY 2011 or later. All awardees of applicable grants and cooperative agreements are required to report to the Federal Subaward Reporting System (FSRS) available at www.FSRS.gov on all subawards over $25,000.

7. Universal Identifier: To enable the use of a universal identifier and to enhance the quality of information available to the public as required by the Federal Funding Accountability and Transparency Act of 2006, to the extent applicable, any proposal awarded in response to this announcement will be required to use the Central Contractor Registration and Dun and Bradstreet Universal Numbering System and be subject to reporting requirements, as

identified in OMB guidance published at 2 CFR Parts 25, 170 (2013), http://www.ecfr.gov/cgi-bin/text-idx?SID=1ccffb4c1d4de03addd6a041113460f9&mc=true&node=se2.1.200_1300&rgn=div8
8. Indirect Cost Rate: If an applicant has not previously established an indirect cost rate with a Federal agency, they may choose to negotiate a rate with the Department of Commerce or use the de minimis indirect cost rate of 10% of MTDC (as allowable under 2 C.F.R. §200.414). The negotiation and approval of a rate is subject to the procedures required by NOAA and the Department of Commerce Standard Terms and Conditions Section B.06. The NOAA contact for indirect or facilities and administrative costs is: Lamar Revis, Grants Officer NOAA Grants Management Division email: lamar.revis@noaa.gov
9. FOIA: In the event that an application contains information or data that you do not want disclosed prior to award for purposes other than the evaluation of the application, you should mark each page containing such information or data with the words "Privileged, Confidential, Commercial, or Financial Information - Limited Use" at the top of the page to assist NOAA in making disclosure determinations. DOC regulations implementing the Freedom of Information Act (FOIA) are found at 5 U.S.C 552, which sets forth rules for DOC to make requested materials, information, and records publicly available under FOIA. The contents of funded applications may be subject to requests for release under the FOIA. Based on the information provided by you, the confidentiality of the content of funded applications will be maintained to the maximum extent permitted by law.

C. Reporting

Award recipients will be required to submit periodic financial and technical performance progress reports. These reports are to be submitted electronically through the NOAA Grants Online system on a semi-annual or more frequent basis as prescribed in the conditions of the award unless the recipient does not have internet access, in which case hard copy submissions will be accepted. All financial reports are routed directly to the NOAA Grants Officer. Performance reports are routed to the NOAA Program Officer. Annual or other episodic reporting may be requested by the R2O Program Office.

VII. Agency Contacts

The point of contact is: Christopher Hedge, NOAA/NWS, 1325 East-West Highway, Room 15328, Silver Spring, MD 20910, phone: 301-427-9242, email: christopher.hedge@noaa.gov. Questions concerning this announcement must be made via email to the point of contact. Questions and NOAA responses will be made public via the web at: http://www.nws.noaa.gov/ost/cstar.htm.

VIII. Other Information

To use grants.gov, applicants must have a Dun and Bradstreet Data Universal Numbering System (DUNS) number and be registered in the Central Contractor Registry (CCR). Allow a minimum of five days to complete the CCR registration. [Note: Your organization's Employer Identification Number (EIN) will be needed on the application form.] Applicants are strongly encouraged not to wait until the application deadline date to begin the application process through grants.gov.