Fiscal Year 2021 Competition Information Sheet - Observations

Note: this information summarizes key content for the Observations Competition from the Notice of Funding Opportunity (NOFO). Please refer to NOAA-OAR-WPO-2021-2006592 on grants.gov for the official content.

Program Name

NOAA/OAR/WPO Observations Program

Program Manager

Mark Vincent (mark.vincent@noaa.gov)

Funding for FY 2021

Pending the availability of funds in FY 2021, the Observations program anticipates a funding allocation of up to $3,000,000 per year for this competition. Proposals may be for up to two years, with up to $300,000/year. A total of approximately 10 -15 projects may be funded.

Timeline for FY 2021

Letters of Intent (LOI) due date: September 22, 2020 5:00 p.m. Eastern Time (ET)

Expected NOAA response date on LOIs: October 16, 2020

Full application package due date: November 18, 2020 5:00 p.m. Eastern Time (ET)

Funding recommendations April 2021

Anticpated Start Date: August 1, 2021

Program Objectives for FY 2021

The aim of this competition is to develop and demonstrate innovative sensor and observing technologies that have high potential for advancing an observation systems portfolio that is mission-effective, integrated, adaptable, and affordable.

Surface-based and boundary layer observations serve as critical inputs for the analysis and forecasts of the operational weather and water enterprise for the protection of life and property and enhancement of the national economy. Given that the relative absence of high-resolution surface and planetary boundary layer observations impedes progress in skillful

predictions of high-impact and disruptive weather, proposals should focus on technologies with the potential to improve the accuracy, reliability, spatial coverage, cost effectiveness, deployability, safety, and sustainability observations for eventual use by the operational weather and water enterprise including NOAA, the National Mesonet Program, the private sector, and other government sectors.

The scope includes weather and water related observations from the surface through the planetary boundary layer including in-situ surface, profiling, balloon-borne, radar, and airborne and/or unmanned systems (UxS) based technologies. Satellite-based sensors are not included in this scope except to calibrate, validate, or integrate with in-situ observations as a secondary objective.

Realizing that boundary layer and surface-based observations are unevenly distributed in space, time and purpose, proposals of particular interest should leverage in-situ surface, profiling, balloon-borne, radar, airborne, and/or UxS based observing technologies for use in sensing adverse weather phenomena beyond just severe thunderstorms and tornadoes, such as extreme precipitation, extreme temperatures, winter storms, flash floods, tropical cyclones, and fire weather, and that are cost-effective, widely available, and/or affordably available for purchase, independent of investment beyond the grant award period.

The strongest proposals should:

- include substantial collaboration with one or more operational weather stakeholders with the potential to benefit from the work and deliver sample data to the stakeholders for evaluation during the practical portion of the award period
- clearly document linkage to operational weather needs and demonstrate or allocate effort to understand how new observations may be used in the operational weather enterprise and tailor aspects of the observation collection and instrument design accordingly
- demonstrate potential to transition to operations, applications, or commercialization sometime after the award period

Opportunities for collaboration with operational stakeholders:
As stated above, strong proposals should have substantial collaboration with one or more operational stakeholders. One source of collaboration is with the NOAA/National Weather Service that has 122 Weather Forecast Offices around the country as well as National Centers, National Water Center, River Forecast Centers, and Center Weather Service Units (https://www.nws.noaa.gov/organization.php). Proposers are encouraged to report their planned interactions with NWS offices to Jordan Gerth, Jordan.Gerth@noaa.gov, at the National Weather Service Office of Observations. NOAA may also have needs for innovative observations to improve airborne surveillance and numerical weather models. Observations that will improve the predictive skill of the Unified Forecast System are encouraged (see ufscommunity.org). Other examples of potential collaboration with operational stakeholders include the National Mesonet Program (https://nationalmesonet.us/nmp-partners/) and State Climatologist Programs (https://stateclimate.org/). Engagement with, and participation by the operational weather commercial sector is also encouraged.

Projects appropriate for this competition range from Readiness Level (RL) 5 to RL 7 and have potential to transition to operations, application, or commercialization at either NOAA or the weather and water enterprise within the next 3 to 6 years.

Program Priorities for FY 2021

WPO, in collaboration with the NWS and other NOAA stakeholders, developed the following nine priorities for the Observations Program.

Obs-1 Extreme temperatures: Extreme temperatures are a public health concern, particularly in urban and suburban areas. High density observations that quantify how extreme temperatures, combined with dew point and wind speed, impact outdoor activities are particularly sought (such as the conditions that children walking to school in the winter, or attending outdoor summertime events would experience) to improve how the public receives messages of apparent temperature and temperature-related hazards.

Obs-2 Aircraft and radiosonde data analysis: Analysis of aircraft data relative to radiosondes, both in time and space, could inform future NWS decisions about allocating resources for one or both observation types. The NWS seeks studies that explore the relative value of in-situ observations providing complementary or duplicative information, evaluating both where there is redundancy in the weather observation network and where there are unfilled gaps, or where there are new types of observations that provide cost-value benefit if adopted more broadly.

Obs-3 Unmanned Aircraft Systems (UAS) data analysis: An analysis or observing system experiment of the quality, consistency, and value of temperature, moisture, and wind observations collected from UAS for assimilation into numerical weather prediction models could enhance NWS operations, investments, and modeling efforts. A proposal of this nature should consider the importance of atmospheric properties with increasing height because UAS would not provide information in the upper troposphere and stratosphere as a radiosonde does. The NWS is also interested if there are certain sites and scenarios where UAS observations are not possible or representative due to local weather conditions or flight restrictions, and an observational strategy for deciding whether collecting an UAS-based observation is safe.

Obs-4 UxS and expendables: UxS and expendables, including systems deployable from operational hurricane and weather surveillance aircraft, that have high potential for improving operational data such as wind speed and direction, temperature, air pressure, and moisture that forecasters and scientists need to better understand, model, and forecast rapidly intensifying storms.

Obs-5 UAS mapping: Georeferenced observations of floodwater extent from UAS platforms enable collection of data sets for validation of flood inundation mapping approaches.

Technologies considered viable include optical imagery showing flooding extent, oblique imagery post-processed to estimate water surface elevation, post-event low-altitude high-resolution imagery showing debris lines. Also of interest is high altitude, high resolution Synthetic Aperture Radar data that offers the potential for near-real time assessment of flooded areas, and rapid estimation of water depth.

Obs-6 Gap filling radars: Small, self-contained radars that provide meteorological insights into deep convection and associated impacts where there is poor or nonexistent radar coverage in the United States, including territories, are of interest. For example, Weather Surveillance Radar (WSR-88D) and terminal doppler weather radar (TDWR) coverage of the U.S. varies. In addition, the United States territory of American Samoa does not have a weather radar despite frequent flash flooding. Proposals involving any radar technology of this nature must explain the anticipated, added benefit of the project for NWS operations and/or societal impact in addition to enhancing a technical or scientific understanding of the equipment or atmosphere, and arrange to deliver the data to NWS operations for use in near real-time at no additional cost to the Government during the grant award period in which it is deployed. Of interest are proposals that leverage a single new radar with low maintenance costs and high data quality, to complement other observations, including existing radar, in-situ, and satellite observations.

Obs-7 Snow observations: Affordable, automated surface-based observations, potentially supported by data analysis, interpretation, and/or processing algorithms, that can provide meteorologists and hydrologists with frequent (hourly or better) surface snowfall information, including new snow accumulation, snowfall rate, snow depth, and snow-water equivalent (SWE), consistent with reporting standards. Automated observations in remote areas that require only seasonal maintenance and do not require external power or communications, and those upstream with or adjacent to transportation corridors and densely populated areas, would be of added benefit. Other potential projects of value include:

- combining winter precipitation datasets, particularly of different observation types (e.g., merging aircraft, UAS, and/or satellite with ground-based observations), toward the goal of a unified, consistent snow dataset spanning multiple decades.
- developing algorithms for snow to SWE.
- analyzing hydrometeor type and density of accumulated winter precipitation.
- airborne and in-situ technologies to collect accurately calibrated and validated SWE estimates throughout the western United States, Alaska, and upper tier to evaluate and support water resource management

Obs-8 Harnessing data sets of opportunity: Observations that are being collected by commercial industry, states, local authorities, and private citizens, but are not presently part of an operational weather observing network, are of interest. These nonconventional observations include data collected in densely populated urban areas and gaps in the United States and territories observing networks, and surrounding oceans. Examples include but are not limited to networks of personal weather stations, data from smartphones, citizen scientist reports, mesonets, and aircraft data.

Obs-9 Other areas of interest include:

- studies that improve the algorithms of existing observing equipment, such as part of the Automated Surface Observing System (ASOS), to provide more accurate or complete observational information for weather services.
- improving the quality of observations through algorithms associated with observing equipment.
- observational studies involving the evolution of the planetary boundary layer in marine environments and coastal areas.
- understanding where there may be complementary or duplicative observations, and where deploying new, affordable observations could enhance the NWS mission with little or no recurring cost for maintenance or development after the award period.
- other innovative observing technologies with high potential for improving weather and water forecasts and services and have strong linkage to operational needs and potential for transition.
- innovative observations needed to improve and validate specific physics packages or processes in component models (e.g., atmosphere, ocean, land, sea ice, wave, atmospheric composition) of the Unified Forecast System (UFScommunity.org)