Fiscal Year (FY) 2018 Verification of the Origins of Rotation in Tornadoes Experiment in the Southeast U. S. (VORTEX-SE), and Infrasound Detection of Tornadoes

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ANNOUNCEMENT OF FEDERAL FUNDING OPPORTUNITY

EXECUTIVE SUMMARY

Federal Agency Name(s): Oceanic and Atmospheric Research (OAR), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce

Funding Opportunity Title: Fiscal Year (FY) 2018 Verification of the Origins of Rotation in Tornadoes Experiment in the Southeast U. S. (VORTEX-SE), and Infrasound Detection of Tornadoes

Announcement Type: Initial

Funding Opportunity Number: NOAA-OAR-OWAQ-2018-2005511

Catalog of Federal Domestic Assistance (CFDA) Number: 11.459, Weather and Air Quality Research

Dates: Full application packages must be submitted through Grants.gov no later than 5:00 p.m. Eastern Time (ET) on Thursday April 12, 2018. Expected project start date is September 1, 2018.

Funding Opportunity Description: This research funding opportunity is being jointly issued by the NOAA OAR Office and Weather and Air Quality (OWAQ) and the National Severe Storms Laboratory (NSSL). It seeks to obtain new knowledge of the meteorological and infrasound aspects of tornadoes in the southeastern United States (U. S.) and the social and behavioral aspects of the public response to tornado forecasts and tornado events. This new knowledge will improve our ability to understand, forecast and warn the public of tornadoes and elicit appropriate responses to mitigate damage, injuries, and loss of life. For the first time in the life of the Program, this year VORTEX-SE places an emphasis on obtaining improved understanding of the processes at play that produce tornadoes in tropical cyclone outer rainbands, as well as during the tropical-extratropical transition over land.

There will be three separate competitions with three funding pools from this announcement, two for VORTEX-SE (addressing 1) the meteorological or social/behavioral priorities and 2) multi-discipline topics addressing both meteorology and social/behavioral priorities), and one for the infrasound category. Proposals in each category will be separated into independent pools based on these focus areas as specified by the Principal Investigators for the purposes of peer review, ranking, and funding.

FULL ANNOUNCEMENT TEXT

I. Funding Opportunity Description

A. Program Objective

Verification of the Origins of Rotation in Tornadoes Experiment in the Southeast United States (VORTEX-SE) is a research program intended to improve tornado forecasts and warnings in the southeastern United States (defined below) by obtaining new knowledge of atmospheric processes that are conducive to tornadoes, and of special importance, in the Southeast. This will be achieved through examination of historical data, special datasets collected in the field as supported by VORTEX-SE, and the application of state-of-the-art numerical weather prediction and data assimilation systems. Further, VORTEX-SE will explore avenues for more effectively communicating tornado forecasts to the public, and evaluate aspects of public risk perception and response to these forecasts in order to more effectively mitigate damage, injuries, and loss of life from tornadoes.

When examining measures of the threat posed by tornadoes to life and property, the southeastern U. S. has six of the eight most vulnerable states. Some of the vulnerability is due to issues such as a relatively large proportion of the population residing in mobile homes, which are known to be unsafe even in moderate strength tornadoes. Another above-normal risk in the Southeast is that many tornadoes occur during nighttime hours, associated with over half the deaths and injuries. Further, tornado casualties are disproportionately in the late fall and winter months, which are not typically associated with tornadoes according to conventional understanding or public perception, and they often occur under conditions of marginal thermodynamic instability but very strong vertical wind shear. Hence, there are many issues in the continuum spanning meteorological understanding to public awareness and perception that must be addressed in order to reduce the high tornado vulnerability in the Southeast.

There is much to be learned about tornadoes associated with landfalling tropical cyclones (TC) and hurricanes. In the United States, TC-spawned tornadoes have been reported within 400 km of the coast from Texas to Maryland. Estimated damage costs attributed to TC tornadoes totaled over $100 million in 2005 alone. The 2017 Atlantic hurricane season was very active, with two landfalling TCs – Hurricanes Harvey and Irma – producing substantial impacts in Texas, Louisiana, and Florida, leading to significant loss of life and property. While many of the impacts associated with the landfall of these storms were concentrated along the immediate coastline (e.g., storm surge, strongest sustained winds), tornado impacts were evident further inland and compounded the danger imposed by widespread flooding. This resulted in a very challenging warning dissemination problem for the National Weather

Service. In the case of Irma, dozens of tornado warnings were issued along the entire Florida Peninsula and damaging wind gusts were embedded within its rain bands, resulting in a perilous situation that lasted several hours in many locations. For these reasons, VORTEX-SE will be placing a much greater emphasis on the TC tornado problem than ever before.

THREE CATEGORIES OF FUNDED PROJECTS

The projects that NOAA will support through this Federal Funding Opportunity (FFO) fall into three categories (VORTEX-SE Type 1, VORTEX-SE Type 2, and Infrasound) as discussed below. Principal investigators must identify which one of these categories their project predominantly falls in since the proposals will be separated, ranked, and selected from the separate proposal pools in separate competitions with separate funding sources:

1) VORTEX-SE: The VORTEX-SE topics pertain to research in the physical, social, behavioral, and economic sciences to improve the ability to forecast, detect, communicate threat information, and reduce vulnerability to tornadoes in the Southeast U. S. There will be two separate competitions for this VORTEX-SE category in each of these two sub-categories: a) Type 1 single-discipline (e.g. atmospheric science, economics), and b) Type 2 multi-discipline or interdisciplinary. Type 2 proposals will uniquely combine at least one of the physical science objectives (see I.B.1.a-e) and one of the Social, Behavioral, and Economics science (SBE) objectives (see I.B.1.f-h). As such, Type 2 proposals are required to have, at a minimum, one physical science Principal Investigator (PI), and one SBE PI. Please note, however, that proposals may also include PIs that represent other disciplinary perspectives, such as structural engineering or biology, for example.

The goal of Type 2 proposals is to embrace an integrated, multi-disciplinary approach to address the objectives. Reviewers of proposals from these two pools will utilize slightly different evaluation criteria, but it should be noted that two criteria (see Sec. V.A.1) address the degree to which a Type 2 proposal utilizes investigators from different disciplines and the degree to which the proposal uniquely combines cross-discipline VORTEX-SE objectives. The purpose of this new two-type approach to proposal classification is to provide an incentive to broaden research into interdisciplinary activities, as well as to accommodate the larger costs that are often involved with interdisciplinary proposals.

2) Infrasound understanding, detection, and warning of tornadoes: This second topic focuses more narrowly on infrasound data collection and applications to the understanding, detection, and warning for severe thunderstorms and tornadoes (including tornadoes generated by land-falling hurricanes) using infrasound techniques.

Details of each of these competitions are described below.

1. VORTEX-SE COMPETITIONS

a) Background Information

Science planning in VORTEX-SE is carried out by a Scientific Steering Committee (SSC). This committee monitors new findings from VORTEX-SE grants, and in the field in general, and annually reassesses the research opportunities that can most efficiently provide benefit to the Southeast. The latest VORTEX-SE Science Plan can be found at http://www.nssl.noaa.gov/projects/vortexse/science2018.pdf. All interested parties are encouraged to join the VORTEX-SE community in the annual workshops and participate in the evolution of the scientific agenda.

For purposes of this competition, the “southeast U.S.” is considered to be a region of enhanced threat of tornado mortality that owes to a combination of meteorological and socioeconomic factors. This region includes mainly the states of Arkansas, Louisiana, Mississippi, Tennessee, Kentucky, Alabama, and Georgia. VORTEX-SE is increasing its emphasis on tornadoes associated with landfalling tropical cyclones, and this emphasis pertains to all of the mainland coastal areas and adjacent inland areas along the Gulf of Mexico and Atlantic northward to the Carolinas.

Experience gained from the first two years of sponsored research in the field indicate that meteorological fields relevant to forecasting tornadoes in the Southeast vary significantly on scales smaller than 100 kilometers during active severe weather episodes, and that important tornado outbreak events have been missed by restricting the focus to just the springtime. Hence, the SSC has recommended that meteorological observing campaigns focusing on “mesoscale variability” span the “cool season” from October to April, as opposed to only taking measurements during the springtime. Doing so should provide sufficient data to assess the mesoscale variability, understand its causes, and test the ability of convection-allowing numerical prediction models to represent those processes correctly, by comparing model forecasts made with and without the supplementary field datasets. This approach of an ongoing commitment to obtain high quality data sets on various special topics every year is intended to build an archive of information to advance our understanding of the Southeast tornado problem, from which research grants can provide new knowledge synergistically, organically, and asynchronously.

In the broadest terms, this FY2018 VORTEX-SE funding opportunity emphasizes: 1) the analysis of existing data sets; 2) the reduction of project risk through addressing specific

issues that must be resolved prior to future research and field campaigns; 3) the mesoscale variability in the near-storm environment through a new “Mesoscale 2018-2019” or more succinctly, “Meso18-19” field project (described more below); 4) social science research in vulnerability, forecast and communication processes, and risk perception; and 5) interdisciplinary approaches and efforts exhibiting a clear pathway toward eventual operational implementation. The meaning of the term “interdisciplinary” in the context of this FFO is purposely kept broad, not to be exclusively physical/social science interactions. However, those specific kinds of studies are given particular emphasis in this announcement; particularly as new knowledge can be applied to improving operational weather forecast and warning services, resulting in lives saved. Interdisciplinary and “Research-to-Operations” efforts are strongly encouraged.

Proposals to this program are restricted to the topics listed below in Sec. I.B.1. The topic descriptions are intentionally broad in order to allow prospective investigators as much freedom as possible to pose novel and innovative approaches. To allow prospective investigators to see the ideas and priorities identified by the Scientific Steering Committee, which are broadly encapsulated in the topics in Sec. I.B.1, the on-line VORTEX-SE Science Plan should be consulted. The Science Plan provides additional insights regarding the science topics, including working group reports that were used to inform the generation of the science topics.

Using guidance from the VORTEX-SE Scientific Steering Committee, the topics were selected by NOAA based upon the maturity of the ideas developed by the community, their timeliness with respect to other research objectives within a multi-year context, and their relevance to the NOAA mission.

b) Spring 2018 Observations

VORTEX-SE has obtained valuable research quality data sets in its first two field campaigns in spring 2016 and 2017, and will obtain additional Doppler radar and environmental data in March-April 2018. This solicitation welcomes proposals that utilize these existing and anticipated data sets to advance our understanding of Southeast tornado-related phenomena. The existing 2016 and 2017 data sets can be obtained at the VORTEX-SE data archive at http://catalog.eol.ucar.edu/vortex-se. The purposes of the planned Spring 2018 measurement campaign, which is very limited in its scope compared to previous VORTEX-SE field campaigns, are to: 1) develop techniques for integrating airborne and ground-based multiple Doppler radars, in terms of obtaining high-quality wind synthesis and demonstrating the ability to produce useful Velocity-Azimuth Display (VAD) wind profiles; 2) develop a coordination strategy for communicating between the aircraft flight operations and scanning

strategies for the ground-based radars; and 3) improve understanding of the various scales of mesoscale heterogeneity promoting tornadogenesis as a function of the storm lifecycle. While it is true that simultaneous airborne and ground-based radar observations have been previously collected in VORTEX-SE and other meteorological field programs, such data sets have been analyzed independently. In order to meet the VORTEX-SE objectives, the ability to coherently integrate airborne and ground-based radar is essential. New software may need to be developed and tested. Hence, data to be obtained in Spring 2018 consist of the following:

1. The NOAA P-3 aircraft, which has been approved for 90 hours but only 36 days in the field between 1 March and 15 April 2018. The availability of the aircraft defines the time frame for making measurements from all the other measurement systems in Spring 2018. The P-3 aircraft will have, in addition to the usual array of in situ thermodynamic sensors, a Compact Raman Lidar (CRL) capable of measuring vertical profiles of the fine-scale temperature and moisture structure of the lower atmosphere. The aircraft will also have the upgraded C-band lower fuselage radar and X-band Doppler tail radar for making pseudo-dual Doppler determination of winds. A major advantage afforded by the P-3 over ground-based radar is that it is able to operate over broad regions, allowing much greater opportunity to observe severe convection than with ground-based platforms.

2. Aircraft only offers coarse temporal resolution due to the time required to turn it around before repeating a flight leg to measure the feature of interest. By contrast, ground-based radars are able to sample more frequently and can typically scan closer to the surface with less clutter contamination than airborne radar. Thus, it is essential to provide clusters of multiple Doppler radars to synergize with the P-3 radar observations. Two C-band dual-polarimetric mobile radars (the University of Oklahoma SMART radars), an S-band radar from the University of Louisiana-Monroe, and the University of Alabama (UAH) ARMOR C-band polarimetric radar will be supported outside of this FFO to integrate with the P-3 radars.

3. Atmospheric wind and thermodynamic profiling systems and mobile radiosondes from UAH and NSSL will make measurements of the near-storm environment to test coordination and integrated observing strategies. These profiling systems will be combined with the CRL measurements from the P-3 aircraft and the VAD profiles to determine the mesoscale variability.

4. Two clusters of ground-based systems will be supported: 1) a cluster in northern Alabama (this local area has been a focal point for VORTEX-SE in the past due to the locally available observing system and project support infrastructure and because it is

representative of the complex terrain found in many parts of the Southeast); and 2) a new cluster in the Mississippi delta region of eastern Louisiana (because the University of Louisiana–Monroe maintains a new S-band dual-polarimetric radar and also has radiosonde systems). Thus, locally available infrastructure will provide critical support in two disparate regions – one with and one lacking complex terrain.

Please note that the grant-supported researchers who collect VORTEX-SE field campaign data sets are not obligated to share them for one year after collection (May 2019). Hence, investigators who are proposing to do analysis work that will utilize these data collected by other institutions must obtain the permission of (or form collaborations with) the data owners prior to submitting a proposal in response to this solicitation. The proposal must clearly assert that the needed permissions have been obtained if that data access is essential to the outcomes of the project.

c) Meso18-19: December 2018 – April 2019

Contingent upon funding in FY2019, NOAA plans to support studies of mesoscale variability of the severe storm environment in the Southeast, i.e., the variability of Convective Available Potential Energy (CAPE) fields, low-level vertical wind shear, and low-level vertical thermodynamic structure of the atmosphere, and the relationship of this mesoscale variability to tornado potential, for the period from 1 December 2018 through 30 April 2019. This 5-month long observing campaign defines the term of “Meso18-19”.

This FFO does NOT REQUIRE that proposed research be tailored toward Meso18-19. Indeed, because proposers cannot know exactly what data will be obtained, due in part to the uncertainty about future funding, nor what types of events will be observed, it would be difficult to prepare a proposal for this competition that effectively utilizes Meso18-19 data. Analysis of Meso18-19 data will be supported in future FFOs, contingent upon continuance of funding for the VORTEX-SE program.

The meteorological data sets that VORTEX-SE expects to obtain in Meso18-19 are:

Deployable, continuously operating surface mesonet data from ~ 40 sites
Wind and thermodynamic profile data from continuously operating mobile systems provided by UAH and NSSL.
Boundary layer flux measurements from one or more fixed sites
Atmospheric soundings from several sites taken at frequent intervals to document spatial and temporal variations in the thermodynamic and wind profiles

This list represents an informed estimate of the minimum number of observations to be obtained through NOAA funding mechanisms outside this grant competition. NSSL has no plans to request use of the P-3 aircraft nor networks of ground-based radars for Meso18-19, in contrast to previous VORTEX-SE field experiments. A detailed observational field experiment plan for Meso18-19 will be developed during the summer of 2018.

d) Interdisciplinary and Operational Forecasting Research

The ultimate goal of research in VORTEX-SE is to improve: the forecasting, warning, and detection of tornadoes; the communication of tornado threats; and the mitigation of those threats. Physical and social science researchers should be able to convey how their proposed work will advance knowledge toward eventual application. Projects should, wherever possible, propose collaborations or interactions across disciplines and/or with operations/applications – specifically, how the significant findings from their proposed activities would be shared and communicated with, and eventually transferred, to the National Weather Service or other components of the weather enterprise engaged in identifying, detecting, communicating, and mitigating tornado hazards. Whether interdisciplinary or not, each project must be able to clearly identify the current Readiness Level (RL) of their research endeavor (NOAA RLs are described at http://www.corporateservices.noaa.gov/ames/administrative_orders/chapter_216/216-105B.html), and how funding the proposed project will move the product, science, service application, or understanding reflected in changes in operational warning procedures at least one rung up the RL ladder by the end of the project period. This is intended to motivate research that will have the greatest, and most immediate, benefit to the public, which ultimately is how VORTEX-SE success will be measured. All proposals (both Types 1 and 2) are expected to identify Readiness Level and how the work will advance the Readiness Level as described above.

e) Prioritization

The process of prioritizing research topics began with input to the program management from the VORTEX-SE Scientific Steering Committee. This committee assessed which research topics are sufficiently well understood and executable in the sense that proposals can be created having the potential for producing the desired new knowledge. The committee also determined the optimal sequencing of related groups of topics to advance the science as efficiently as possible. Considering this information, NOAA then established which foci are of greatest potential to advance the NOAA mission. This forms the basis for the specific research objectives listed below in Section I. B. 1.

Further prioritization will involve synergism between funded activities and maximizing the number of scientific findings to improve operational forecasts, warnings, and societal response. Thus, all investigators responding to this FFO should consider how significant findings from their proposed activities can be shared and communicated with, and eventually transferred, to National Weather Service (NWS) operations, to other organizations and individuals responsible for communicating weather hazard information to the public, and to the public in general. Proposers may wish to interact with NOAA research labs and the National Weather Service to develop proposals for projects that support the NOAA mission according to the priorities listed below.

VORTEX-SE is a program that is being conducted with a single one-year allocation of funds to NOAA. Because there is no certainty of additional future funds, the highest priority will be those projects that can produce significant new knowledge through a single one- or two-year grant.

2. INFRASOUND UNDERSTANDING, DETECTION, AND WARNING OF TORNADOES COMPETITION

The second category of supported projects in this FFO is focused on infrasound applications to tornado understanding, detection, and warning. A separate competition from the above VORTEX-SE competition with separate funding will be used.

Innovative research over the past 40+ years has demonstrated the potential of infrasonic technology for the detection of a variety of geophysical phenomena, including tornadoes. Infrasound (specifically near-infrasound) is the range of acoustic frequencies just below the audible and approximately in the 0. 5 to 10 Hz frequency range. Infrasound can travel great distances with little atmospheric absorption (sometimes over 1000 km) but can take many minutes to an hour to travel these distances. It can take about five minutes for infrasound waves to travel only about 100 km.

Limited studies using Doppler radars and visual observations for verification have shown correspondence between the occurrence of tornadoes and the generation of infrasound from the same region as detected by specially-designed ground-based infrasonic observation networks deployed in the United States, mostly on the Colorado plains. Also there have been very limited studies addressing the potential of improved understanding of hurricanes, tornadoes associated with land-falling hurricanes, and related phenomena (e. g., land spouts) through infrasound data collection. There are many uncertainties due to the limited amount of data that has been collected to study the phenomena.

NOAA plans to support up to several studies under this program to improve our understanding of infrasound as it relates to the detection of tornadoes in the U. S. , particularly the Southeast U.S., the potential operational forecasting and warning benefits, and the limits of temporal and spatial detectability with various infrasound observing network configurations (e. g., how precise can source locations be determined, measures of detectability and warning such as false alarm rate and probability of detection, etc.).

Because of limited available funding, NOAA will not support studies under this FFO related to the engineering design and development of infrasonic observing sensor hardware. Infrasonic sensors in the desired frequency range have been developed and are available commercially. NOAA would support the deployment of sensor networks and collection of such data in the approximate 0. 5-10 Hz near-infrasound range from existing sensors. We are most interested in the follow up analysis of that data, through comparison with historic archived infrasonic data and other available coincident observational meteorological observation data leveraged from the concurrent VORTEX-SE field campaign or other available environmental data, that could produce meaningful practical results and improved understanding with limited funding over a two year time span. Specific targeted NOAA science priorities are described in the next section B.2 below.

B. Program Priorities

The program priorities for each of the project categories are described in detail below. Highest rated proposals from this FFO are expected to be those that clearly address one or more of these focused priorities.

1. VORTEX-SE COMPETITIONS

All topics in this section have the program-wide requirement for establishing current and end-of-project Readiness Levels. Topics fall under the broad banners of physical science, social and behavioral science, and operational meteorology. Proposals for obtaining mobile Doppler observations, disdrometer observations, or mobile sounding observations will NOT be considered for funding in this competition; these observations are either not needed in Meso18-19 or are being supported outside of the FFO.

a. Studies of the mesoscale environment related to tornado potential in the Southeast.

Early VORTEX-SE findings, both from observational work as well as from convection-allowing models, indicate that CAPE, thermodynamic stability, and vertical wind shear can vary on scales of considerably small than 200 km in ways that locally enhance tornado potential in otherwise more benign-appearing environments. This topic supports

climatological, observational, and/or numerical investigations of the heterogeneous mesoscale environment for southeast US tornado situations. Use of existing VORTEX-SE data sets and NWP gridded data is encouraged.

b. Storm processes affecting tornado potential

Processes that are associated with the occurrence of non-classical tornadoes (e.g. QLCS, convective clusters, embedded supercells, etc.) continue to be of special interest in the VORTEX-SE. This topic includes radar-based climatology studies of these events and their signatures and precursors in conventional and polarimetric radar data. Observational studies utilizing already-collected VORTEX-SE data are encouraged, as are numerical simulation studies.

c. Clarification of the scales and character of mesoscale processes that are associated with forecast uncertainty on the watch/outlook time scales.
The SSC believes that additional research emphasis must be brought to bear on the matter of the important spatial and temporal scales of heterogeneity for the tornado prediction problem. Lack of this understanding makes it difficult to discern exact observing and research needs at this time. Hence this FFO will support numerical studies using approaches such as Observing System Simulation Experiments (OSSE), Ensemble Sensitivity Analysis (ESA), data denial experiments, etc. to help inform future observation needs for either/both fundamental research and efforts to improve numerical prediction.

d. Studies of the interactions of the co-evolution of draft structure, radar and satellite signatures, and lightning flash character and frequency in potentially tornadic storms.
Initial VORTEX-SE findings show possible associations between the stage of evolution of potentially tornadic storms, their draft structures and intensity, and the frequency, size, and location of lightning in the storm. These findings are preliminary, but may lead to improved ways of using lightning information to infer tornado potential in Southeast storms. This topic seeks new research to continue to better define the possible generality of the initial findings and their potential for diagnosing storm structure, stage, and tornado potential. Using lightning information to gauge tornado potential in landfalling tropical cyclones is also of interest (see topic “e” immediately below).

e. Tornadoes in landfalling tropical cyclones (LTC)

To lay the groundwork for possible future field observations, we seek improved understanding of the antecedent environments that support tornadoes in tropical cyclone outer rainbands, as well as during the tropical-extratropical transition over land.

Climatological analyses are encouraged, perhaps combined with idealized and real-case numerical modeling studies, of environmental characteristics and the statistical distribution of gust factor, tornado duration, and size and number of tornadoes in LTCs of varying size and/or intensity compared to non-LTC tornadoes.

In addition to these meteorological topics of research, there are a number of Social, Behavioral, and Economics science (SBE) questions pertaining to LTC events meriting attention. For example, issues concerning the perception, communication, and response to tornado warnings issued during LTC events are complex and multifaceted, such as when multi-hazard warnings are issued simultaneously (tornadoes, hurricane-force winds, storm surge, inland flooding), leading to the high likelihood of conflicting messages or confusion about the right course of evasive action to take to save one's life. It is also not well understood just how significant the tornado hazard threat is compared to these other hurricane-related hazards, nor what is the best way to convey the LTC tornado threat information.

f. Understanding and reducing societal vulnerability to tornadoes

This topic has three main emphases that are of a strongly interdisciplinary nature: 1) investigating how physical, social, and economic factors interact to contribute to harm from tornadoes in the Southeast, and which intersections of factors are the most important contributors in different local and household circumstances; 2) understanding different populations' capacities and current practices that can be utilized and leveraged to alleviate vulnerabilities and reduce harm from tornadoes in the Southeast; and 3) understanding the factors and decisions that enhance individual survival of tornadoes under different circumstances. Proposed efforts that would move the basic research on these topics to the development of means to address these challenges and an objective method to evaluate those approaches are particularly encouraged.

g. Research on operational NWS and partners forecast and warning decision-making process, and public response

The two main emphases in this topic are 1) investigating forecasters' interpretations and use of different types of information in decisions about whether, when, and how to issue warnings and other products; and 2) understanding how probabilistic hazard and warning information affects the forecast and warning process and information gaps that contribute to uncertainty. This work will help establish foundational knowledge about uncertainty that will facilitate a future transition to a more probabilistic approach to warnings. It will also provide important knowledge for prioritizing physical science research and observations, and for

developing and testing recommendations for operational improvements in subsequent years of the program.

Investigators are encouraged to consider contemporary research activities such as the Warn-on-Forecast project (http://www.nssl.noaa.gov/projects/wof/) and FACETs (http://www.nssl.noaa.gov/projects/facets/) when developing proposal ideas. FACETs is simultaneously a proposed reinvention of the NWS hazard forecasting paradigm; a comprehensive framework to organize the science, technology and practices needed to achieve that reinvention; and a potential delivery mechanism for high-resolution, probabilistic guidance from numerical weather prediction ensembles. NOAA's Warn-on-Forecast research program seeks to dramatically increase tornado, severe thunderstorm, and flash flood warning lead times using probabilistic hazard guidance that is provided by an ensemble of forecasts from convection-resolving numerical weather prediction models.

h. Risk communication, risk perception, and information use in protective decision making (with a focus on members of the public and other end-users)

This topic has three primary emphases: 1) understanding the interpretations and uses of probabilistic hazard information, warnings and other information by different members of the public in different circumstances; 2) understanding the perception, use, and interpretation of tornado information prior to and during the concurrent hazard scenarios of landfalling tropical cyclones; and 3) investigating intersections among information, vulnerabilities and capacities, and protective decision making. This interdisciplinary work will provide an important foundation for investigating more specific research questions and developing and testing recommendations for improving risk communication and protective decision making in subsequent years of the program.

2. INFRASOUND UNDERSTANDING, DETECTION, AND WARNING OF TORNADOES COMPETITION

The following program priorities are among the most important activities that NOAA would support to help demonstrate the potential value of infrasound technology for tornado understanding, detection, and warning, especially when applied to the southeast U. S. Collection and analysis of new infrasonic data for strong and weak tornadoes in the Southeast U. S. during the project period are highly encouraged.

a. Demonstrate how infrasound information can enhance tornado threat predictive capability of the NWS (e. g., size, strength, lead time, location, etc.)

The operational benefits to the NWS of infrasound for the detection and warning of tornadoes (including tornadoes from land-falling hurricanes) to improve warning lead time have been evaluated in the early 2000's in coordination with NWS forecast offices in Colorado and Kansas but have not been fully studied. Working or partnering with NOAA or other meteorologists, in particular NWS Weather Forecast Office science personnel, is highly encouraged during the course of the project so that operational weather forecasters can evaluate the potential future benefits of this technology.

b. Measure infrasound from tornadic storms also scanned with Doppler and polarimetric radars and observed by lightning sensors and storm chasers and compare the data to relate the infrasound characteristic to the physical attributes of tornadoes deduced by these observations and to identify the radiating mechanisms responsible for infrasound generation.

The physical mechanisms in tornadic thunderstorms that might generate these acoustic waves is uncertain but has been postulated to be caused by various sources, including radial vibration processes of the vortex core, flow instabilities, and corotating multiple vortices. Past studies suggest some ability to determine vortex size and strength based on the frequency of the infrasound. Comparison with Doppler radar data is encouraged to confirm that infrasound signals attributed to tornadoes are indeed associated with radar-observed mesocyclone and/or tornado circulations and/or actual observed tornado tracks. How can the physical generating mechanism (e.g., tornadoes) be definitively identified, and how can false alarms from non-tornadic sources be identified and reduced to make sure that a tornado source is being isolated from other irrelevant sources?

c. Study infrasound propagation in complex atmospheric environments associated with severe weather (e. g., with outflow boundaries, mesocyclones, high shear) and in regions of complex terrain to determine detectability efficiency by ground networks

Past studies have focused on the high plains of Colorado and not in other diverse regions of the U. S. such as in the Southeast U. S where complex terrain and potentially complex ducting environments may have important effects on infrasound propagation and detection by ground-based observing networks.

d. Collect infrasonic data during VORTEX-SE observational field campaigns and other times and to leverage other existing ancillary environmental observations collected and funded through other sources

e. Develop improved algorithms for real time processing of infrasonic data and subsequent display that present infrasonic data in quickly-accessible forms that can be easily

interpreted by operational meteorologist forecasters.

C. Program Authority

15 USC 8512(c)(1)

II. Award Information

A. Funding Availability

VORTEX-SE competitions: It is expected that in Fiscal Year (FY) 2018 NOAA will fund around 2-4 Type 2 projects and around 4-8 Type 1 projects. Total grant funding of the two pools combined is expected to be around $2.6M. Total two-year funding amounts per project are limited to no less than $100,000 and no more than $300,000 for Type 1 projects, and no more than $400,000 for Type 2 projects (see I.A for descriptions). Funds allocated for each category type may be altered depending on the number and quality of proposals submitted within each category.

Infrasound competition: It is expected that NOAA will fund 1-2 infrasound projects depending on the final FY2018 NOAA budget appropriation. The maximum two-year funding per project is $500,000. If additional infrasound funding beyond FY2017 levels becomes available to NOAA, additional grant projects may be awarded.

For the case of multi-institution projects for all of the above competitions, these amounts identified above are total per-project amounts, not per-institution amounts, over the total period of the grant award. Funding of any proposals is contingent upon availability of these funds.

B. Project/Award Period

The period of awards is up to two years. Release of the funding for the second year is contingent upon a favorable review near the end of the first year.

C. Type of Funding Instrument

The funding instrument for awards will be a grant. If, however, it is anticipated that NOAA will be substantially involved in the implementation of the project, the funding instrument will be a cooperative agreement. Examples of substantial involvement may include, but are not limited to, applications for collaboration between NOAA scientists and a recipient scientist or contemplation by NOAA of detailing Federal personnel to work on proposed projects. NOAA will make decisions regarding the use of a cooperative agreement on a case-by-case basis. Funding for contractual arrangements for services and products for

delivery to NOAA is not available under this announcement.

III. Eligibility Information

A. Eligible Applicants

Eligible applicants are institutions of higher education; other nonprofits; commercial organizations; or state, local, and Indian tribal governments. Federal government employees are ineligible but may serve as unfunded co-I's on applications where substantial federal involvement is proposed.

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

Application packages for full proposals are available at: www.grants.gov/web/grants/applicants/apply-for-grants.html.

B. Content and Form of Application

The instructions for preparation of full proposals provided below are mandatory. Failure to adhere to these requirements will result in proposals being rejected and returned without review. Please carefully review and apply this application information.

1. Full Proposal

(a) The full application (proposal) must be dated and display page numbers. It must include a title page that identifies each Principal Investigator (PI) and co-PI and the respective institutional representative by full name, title, organization, telephone number, mailing address, e-mail address. Identify the NOAA FFO competition number and the most appropriate category from section I (either VORTEX-SE Type 1 or 2 or Infrasound).

The title page must include a brief table at the bottom showing the total requested funds for each annual period for each institution that is contributing to the project. If there are several

institutions submitting separate applications for the same joint project, the names of all institutions along with their lead PI information and total requested funding for each annual period for each institution must appear on the title page of each of the applications.

(b) A one-page abstract must be included and must contain a concise summary of the proposed work to be completed and the identification of the most appropriate category from section I. The abstract must appear on a separate page, headed with the proposal title and the name(s) of the PI(s) and their home institution(s).

(c) All proposals must provide a Statement of Work that includes each of the following sections which should be clearly and separately identified in the proposal:

(1) The proposed duration of the project;

(2) The category of the proposal (see Sec. I.A): “Type 1” (single-discipline) or “Type 2” (multi-discipline) for the VORTEX-SE category or “Infrasound” for the Infrasound category

(3) The proposed work must be completely described, including: identification of the problem to be addressed and its relevance to the specific science priorities identified in Section I. B; the conceptual framework; scientific hypotheses and objectives; results from prior research; proposed methodology and work plan; the current Readiness Level; and a pathway into eventual operational applications. Include a reference list at the end with the most important references;

(4) Project deliverables (expected analyses, results, etc., that would be described in the research performance progress reports);

(5) A timeline with key milestones for conducting the research and delivering the scientific and technical results over the course of the project;

(6) A description of travel associated with data collection, project meetings, and the presentation of results at scientific conferences.

(7) A description of the proposed collaborations with other individuals/groups in the Weather Enterprise (e. g. the National Weather Service, emergency managers, the private sector) involved in identifying, detecting, communicating, and/or mitigating tornado hazards and risks, the current Readiness Level of the project, and the expected path to the next Readiness Level (see Sec. I.A.1.d)

(8) If data sets are utilized that are not yet publicly available, a description of the data access arrangements that have been made with the persons or institutions managing that data.

The above Statement of Work items in IV.B.1. (c).1-8 must be fully contained within no more than TEN PAGES (not including reference list) using a 12-point font and one-inch margins. For applications from multiple institutions for the same joint project, identical SOWs are typically submitted in each separate institution's application, but they must clearly describe the work contributions of each PI and institution.

(d) An abbreviated Curriculum Vitae (CV) for the PIs, co-PIs, and co-Is with a reference list of all publications within at least the last three years must be included. CV's are not needed for collaborator partners.

(e) Current and pending financial assistance support: Each investigator must submit a list that includes project title, supporting agency, investigator months, total dollar value and duration. Requested amounts should be listed for pending support.

(f) Data Management Plan: Proposals submitted in response to this Announcement must include a Data Management Plan (up to 2 pages). See section VI. B., Administrative and National Policy Requirements, below for additional information on what the plan should contain.

(g) The full proposal package includes the information described in this section as well as the required federal forms: (1) Application for Federal Assistance (SF-424), (2) Budget Information - Non-Construction Programs (SF-424A), (3) Certifications (CD-511), (4) Assurances - Non-Construction Program (SF-424B), and (5) Disclosure of Lobbying Activities (Standard Form LLL). Applicants must use the Standard Form SF 424A Budget Information-Non Construction Programs that is contained in the standard NOAA Grants and Cooperative Agreement Package. Pay careful attention to show the yearly budget breakout on the SF 424A for multi-year proposals.

(h) All applicants must submit (in addition to the above SF-424A) a detailed itemized Budget Table within the Budget Narrative Attachment section broken out by year that includes the PI's scientific and technical support staff salaries and fringe benefits, facility requirements, computing and communications, supplies and travel. It must also include a detailed Budget Justification that describes and justifies each expense and demonstrates cost effectiveness (refer to the GMD Budget Narrative Guidance at http://www.ago.noaa.gov/grants/docs/gmd_budget_narrative_guidance_-_05-24-2017_final.pdf). Efforts that involve interdisciplinary research and development, and/or

conducting testing and evaluation of new forecast and warning products and services to the National Weather Service or other providers of weather information to the public, should clearly explain how the budget addresses those needs. The information on the SF-424A and this separate budget table must be consistent and should include only the amount of funding that will be provided to the institution submitting the proposal. It should not include budget information for PIs or co-PIs at other institutions who are contributing to the joint project since that information should be included in their own separate application. However, in cases of multiple applications from separate institutions associated with the same project, the summary budget table is still required to be included at the bottom of the title page as described above in Sec. IV.B.1.a.

If indirect charges are included in the budget, applicant must have an approved negotiated Indirect Cost Rate Agreement. 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
1325 East West Highway
9th Floor
Silver Spring, Maryland 20910
lamar.revis@noaa.gov

(i) This announcement does not require any National Environmental Policy Act (NEPA) questions to be answered as part of the application. This will be done after project selection. For additional information on NEPA, see section VI. B.

C. Unique Entity Identifier and System for Award Management (SAM)

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 System for Award Management (SAM), which may be accessed online at https://www.sam.gov/portal/public/SAM/. Applicants are also required to use the Dun and Bradstreet Universal Numbering System and will be subject to reporting requirements, as identified in OMB guidance published at 2 CFR Parts 25, 170 (2013), which may be accessed at https://www.ecfr.gov/cgi-bin/text-

idx?SID=1ccffb4c1d4de03addd6a041113460f9&mc=true&node=se2.%201.200_1300&rgn=div8.

D. Submission Dates and Times

Complete application packages must be submitted no later than 05:00 p.m. Eastern Time (ET) on Thursday April 12, 2018. The date and time receipt indication from Grants.gov will be the basis of determining timeliness. Applications received after that time, or which are incomplete, will be rejected and will not be reviewed.

E. Intergovernmental Review

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

F. Funding Restrictions

NOAA will not accept proposals for projects related to the engineering development of new or improved infrasonic, radar, or other meteorological observational sensor hardware. Existing or off-the-shelf hardware or field experiment equipment is expected to be used where appropriate.

Proposals for obtaining mobile Doppler observations, disdrometer observations, or mobile sounding observations will NOT be considered for funding in this competition; these observations are either not needed in Meso18-19 or are being supported outside of the FFO.

NOAA will not accept more than one proposal for joint projects with identical (or nearly identical) statements of work that are submitted from the same institution (i. e., an institution cannot be considered for more than one funded grant for the same project and must abide by the project funding limits specified in Sect. II. A).

Funding beyond the first year will be dependent upon satisfactory performance and the continued availability of funds.

G. Other Submission Requirements

Complete application packages must be submitted electronically through the http://grants.gov website by the due date. Applicants should note that it can take between 3-5 business days or as long as 3 weeks to register with Grants.gov if all steps are not completed in a timely manner, and registration is required only once. Users of Grants.gov will be able to download a copy of the application package, complete it offline, and then upload and submit the application via the Grants.gov site. If an applicant has problems downloading the

application forms from Grants.gov, contact Grants.gov Customer Support at 1-800-518-4726 or support@Grants.gov. To use Grants.gov, applicants must have a Dun and Bradstreet Universal Numbering System (DUNS) number and current registration in the System for Award Management (SAM) system. Applicants should allow a minimum of five days to complete the SAM registration. Registration is required only once, but must be renewed periodically. In all, there are approximately five steps needed to set up your organization's Grants.gov account (see https://www.grants.gov/web/grants/applicants/registration.html).
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 CI 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 (1) that the university has submitted the proposal on behalf of the CI; (2) that the existing University/NOAA MOA will be incorporated by reference into the terms of the competitive award, and (3) that 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.

V. Application Review Information

A. Evaluation Criteria

Applicants are required to address in their proposal the criterion described in this section which are the fundamental basis for reviewing, scoring, and ranking of the proposals. The evaluation criteria and weighting of the criteria are as follows for both competitions (for a total of 100 points):

1. Importance/Relevance and Applicability of Proposed Project to Program Goals (30 points)

This criterion ascertains whether there is relevance to NOAA, federal, regional, state, or local activities, and whether the proposed activity is aligned with project objectives. The reviewers will consider the following questions in their assessment of this criterion:

Does the proposal identify and address one or more of the NOAA science priorities listed in

Section I. B consistent with the VORTEX-SE Science Plan or infrasonic objectives and priorities?

Does the project expect to provide significant new knowledge through a single award with no assumptions regarding follow-on support?

Does the proposed activity involve direct collaboration with elements of the Weather Enterprise involved in identifying, detecting, and communicating tornado hazard information, and mitigating tornado risk? Such elements might, for example, be the National Weather Service, emergency managers, or private forecasting entities. Does the proposed activity specify the means by which the research will be coordinated, shared, communicated and managed between the various communities?

Does this proposal identify the path to advance knowledge to the next Readiness Level by the end of the grant period (see Section I.A.1d)?

VORTEX-SE Type 2 proposals only: Does the proposed work involve more than one discipline? Does the proposed work uniquely combine the at least one of the physical science objectives (see I.B.1.a-e) and one of the SBE objectives (see I.B.1.f-h)? Does the proposal have at least one PI from the physical sciences and at least one from the SBE sciences?

2. Technical merit (35 points)

This criterion assesses whether the approach is technically sound, if the methods are appropriate, and whether there are clear project goals and objectives. The reviewers will consider the following questions in their assessment of this criterion:

Is the conceptual framework, design, methodology, and proposed analysis adequately developed, well-integrated, and appropriate for the goal of the project?

Is the scope of the proposal appropriate for a short-duration grant?

Does the applicant acknowledge potential problem areas and consider alternatives to mitigate risks?

Does the proposal include metrics that evaluate the success or failure of the project?

Does the proposal include appropriate milestones for this project?

3. Overall qualifications of applicants (20 points)

This ascertains whether the applicant possesses the necessary education, experience, training, facilities, and administrative resources to accomplish the project. The reviewers will consider the following questions in their assessment of this criterion:

Does the applicant have the necessary education, experience, training, facilities, and resources to accomplish the project?

Does the applicant have prior experience in transitioning research to application?

4. Project costs (10 points)

The project's budget is evaluated to determine if it is realistic and commensurate with the project needs and time-frame. The reviewers will consider the following questions in their assessment of this criterion:

Are the requested costs realistic, reasonable, allowable, allocable, necessary and commensurate with the project needs and time period?

Has the applicant proposed cost-efficient ways of accomplishing the project and collaborating with other project participants?

If the project requires existing data or observations, has the applicant made arrangements to obtain the data or observations?

5. Outreach and education (5 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. The reviewers will consider the following questions in their assessment of this criterion:

Does the proposal include a plan for sharing project progress and results with the general public through a web site?

Does the proposal include the publication of the results in a peer-reviewed publication and presenting results at a national conference or workshop?

Does the proposal promote the education and field experience of undergraduate and graduate

students, and/or are opportunities developed to share with K-12 educators?

B. Review and Selection Process

Once a full application has been received, an administrative review will first be conducted to determine compliance with all submission requirements, completeness of the application, and general responsiveness to the NOAA priorities in Section I.B. If all requirements are satisfied and the application is responsive to the NOAA priorities, the application will move to the next stage of review. If not, the application will be rejected and the PIs will be notified. The competition category in Sect. I selected by the applicant as most appropriate for the proposed project (VORTEX-SE Type 1, VORTEX-SE Type 2, or Infrasound) will be reviewed by NOAA. If it is obviously inappropriate, NOAA will reassign the proposal to the most appropriate category.

All compliant proposals will then receive an objective review within one of the competition category pools. Independent peer mail reviews consisting of at least three subject matter experts who may be Federal and non-Federal Government employees will evaluate applications using the evaluation criteria specified in section V. A. The independent reviewers' scores will be averaged to obtain the average score for each application. These final scores for each application will be used to determine the rank order of the proposals for each of the two competitions. The NSSL Director will assess the rankings and evaluations and make a fund or do-not-fund recommendation to the OWAQ Director for the VORTEX-SE competition. The OWAQ Director will then make final selection recommendations for all three competitions to the NOAA Grants Officer. Any application considered for funding may be required to address the issues raised in the evaluation of the application by the reviewers, program officer, selecting official, and/or grants officer before a selection decision is made.

C. Selection Factors

The merit review ratings shall provide a rank order to the Selecting Official for final funding recommendations. The OWAQ Director shall recommend awards in the rank order of the review unless the applications are 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:
a. Geographically
b. By type of institutions
c. By type of partners

d. By research areas
e. By project types

3. Whether this project duplicates other projects funded or considered for funding by NOAA or other federal agencies.

4. Program priorities and policy factors.

5. Applicant's prior award performance.

6. Partnerships and/or 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

Funding for approved projects is anticipated to begin September 1, 2018. Applicants should use this date as their proposed project start date.

VI. Award Administration Information

A. Award Notices

Applicants will receive notification from NOAA that their application has either been recommended or not recommended for funding to the NOAA Grants Management Division after completion of the review process. All applicants will receive their average scores for their application and overarching reviewer comments. Notices of recommendation for funding are not an authorization to initiate the project. Official notification of funding, signed by a NOAA Grants Officer, will come later if approved and is the only authorizing document that allows the project to begin.

B. Administrative and National Policy Requirements

DEPARTMENT OF COMMERCE PRE-AWARD NOTIFICATION REQUIREMENTS FOR GRANTS AND COOPERATIVE AGREEMENTS. 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) are applicable to this solicitation and may be accessed online at http://www.gpo.gov/fdsys/pkg/FR-2014-12-30/pdf/2014-30297.pdf

LIMITATION OF LIABILITY. Funding for programs listed in this notice is contingent upon the availability of continuing Congressional appropriations. Applicants are hereby given notice that funds have not yet been appropriated for the programs listed in this notice. In no event will NOAA or the Department of Commerce be responsible for proposal preparation costs. Publication of this announcement does not oblige NOAA to award any specific project or to obligate any available funds.

REVIEW OF RISK. After applications are proposed for funding by the Selecting Official, the Grants Office will perform administrative reviews, including an assessment of risk posed by the applicant under 2 C.F.R. 200.205. These may include assessments of the financial stability of an applicant and the quality of the applicant's management systems, history of performance, and the applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities. Special conditions that address any risks determined to exist may be applied. Applicants may submit comments to the Federal Awardee Performance and Integrity Information System (FAPIIS) about any information included in the system about their organization for consideration by the awarding agency.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA). If recommended for funding, applicants whose proposed projects may have an environmental impact will be asked to furnish sufficient information to assist NOAA in assessing the potential environmental consequences of supporting the project. NOAA must analyze the potential environmental impacts, as required by the National Environmental Policy Act (NEPA), for each project which seeks NOAA funding. Detailed information on NEPA can be found at the following NOAA NEPA web site: www.nepa.noaa.gov, including our NOAA Administrative order 216-6 for NEPA, www.nepa.noaa.gov/NAO216_6.pdf, and the Council on Environmental Quality implementation regulations, http://ceq.hhs.doe.gov/nepa/regs/ceq/toc_ceq.htm.

If needed by NOAA for NEPA assessment, applicants will be asked 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.

UNPAID OR DELINQUENT TAX LIABILITY. In accordance with Section 523 of Division B and Sections 744 and 745 of Division E of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235) or a future public law, an authorized representative of the selected applicant(s) will be required to provide certain pre-award representations regarding federal felony and federal criminal tax convictions, unpaid federal tax assessments, and delinquent federal tax returns. The form must be completed and submitted with grant applications for: (a) all for-profit and non-profit organization applicants (Part I, and if required, Part II); and (b) all non-Federal entity applicants anticipating receipt of $5 million or more in the current Federal Fiscal Year appropriated funding (Part II only). The form can be found at http://www.ago.noaa.gov/grants/forms.html.

UNIFORM ADMINISTRATIVE REQUIREMENTS, COST PRINCIPLES, AND AUDIT REQUIREMENTS.
Through 2 C.F.R. § 1327.101, the Department of Commerce adopted Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards at 2 C.F.R. Part 200, which apply to awards in this program. Refer to http://go.usa.gov/SBYh and http://go.usa.gov/SBg4.

DOC TERMS AND CONDITIONS. Successful applicants who accept a NOAA award under this solicitation will be bound by Department of Commerce Financial Assistance Standard Terms and Conditions. This document will be provided in the award package in NOAA's Grants Online system at http://www.ago.noaa.gov and at http://go.usa.gov/hKbj.

MINORITY SERVING INSTITUTIONS. The Department of Commerce/National Oceanic and Atmospheric Administration (DOC/NOAA) is strongly committed to increasing the participation of Minority Serving Institutions (MSIs), i.e., Historically Black Colleges and Universities, Hispanic-serving institutions, Tribal colleges and universities, Alaskan Native and Native Hawaiian institutions, and institutions that work in underserved communities.

DATA SHARING PLAN.

1. Environmental data and information collected or created under NOAA grants or cooperative agreements must be made discoverable by and accessible to the general public,

in a timely fashion (typically within two years), free of charge or at no more than the cost of reproduction, unless an exemption is granted by the NOAA Program. Data should be available in at least one machine-readable format, preferably a widely-used or open-standard format, and should also be accompanied by machine-readable documentation (metadata), preferably based on widely used or international standards.

2. Proposals submitted in response to this Announcement must include a Data Management Plan of up to two pages describing how these requirements will be satisfied. The Data Management Plan should be aligned with the Data Management Guidance provided by NOAA in the Announcement. The contents of the Data Management Plan (or absence thereof), and past performance regarding such plans, will be considered as part of proposal review. A typical plan should include descriptions of the types of environmental data and information expected to be 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; methods for providing data access; approximate total volume of data to be collected; and prior experience in making such data accessible. The costs of data preparation, accessibility, or archiving may be included in the proposal budget unless otherwise stated in the Guidance. Accepted submission of data to the NOAA National Centers for Environmental Information (NCEI) is one way to satisfy data sharing requirements; however, NCEI is not obligated to accept all submissions and may charge a fee, particularly for large or unusual datasets.

3. NOAA may, at its own discretion, make publicly visible the Data Management Plan from funded proposals, or use information from the Data Management Plan to produce a formal metadata record and include that metadata in a Catalog to indicate the pending availability of new data.

4. Proposal submitters are hereby advised that the final pre-publication manuscripts of scholarly articles produced entirely or primarily with NOAA funding will be required to be submitted to NOAA Institutional Repository after acceptance, and no later than upon publication. Such manuscripts shall be made publicly available by NOAA one year after publication by the journal.

FREEDOM OF INFORMATION ACT (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, 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), 5 U.S.C 552, are found at 15 C.F.R. Part 4, 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 the applicant, the confidentiality of the content of funded applications will be maintained to the maximum extent permitted by law.

C. Reporting

The Federal Funding Accountability and Transparency Act, 31 U.S.C. 6101 note, includes a requirement for awardees of applicable Federal grants to report information about first-tier subawards and executive compensation under Federal assistance awards. All awardees of applicable grants and cooperative agreements are required to report to the Federal Sub-award Reporting System (FSRS) available at https://www.fsrs.gov/ on all sub-awards over $25,000. Refer to 2 CFR Parts 170.

Award recipients will be required to submit performance (technical) and financial reports via NOAA's Grants Online system. Performance reports must follow a content template provided by NOAA/OAR. Collaborative project PIs should provide an identical report from each of the separate collaborating institutions that clearly identifies what work each institution did. All reports will be submitted on a semi-annual schedule and must be submitted no later than 30 days following the end of each 6-month period from the start date of the award. The comprehensive final report is due 90 days after the award expiration. Copies of all submitted reports will become the property of the U. S. Government.

VII. Agency Contacts

For questions about this announcement contact Richard Fulton at NOAA-OAR-OWAQ at Richard.Fulton@noaa.gov.

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 System for Award Management (SAM). [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 data to begin the application process through grants.gov.