NOAA Reviewer Instructions for *Air Quality Research and Forecasting* Proposals

Fiscal Year (FY) 2019 Office of Weather and Air Quality Research Programs NOAA-OAR-OWAQ-2019-2005820

12/7/2019

The following instructions will be used by the peer review panel to complete their reviews of the full proposal submissions for the above announcement of Notice of Funding Opportunity (NOFO) that was published by NOAA on grants.gov on September 26, 2018.

1) NOAA's Grants Online system will be used by the reviewers to access and download the assigned proposals and to submit evaluation scores and comments for each proposal. All reviewers will have a Grants Online profile created for them by NOAA, permitting on-line access to the proposals and review forms. When reviewer assignments are made to the proposals by NOAA, one email will be sent out to each reviewer by Grants Online which contains a unique login name and password for this competition and the list of assigned proposals. Any additional correspondence from OWAQ to reviewers via direct email will be limited to alerting reviewers to the upcoming review deadline and requesting completion of any reviews that are past due.

2) All system-related questions and technical difficulties with the Grants Online review system not directly related to a proposal's content should be directed to the Grants Online Help Desk, which can be reached at GrantsOnline.Helpdesk@noaa.gov ((301) 444-2112 in the Washington, DC Metro area, (877) 662-2478 toll free). For all other non-system-related questions, contact the Review Panel Chairman (RPC) Richard Fulton in the NOAA/OAR Office of Weather and Air Quality (OWAQ) (richard.fulton@noaa.gov, 301-734-1289).

3) Multiple proposals may be assigned to each reviewer. **Reviewers should review their assigned proposals and enter their scores and comments into the Grants Online scoresheet by close of business Monday January 21, 2019** which is approximately four weeks after they will be distributed to them around Friday December 21, 2019. Please inform the RPC immediately if that date is not possible and not at the last minute of the review period when it's then too late to re-assign.

4) Please inform the RPC if there may be a conflict of interest for one or more assigned proposals that requires recusal for any reason that the reviewer believes could compromise her/her ability to provide an objective unbiased review (e.g., close relationships, work affiliations, etc.). A proposal assigned to a reviewer requesting to be recused will be reassigned to another reviewer by the RPC. All non-Federal Government employee reviewers must read and sign the Form CD571 "Reviewer Conflict of Interest and Confidentiality Certification for Non-Governmental Peer

Reviewers" before proposal reviews can be submitted through the Grants Online System. This form, available electronically within the system, must be printed out, signed, scanned, and uploaded into Grants Online. Instructions for approving the form can be found in the **Grants Online Reviewer Quick Reference Guide** (see pg. 9-11), which will be provided in the user's profile.

5) Reviewers will be provided an electronic copy of the full NOFO in Grants Online, via their user profile. They should review it to understand the overall intent and application requirements of the competition and, in particular, read the important section I "Funding Opportunity Description" that includes two subsections, "Program Objectives" and "Program Priorities", specifying NOAA's focused priorities for work to be funded by this NOFO for each competition. Appendix A, included below for the reviewer's convenience, is a condensed version of those sections from the NOFO that contains the specific information for this particular competition. The other important section to become familiar with is section V.A "Evaluation Criteria" (see Appendix B included below for the reviewer's convenience) which identifies the Evaluation Criteria that will be used to score all competition's proposals and appropriate questions to consider for each one when evaluating them. These two sections are key to providing the standard baseline information necessary to review and score each of the proposals.

6) Reviewers will evaluate the proposals against the five Evaluation Criteria of section V.A of the NOFO. These five criteria have a possible maximum score of 100 points. In order to reduce reviewer biases and to better standardize review scores, the following scoring rubric should be used in scoring.

Total Score	**Guidance**
86-100 (Outstanding)	- The PIs have identified a problem that has not been solved - The PIs have designed a logical approach to solving the problem - The PIs will succeed in collecting the data/information required for the solution. - The proposed activities are consistent with the proposed budget - The PIs have the necessary expertise to conduct the work - Reviewer has no concerns with the proposal - Strongly recommend for funding
70-85 (Good)	- The PIs may have minor gaps in their understanding of the problem - The approach to solving the problem has minor risks of failure that the PIs do not acknowledge/understand - The data/information collected may not be sufficient to solve the problem

	- The budget is too large for the proposed work, or more work has been proposed than can be conducted under the budget - The PIs may not be experts but should be qualified - Minor concerns with the proposal - Recommend for funding
57-69 (Adequate)	- The problem is fairly well understood already, or the likelihood of a solution is low - There are flaws in reasoning that have a significant chance of causing the approach to fail; important alternative hypotheses cannot be excluded - There is a low probability that the data/information needed will be collected - The budget is inconsistent with the scope of the work - The PI's have very little experience conducting research of this type - Major concerns with the proposal - Recommend only if funding is available
<57 (Poor)	- The problem as stated probably cannot be solved - Important alternative hypotheses are being ignored - The chance of failure of the approach is large because of logic flaws or risks in data/information collection - The PIs have little experience conducting this type of research - Significant concerns with the proposal - Not recommended for funding

7) All reviewers will submit their review through the Grants Online system, filling out a numerical score and comments in the appropriately labeled boxes. Comments are highly recommended to explain your scores. A sample of these boxes is shown in Appendix C. Anonymity of each reviewer's scores and comments will be maintained by NOAA to the extent permitted by law.

8) Each proposal should be reviewed independently of other reviewers and the proposal Principal Investigators (PIs) and co-PIs and others listed on the proposal title page. No direct contact can be made by the reviewers to any PIs or co-PIs to ask questions or get clarifications.

9) Reviewers must destroy or delete any copies of proposals (hard copies or electronic copies) downloaded from Grants Online once their reviews are completed.

10) After all reviews are submitted by the deadline, NOAA will consolidate the reviews and scores, and selections will be made according to the NOFO criteria.

11) Key Dates:

- Friday December 21, 2018 – Grants Online distributes emails to the reviewers with login information to Grants Online to kick off the review period.

- Monday January 21, 2019 – Completion due date for all individual review score forms in Grants Online for all proposals.

Appendix A. Funding Opportunity Description

The information below, specific to this *Air Quality Research and Forecasting* (AQRF) competition, is extracted directly from the published NOFO and associated AQRF Information Sheet and is included here for the reviewer's convenience.

A. Program Objective

3. Air Quality Research and Forecasting

Air quality has improved significantly in recent decades following passage of the Clean Air Act in 1970. There are still many areas of the country, however, where the public is exposed to unhealthy levels of air pollutants and sensitive ecosystems are damaged by air pollution. This was especially evident this year when wildfires were numerous over large parts of Western North America and because of high surface ozone episodes during heat wave scenarios in the East. To help the nation mitigate these impacts, NOAA works with the Environmental Protection Agency (EPA), state and local air quality agencies, academia, and the private sector to provide sophisticated air quality forecast capability for the Nation called the National Air Quality Forecasting Capability (NAQFC).

The current NOAA operational forecast challenges for fine particulate matter (PM2.5) and ozone predictions include improving emissions from sources such as wildfire smoke and dust, chemical mechanisms (e.g., representation of secondary organic aerosols) that accounts for reactions from wildfire-associated species, accuracy of meteorological predictions for fields such as planetary boundary layer height and flows in complex terrain and near coasts, chemical boundary conditions, and tempo-spatially resolved trans-boundary influences. These are among the challenges producing seasonal biases in air quality forecast guidance. Bias correction post-processing algorithms have been implemented operationally to reduce these biases.

For additional program information on the NAQFC and this competition, please review the supplemental Information Sheet for the Air Quality Research and Forecasting competition in the grant package associated with this announcement at https://www.grants.gov.

B. Program Priorities

NOAA's highest priorities for each of the eight separate competitions funded through this announcement are identified below. Applicants for a given competition below should clearly indicate and address in their proposal one or more of the associated priorities for that specific competition. Proposals not directly associated with one or more of these priorities are discouraged.

3. Air Quality Research and Forecasting

A NOAA-sponsored workshop on the future direction of air quality forecasting research in November 2014 and other related workshops, publications, and operational forecasting experience over the past five years have identified the highest priority air quality forecasting science gaps that need to be addressed to improve NOAA air quality forecasting services over the next 5-10 years.

AQRF-1: Development and evaluation of high-resolution (1-4 km) air quality forecast capabilities that are consistent with NOAA weather forecast models at these resolutions, including two-way coupled models, for representation of local phenomena such as fine-scale processes in coastal region, over complex terrain, or in urban areas, especially those that take advantage of recent air quality field experiments.

AQRF-2: FV3 model-driven meteorological predictions will be used by NAQFC with on-line coupling in the near future. This future NAQFC system comprised of FV3 with an on-line EPA chemistry model should be developed and evaluated for both the warm and cool seasons for likely occurrence of poor air quality episodes. Investigations into the impact of use of the FV3 model with basic and advanced physics options are encouraged along with better understanding and improvement of model performance over urban, rural, mountainous and coastal areas.

AQRF-3: Improved spatial and temporal estimates of anthropogenic and natural pollutant emissions, including wildfire smoke and dust and other potential sources of model biases, using NOAA satellite remote sensing and other data sources

AQRF-4: Explore and quantify the potential value of ensemble model approaches and post processing to operational air quality forecasting

AQRF-5: Improved model representation in the FV3 model of physical/chemical processes for long range transport including lateral boundary conditions for regional models and regional/local phenomena for improvement in skill of ozone and fine PM forecast guidance

INFORMATION SHEET FOR THE FY2019 NOAA/OAR/OWAQ *AIR QUALITY RESEARCH AND FORECASTING* COMPETITION

NOAA collaborates with the external science community on improving NOAA's air quality forecasting capabilities through applied research and provides financial support for research-to-operations (R2O) transition projects through the U.S. Weather Research Program to accelerate their transition to operations and to enhance the public benefits derived from these projects. To get a sense for the types of current and past air quality research and forecasting projects funded by OWAQ, please go to http://owaq.noaa.gov/GrantsandProjects.aspx and sort by the "Air Quality Forecasting" theme.

The National Air Quality Forecasting Capability (NAQFC) provides nationwide operational predictions of ozone, suspended fine particulate matter (PM), and wildfire smoke, as well as airborne dust from dust storms over the contiguous lower 48 states. NOAA predictions are currently produced for two days at 12 km resolution and 1 hour time intervals and are distributed in numerical and graphical format at http://airquality.weather.gov/. Ozone and PM prediction are achieved by coupling the NOAA National Centers for Environmental Prediction (NCEP) operational regional mesoscale meteorology forecasts with inventory-based emissions estimates from the EPA, natural source emissions from wildfire smoke and dust, and chemical processes within the EPA Community Multiscale Air Quality (CMAQ) model. The NCEP North American Model (NAM) provides the meteorology driver for NAQFC currently. However, by 2021 NAM will be replaced by the NOAA Unified Forecast System (UFS) Finite Volume-3 (FV3) dynamic core meteorological model which will be a major transition.

The NOAA Hybrid Single Particle Lagrangian Integrated Trajectory (HYSPLIT) model is used to provide standalone predictions of wildfire smoke and dust storm predictions, both of which have highly variable intermittent sources. Smoke emissions are estimated from sources based on NOAA/NESDIS analysis of satellite imagery for fire location combined with U.S. Forest Service's BlueSky framework. Dust source locations are based on satellite climatology of the frequency of dust emissions. Dust is emitted in the model when threshold near-surface friction velocity is exceeded and modulated by real time soil moisture predictions. Routine verification relies on the EPA AIRNow network of observations from surface monitors, whereas verification of smoke and dust predictions relies primarily on satellite retrievals of smoke and dust column integrals. Dust predictions were implemented in 2012.

Emissions used for ozone and PM2.5 predictions are updated regularly with improvements including projected changes in emissions from point and mobile sources (reducing NOx emissions especially in the eastern US), and inclusion of smoke and dust sources in CMAQ with updates to NAM and CMAQ chemistry. In February 2017, the CMAQ model that provides operational ozone predictions was upgraded to use a newer CB05 chemical mechanism and includes the AERO6 module and real-time smoke and dust emissions to provide operational PM2.5 predictions from the same system.

Projects focusing on air quality research and forecasting that are relatively mature and not in the early stages of development or proof-of-concept are appropriate for this funding opportunity. This includes those projects that propose practical outcomes that could be transitioned operationally to NOAA in the next 3-5 years. In the parlance of NOAA and other federal agencies, this requirement translates to the higher "technology readiness levels". Readiness levels, as adopted by NOAA per NAO 216-105B, have been described in the associated NOFO for this competition and announcement in Section I.A "Program Objectives". Please refer to that section for additional information.

Projects that are most appropriate for this competition generally fall in or near the "demonstration" level of technical maturity, i.e., readiness levels of about 5 through 8 during the duration of the project. Ideally, the transition of a funded project from, say, readiness level 5 or 6 at start-up to 8 at completion is OAR's driving goal in funding these projects. On the other hand, projects in early stages of development or proof-of-concept during the project period (those with start-up readiness levels of 4 or below) are not the focus of this funding opportunity. Transitioning a mature demonstrated capability from level 8 to 9 is beyond the scope of this funding opportunity but could occur after the projects end if they are successful and approved for operational implementation by the NWS. Completed projects satisfying NWS metrics for success and operational constraints (e.g., added value, ease of use, computational efficiency, etc.) may be selected later for operational implementation by appropriate NWS operational offices.

PIs selected for funding will collaboratively develop Research-to-Operations Transition Plans in coordination with designated NWS staff within six months of the project start date. This plan will outline how the project outcomes are envisioned to be transitioned to NWS operations. NOAA guidance will be provided.

Appendix B. NOFO Evaluation Criteria

The information below is extracted directly from the published NOFO and included here for the reviewer's convenience.

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 intrinsic value in the proposed work and/or relevance to NOAA, federal, regional, state, or local activities. The reviewers will consider the following questions in their assessment of this criterion:

(1) Does the proposal identify a clear problem or opportunity to be addressed that is highly relevant to the NOAA Program Objective and Priorities identified in Section I?

(2) Does the proposal identify and quantify the benefit or impact to the Program Priorities?

(3) Does the proposal identify an appropriate degree of collaboration with one or more potential NOAA or other operational units throughout the project? Are the proposed end-users identified and appropriate to the Program Priorities?

For the competitions that are focused on transitioning research outcomes to NWS or weather/water enterprise applications and operations (excludes VORTEX-SE, S2S, and Infrasound competitions), this additional review question must be considered:

(4) Is the proposed work both relevant to and feasible to transition to an NWS or weather/water enterprise operational forecasting service capability within 2-5 years? Is the proposed start-up Readiness Level in the appropriate range for the specific competition to which it is applying? Is the proposed path to operations realistic and achievable within the framework of existing NWS infrastructure and concepts of operations?

2. Technical/Scientific Merit (35 points)

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

(1) Are the proposal methods and proposed solution technically sound and achievable?

(2) Will the proposed project improve technology, concepts, or methods that advance the field of study and eventually improve NOAA operations?

(3) Does the proposal employ novel concepts, approaches, or methods?

(4) Does the proposal include a clear schedule for milestones, deliverables, and advancing Readiness Levels?

(5) Does the proposal identify metrics for evaluating the success or failure?

(6) Does the proposal include a Data Management Plan as described in Section VI.B that adequately describes plans for data sharing?

3. Overall Qualifications of Applicants (20 points)

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

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

(2) Does the applicant propose effective collaborative arrangements and partnerships to accomplish the project?

(3) Has the applicant demonstrated the ability to conduct successful research and research-to-operations transition programs related to the NOAA priorities in Section I.B and publish peer reviewed articles?

4. Project Costs (10 points)

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

(1) Are the requested costs realistic, reasonable, allowable, allocable, necessary and commensurate with the project benefits, deliverables, and time period?

(2) Has the applicant proposed cost-efficient ways of accomplishing the project?

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:

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

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

(3) 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?

Appendix C. Sample Grants Online Score Form Boxes

Technical/Scientific Merit

This criterion assesses whether the approach is technically sound and/or innovative, if the methods are appropriate, and whether there are clear project goals and objectives.

Scoring Range: 0.0 to 20.0

Score (Required):

Comments (Required):

This is where the Reviewer enters comments about the Technical / Scientific Merit of the application.

Spell Check

ProjCost

Test Criteria

Scoring Range: 10.0 to 30.0

Score (Required):

Comments (Not Required):