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: Collaborative Science, Technology, and Applied Research (CSTAR) Program

Announcement Type: Initial

Funding Opportunity Number: NOAA-NWS-NWSPO-2010-2001696

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

Dates: Full proposals must be received and validated by Grants.gov, postmarked, or provided to a delivery service on or before 5 p.m. EDT, October 16, 2009. 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. Applications received after the deadline will be rejected/returned to the sender without further consideration. Use of U.S. mail or another delivery service must be documented with a receipt. No facsimile or electronic mail applications will be accepted.

Funding Opportunity Description: The CSTAR Program represents an NOAA/NWS effort to create a cost-effective transition from basic and applied research to operations and services through collaborative research between operational forecasters and academic institutions which have expertise in the environmental sciences. These activities will engage researchers and students in applied research of interest to 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. The NOAA CSTAR Program is a contributing element of the U.S. Weather Research Program (USWRP). NOAA's program is designed to complement other agency contributions to that national effort. The CSTAR Program addresses NOAA's Mission Goal 3--Serve society's needs for weather and water information.

FULL ANNOUNCEMENT TEXT

I. Funding Opportunity Description

A. Program Objective

The long term objective of the CSTAR Program is to improve the overall forecast and warning capabilities of the operational hydrometeorological community by addressing the following science and technology themes through collaborative research efforts between the NWS and academic institutions:

Warn on Forecast for High Impact Events: Decision support services will be enhanced by developing the capability to issue short-fused warnings/alerts before the phenomena actually occur. This concept, called "Warn on Forecast," advances the idea of warnings/alerts issued with greater lead times, allowing decision makers the opportunity to make better, more informed choices across the spectrum of High Impact Events.

Next Generation Forecast System: Decision support services will be enhanced by developing a next generation forecast system that will provide an increasing number of environmental and uncertainty fields in a high spatial and temporal resolution four-dimensional gridded database. The forecast database will support core operational services and be used as input to external user decision support systems. The forecast database would represent the best, quality-controlled state of current and forecast environmental conditions.

Integrated Observing and Analysis System: Decision support services will be enhanced by developing a robust next generation "Integrated Observing and Analysis System" to produce the best "state of the environment" and serve as the basis for future forecast systems such as "Warn on Forecast" and the "Next Generation 4-D Forecast System."

Decision Support Information Systems: Operational weather and water services will evolve from a role of disseminating data and products to one of interactive sharing of weather and climate environmental information for the primary goal of providing decision support to community leaders, partners and the public.

Integrating Social Science into Weather and Water Research and Operations: Operational decision support services will be enhanced by improving the ability to assess, understand, and meet customer needs and determine the value those services provide through the integration of social science in its research and operational programs.

Individual NWS Regions and the National Centers for Environmental Prediction (NCEP) service centers have developed a set of science priorities that complement these science and technology themes but differ due to differences in factors such as topography,

weather regimes, and mission.

B. Program Priorities

NOAA will give sole attention to individual proposals addressing the identified science priorities from NWS Regions and National Centers for Environmental Prediction (NCEP) service centers as listed below or which directly address or incorporate solutions to science issues complementing the NOAA Hydrometeorogical Testbed (HMT) effort. Proposals must clearly specify which primary science priorities are being addressed.

A proposal must contain at least two distinct subtasks addressing one or more of the science priorities listed. Principal investigators (PIs) must clearly address the science and technology transfer process contained within the proposal. This includes their interactions with operational NWS units, including Weather Forecast Offices, River Forecast Centers, NCEP service centers, and regional offices, with the specific goal of improving operational services.

The names, affiliations, and phone numbers of relevant focal points are provided. Prospective applicants should communicate with these focal points for further information on priorities. Focal points cannot assist in the conceptual design and specific elements to be included in a proposal. Applicants must submit completed proposals to the NOAA/NWS through the grants.gov portal rather than to individual focal points.

1. NWS Eastern Region Science Priorities

Development of techniques to incorporate the effects of the region's unique geomorphic features such as the Appalachian Mountains, Atlantic Seaboard, and the Great Lakes into operational forecast and warning services. This includes the impacts of these features on the type, amount, and intensity of precipitation, and the interaction of these terrain features with large scale weather systems such as winter storms, hurricanes, and closed lows.

Development of improved, region-specific conceptual models for tornado, hail, high wind (both convective and synoptic), flash flood, and localized heavy snow events. Such development should include detailed investigation of the roles of mesoscale phenomenon such as gravity waves, thermal and moisture boundaries, and localized instabilities during these events.

Development of improved detection and warning techniques for low-topped severe convection and associated tornado development, and pulse convection events.

Improved understanding of cloud physics and associated microphysical processes associated with determining precipitation type, snowfall efficiency, and extreme rainfall rates and the development of associated advanced techniques for forecasting these

phenomena.

Improved understanding and modeling of snow melt and river ice formation and break-up processes.

Improved forecasts and warnings of severe weather and heavy precipitation during tropical cyclone events.

Improved storm surge forecasts and coastal flood warnings during tropical cyclone and extratropical storm events.

Improved wind and wave forecasts for the Atlantic coastal zone (within 60 nm including the various bays and sounds along the Atlantic seaboard), and the Great Lakes.

Improved understanding and modeling of cloud physics and associated microphysical processes associated with fog, ceilings, clouds bases, cloud tops, and surface visibility, and associated advanced techniques for forecasting these phenomena.

Development of new techniques to utilize lightning information in the forecast and warning process.

Development of innovative approaches to formulate, produce, display, and deliver high resolution digital forecasts and products for the heavily populated eastern United States.

Development of new techniques to utilize high resolution surface analysis grids to verify and evaluate digital forecasts.

Development of new techniques to more effectively and efficiently utilize information from ensemble prediction systems in the forecast process.

Development of innovative methodologies to communicate forecast uncertainties to a wide variety of users.

FOR FURTHER INFORMATION CONTACT: Kenneth Johnson, NOAA/NWS/Eastern Region Scientific Services Division, 631-244 0136, or by email at Kenneth.Johnson@noaa.gov.

2. NWS Southern Region Science Priorities

Develop methodologies to help forecasters effectively utilize new dual-polarization radar data to improve severe weather warnings (mainly hail detection) and flash flood forecasting (through better quantitative precipitation estimates).

Investigate methods and techniques to utilize high resolution analysis and modeling capabilities to extend short-term prediction of severe convective storms out to 30 minutes to

an hour ("Warn on forecast").

Development of improved techniques for the prediction of freezing and frozen precipitation events in the NWS Southern Region, including timing, areal extent, intensity and amount.

Development of techniques to produce and implement effective short term cloud-to-ground lightning "alerts", particularly for use by public safety officials.

Improved understanding and monitoring/forecasting of extreme rainfall events associated with weak tropical cyclones or remnants of tropical cyclones.

Development of improved techniques to observe and forecast near-shore wind and waves in the coastal environment.

Improved understanding of the influences of the topographical surface forcing in the southern Appalachians, the Texas Hill Country, the Mexican Plateau, the Gulf Coast and the mountains of Puerto Rico on weather problems such as type, amount, duration and intensity of precipitation and resultant flash flooding.

Improved methodologies to predict the onset and duration of low clouds and restrictions to visibilities resulting in adverse effects on marine and aviation interests.

Improved methodologies for detection and warning of "tropical" tornadoes associated with inland moving tropical cyclones.

Development of techniques to improve hydrologic modeling and prediction for Southern U.S. rivers and streams, including calibration of models, improved distributive modeling techniques, and improved soil moisture accounting.

Development of "smart systems" to improve first-guess population of forecast grids and intelligently monitor the local WFO gridded database.

FOR FURTHER INFORMATION CONTACT: David "Rusty" Billingsley, NOAA/NWS/Southern Region Scientific Services Division, 817-978-1300, or by email at david.billingsley@noaa.gov.

3. NWS Central Region Science Priorities

Development of improved methods for forecasting severe convective storms (specifically tornado development, hail 1 inch diameter or greater and convective winds in excess of 60 mph).

Development of improved methods for forecasting low-topped severe convection.

Development of improved methods for forecasting non-supercell tornadoes.

Development of improved methods for forecasting cloud-to-ground lightning.

Development of improved methods for forecasting high impact weather events through the use and development of numerical models, and the application of model ensemble techniques in the forecast process.

Development of methodologies for the use of dual-polarimetric Doppler weather radar and other multi-sensor technology to detect precursor conditions and enhance forecast capabilities for improved warnings.

Development of improved diagnostic methodologies to interrogate remotely sensed data (radar, satellite, etc.).

Development of improved methods for forecasting precipitation type and winter precipitation accumulation amounts.

Development of improved methods for forecasting the onset and dissipation of conditions contributing to IFR flying conditions and low level wind shear.

Develop improved methods for providing 2-way, interactive decision support tools for decision makers and forecasters .

Develop improved methods for communicating weather and water information to the public and decision makers which incorporates forecast uncertainty.

FOR FURTHER INFORMATION CONTACT: Peter Browning, NOAA/NWS/Central Region Scientific Services Division, 816 268 3110, or by email at Peter.Browning@noaa.gov

4. NWS Western Region Science Priorities

Priorities stated in section related to the preparation of NWS digital forecast products above, with a focus on complex mountainous terrain and coastal environment.

Improve acquisition and use of non-NWS observational networks, such as mesonets.

Improve analysis through better assimilation systems that produce more realistic analysis in complex terrain and coastal areas.

Identify and help improve the relationship of public safety and economic impacts due to significant meteorological and hydrological events in the mountainous western U.S.

In the West, water is a critical and closely managed resource. Improve operational precipitation (snow/rain as it varies with elevation) and hydrological forecasts in complex

terrain across a wide range of western U.S. meteorological regimes.

Improve hydrological modeling, through use of emerging techniques, such as distributed hydrologic modeling, of rain/snow melt processes in complex terrain.

Improve fire-weather forecasts and smoke dispersion in the western United States.

FOR FURTHER INFORMATION CONTACT: Andy Edman, NOAA/NWS/Western Region Scientific Services Division, 801-524-5131, or by email at andy.edman@noaa.gov.

5. NWS Alaska Region Science Priorities

Improve the accuracy (probability of detection) and lead time for high impact weather events by better understanding the predictability of these events by numerical models and the application of model ensemble techniques in the forecast process.

Developing a climatology of sea ice, ocean waves, air and water temperature, wind speed and direction, and permafrost to aid in forecasting impacts of storms on coastal erosion in Alaska.

Improve the utilization of numerical guidance in the forecast process by developing more efficient and effective methodologies to display, review, and interrogate numerical model output in an operational environment.

Improve the quality of weather services to the public through the development of new and innovative forecast methodologies and products, including innovative methodologies to communicate forecast uncertainties to a wide variety of users. Improve the quality of numerical model analyses and forecasts in the North Pacific and over Alaska, including improved data assimilation techniques, characterization of the arctic and marine boundary layers, and processes related to the ocean-atmosphere-cryosphere interfaces.

FOR FURTHER INFORMATION CONTACT: Carven Scott, NOAA/NWS/Alaska Region Environmental and Scientific Services Division, 907-271-5131, or by email at carven.scott@noaa.gov.

6. NWS Pacific Region Science Priorities

Use Geographic Information Systems technology to display, analyze, and process hydrometeorological forecast and observational data.

Develop techniques to assess and improve forecasts of tropical cyclone intensity in the Pacific.

Optimize the utility of new and existing observing systems, with emphasis on satellites and their use in providing precipitation estimations.

Develop, optimize, and utilize local high resolution modeling capabilities aimed at providing operational real time guidance as well as a tool for locally conducted research.

Conduct Pacific Basin synoptic climatological studies, with emphasis on flash-flood and high wind events.

FOR FURTHER INFORMATION CONTACT: Bill Ward, NOAA/NWS/Pacific Region Environmental Scientific Services Division, 808-532-6415, or by email at bill.ward@noaa.gov.

7. NWS National Centers for Environmental Prediction Science Priorities

Hydrometeorological Prediction Center (HPC): Improve understanding and forecast methodologies for extreme rainfall events, including application of high-resolution modeling and ensemble approaches.

Develop improved techniques to assess aspects of daily model forecasts (6h - 7day lead times), including model initializations, forecast trends, physical realism, and bias.

Develop operational feature-based verification techniques applied to model and human forecasts.

Develop techniques to modify gridded numerical guidance to produce gridded forecast products, which are made horizontally, vertically, and temporally consistent using sound meteorological theory.

Develop better techniques to incorporate uncertainty derived from short and medium range ensembles forecasts into the forecast process and convey this uncertainty to users of HPC products.

Develop improved techniques for the prediction of freezing and frozen precipitation events (timing, areal extent, intensity, and amount).

Develop better understanding and application of climate-weather connections (e.g., MJO, NAO, PNA, etc.) to improve medium range forecasts.

Ocean Prediction Center: Improve use of all sources of surface marine observations in data assimilation for numerical weather prediction.

Improve numerical weather prediction of marine boundary layer.

Improve numerical weather prediction of explosive extratropical cyclogenesis.

Improve numerical weather prediction of hazardous mesoscale marine conditions in the vicinity of the Gulf Stream.

Storm Prediction Center: Develop mesoscale or storm scale numerical prediction models, ensemble approaches, and verification techniques to improve forecasts of the location, timing, intensity, and mode of deep moist convection and its associated hazards.

Develop three dimensional mesoscale analysis techniques, observing systems, expert systems or statistical guidance, robust conceptual models, and scientific understanding to improve forecasts of the location, timing, intensity, and mode of deep moist convection and its associated hazards.

Develop operational techniques to synthesize, view, and analyze total lightning, determine its association to convective weather types, and develop total lightning forecast techniques and products.

Develop techniques to observe and integrate in real-time the detailed 4-dimensional evolution of atmospheric water vapor, blending multi-sensor data from satellite, radar, aircraft, and other remote sensing sources (e.g., GPS, WSR-88D refractivity, TAMDAR, WVSS, and RASS), and develop new operational display and analysis tools to accurately depict the distribution of water vapor for use in convective forecasting.

Aviation Weather Center: Evaluation and analysis of verification techniques to understand which parameters are most useful and usable to AIRMET and SIGMET verification.

Development and implementation of tools for the conversion of cloud height observations and forecasts from height above ground to height above sea level for the diagnosis and forecast of mountain obscuration.

Triggers to the production of moderate or greater turbulence outside regions under convective SIGMETs, rather arbitrarily divided into three height-based regimes:

-Boundary layer (turbulence impacts surface to ~ 2 kft above the top of the boundary layer)

-Mid level (turbulence impacts from top of boundary layer to FL180)

-High level (turbulence impacts above FL180)

-Evaluation and analysis of global convection detection and monitoring techniques with time scales of one hour or less.

-Evaluation and analysis of model and ensemble diagnostic fields specific to enroute aviation forecasts (e.g., Ellrod index, TKE, CIP, FIP, GTG, RAP ICE, etc.)

Climate Prediction Center: Develop physically based techniques to improve the prediction skill of weekly (e.g., 6-10 Day, Week 2, Week 3, Week 4), monthly, and seasonal

precipitation and temperature, including regional climate prediction systems. Methods may include improving dynamic and coupled models and model ensembles, as well as combining output from multiple models and super-ensembles.

Develop improved national and global forecasts of seasonal climate variability through better understanding of the couple atmosphere/ocean system and the effects of climate variations on that coupling and on ensemble systems.

Improve the ability of climate models to capture the statistics of weather, and the linkage between climate variability and weather extremes.

Improve objectivity and verification techniques for U. S. and international Threats Assessments which cover time scales from several days to multiple seasons. Threats include all extreme weather and climate phenomena such as droughts, floods, storms, hurricanes, cold, heat.

Develop comprehensive modeling of land surface hydrology to the benefit of physical understanding, and improved hydrological forecasts in all seasons and improved seasonal temperature and precipitation forecasts in the warm half year.

Develop improved methods for predicting and using, short and long time scale variability in seasonal climate forecasting, e.g., the Arctic Oscillation and the Madden Julian Oscillation. This may also include investigation of possible interaction between troposphere and stratosphere and the long-term aspects of ozone change and climate trends/change in general.

Develop improved and collaborative methods for diagnosing, evaluating and comparing climate model output.

Develop improved drought monitoring and seasonal drought outlook techniques.

Improve seasonal hurricane outlooks through improved understanding of the impacts of intraseasonal and decadal scale variability on tropical storm activity.

Tropical Prediction Center: Improve understanding and guidance on tropical cyclone intensity change, with highest priority on the onset, duration and magnitude of rapid intensification events for tropical cyclones.

Identify, understand, and then reduce guidance and official track forecast error of outlier storms, focusing on both large speed errors (e.g., accelerating "recurvers" and stalling storms) and large direction errors (e.g., loops and tropical cyclones like Mitch (1998) and Keith (2000)).

Develop statistically based real time "guidance on guidance" for track, including multi

model consensus approaches, "super ensembling", etc. Provide guidance to forecasters in probabilistic and other formats.

Space Environment Center: Improve use of all sources of solar-terrestrial observations in data assimilation for numerical space weather prediction.

Improve numerical space weather prediction of solar particle events.

Improve numerical space weather prediction of geomagnetic storms.

Improve numerical space weather prediction and specification of the radiation belts.

Investigate the feasibility and develop methods for integrating space weather products into operation data processing and display systems.

(Note: In all instances, projects are encouraged which not only address the priorities of individual NCEP service centers but also address aspects of the NCEP/Environmental Modeling Center's goals for improving data assimilation and numerical modeling of the atmosphere, oceans, and Earth's surface.)

FOR FURTHER INFORMATION CONTACT: Dennis Staley, NOAA/NWS/NCEP, 301-763-8000 ext. 7007, or by email at Dennis.Staley@noaa.gov.

8. Scientific Priorities and Regional Demonstrations Related to the NOAA HMT

The NOAA HMT (http://hmt.noaa.gov/) is designed to bring the research and operational communities together in a common framework to accelerate research and development in the hydrometeorological sciences and enhance their infusion into daily forecasting operations. It is a national strategy that is being implemented regionally. HMT-West is presently active in Northern California, centered on the American River Basin near Sacramento. Planning is presently underway to establish a second testbed in North Carolina (centered on the Tar-Neuse River Basins) and is projected to begin in 2011.

HMT focuses on six major activity areas:

- Quantitative Precipitation Estimation (QPE)

- Quantitative Precipitation Forecasts (QPF)

- Snow Level and Snow Pack

- Hydrologic Applications and Surface Processes

- Decision Support Tools

- Verification

Up to two proposals addressing these major activity areas will be given consideration for support. Funding for these proposals will be provided by the USWRP through the CSTAR announcement. Proposals engaging HMT partners (as listed on the web site), focused on the aforementioned basins, and/or using existing HMT infrastructure are encouraged.

FOR FURTHER INFORMATION CONTACT: Tim Schneider, NOAA/ESRL, 303-497-5160, or by email at Timothy.Schneider@noaa.gov.

9. Scientific Priorities for the Office of Hydrologic Development

Demonstrate the use of innovative remote sensing techniques for soil moisture and demonstrate the application of soil moisture observations to improve streamflow simulation skill with distributed hydrologic models, both for flash flood application and long-term (seasonal) hydrologic forecasting. If interested in submitting a proposal addressing this issue, it should be coordinated through the contacts listed above.

C. Program Authority

Authority for the CSTAR 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 proposals is anticipated to be approximately $750,000. However, there is no appropriation of funds at this time and no guarantee that there will be. Individual annual awards in the form of cooperative agreements are limited to a maximum of $125,000 per year for no more than three years. We anticipate making 4-6 awards.

B. Project/Award Period

This program announcement is for projects to be conducted by university investigators for a 1-year, 2-year, or 3-year period, with an anticipated start date of May 1, 2010 unless otherwise directed. When a proposal for a multi-year award is approved, funding will initially be provided for only the first year of the program. If an application is selected for initial funding, the NWS has no obligation to provide additional funding in connection with that award in subsequent years. Funding for each subsequent year of a multi-year proposal is at the discretion of the NWS. It will be contingent upon satisfactory progress in relation to the stated goals of the proposal to address specific science needs and priorities of the NWS and the availability of funds. Applications must include a scope of work and a budget for the entire award period.