SFY2019
UW Work Plan

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EPA Region 10

NW-AIRQUEST
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SFY19 WORK PLAN

Project title: Northwest Regional Prediction Model-2 (WRF)

Project Duration: July 1, 2018 – June 30, 2019

Description and scope of project:

1

The Northwest Regional Prediction effort has three major components: high-resolution weather predictions made twice daily using WRF mesoscale atmospheric models, daily ensemble forecasting providing probabilistic and uncertainty information, and real-time collection of observations from all available sources throughout the region.

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The University of Washington will:

1. Provide a suite of deterministic meteorological analyses and forecast products to air quality agencies in Washington, Idaho and Oregon twice daily, using operational runs from the current and future regional versions of NCEP's Weather Research and Forecasting model (WRF) at 36, 12, 4, and 4/3 km grid resolution. Products are to be available via the University of Washington's Department of Atmospheric Sciences website (http://www.atmos.washington.edu/wrfrt/) at approximately 9:30AM/9:30PM Pacific Standard Time (36, 12, 4 km domains) and approximately 2:30PM/2:30AM (1.3 km grid) following the 1200 or 0000 UTC initialization times of the modeling system. Forecast products shall extend out to 180 hours for the 36 and 12 km resolutions, 84 hours for 4 km resolution, and 72 hours for the 4/3 km resolution.

   Provide an experimental 4-km ensemble forecast and web products twice daily at approximately 8:00AM/8:00PM Pacific Standard Time following the 0000 or 12000 UTC initialization times of the modeling system. Forecast products shall extend out 72 hours.

   This suite of products will be referred to as the University of Washington Environmental Prediction System (ENVPREDSYS). Products shall include:

   a. Surface and upper air charts
   b. Ventilation products
   c. Upper air soundings
   d. Meteograms
   e. Time height series
   f. Ensemble plumes
   g. Ensemble mean and spread maps

Air quality products, including all the ventilation indices, will be generated as the forecast progresses, rather than when the entire forecast is complete.

Graphics and Other Products

2. Maintain and improve the dissemination of the Northwest regional forecasts through the web and other means. Continual improvement will be made to the regional prediction web site, including improved graphics, color schemes and additional products. Specific elements will be determined in collaboration with the NW Regional Modeling Consortium partners who are providing funding. Priority for graphics additions and improvements will be based on the relative contributions of participating agencies.

7. Evaluate new approaches for displaying web graphics. One goal would be to allow users to zoom into a particular area and have the labels, wind barbs, etc. scale appropriately. Another is to give the viewer the ability to zoom in, at full resolution, for an area of interest. Until the new web display system is in place, implement graphical subdomains for the 1.33 km domain as requested by the air quality agencies. Implement emergency graphical subdomains and trajectories (e.g., for areas with wildfires), as requested.

Same as last year

Update Science

3. Provide periodic assessments of which aspects of model science, if any, are deficient for meteorological modeling needs. Recommend methods for resolving deficiencies and provide written analytical assessments of model science improvements as needed. Make needed improvements in the modeling system, including updating to new versions when verification statistics indicate a positive impact.

Same as last year

Model Evaluation

4. Provide on-going automated statistical comparisons and verification of the various forecast systems within the ENVPREDSYS. Perform upper-air verification at as many near-surface levels as possible.

   When changes to the model are made, model performance will be assessed. In addition, the changes will be tested for recent periods and locations as provided by the air quality agencies. It is incumbent upon the air quality agencies to provide specifics on these episodes in order for this task to be completed.

5. Continue assessment of PBL, LSM, and convective schemes in WRF. Assessment will be made for all areas of the domain and times of the year, but particular attention will be paid for performance during wintertime stagnant conditions.

Same as last year

Specific Focus for This Year

6. Run a 4-km resolution ensemble at both 0000 UTC and 1200 UTC, out to at least 72 hours out with at least 20 members, including initialization and physics perturbations. Make available to Consortium members by ftp the raw output for the ensemble mean for a specific set of variables (~dozen) for a short list of locations. Continue development of ensemble displays, especially the plume products. Begin development of a calibrated ensemble product and test probabilistic products that have been identified as priorities by Consortium members.

Deliverables:

1. ENVPREDSYS products will be produced and updated to the website 365 days a year with a reliability measure of at least 97%.

2. Provide ENVPREDSYS gridded data fields from the 00 UTC operational runs to Washington State University- AIRPACT and ClearSky predictions systems by 08Z.

3. Annual "state of the model" report must be provided to Project Sponsor for the contract period ending June 30, 2019. This report can be in the form of a presentation to the Consortium. The report must detail progress made against specific deliverables, status of performance measures, problems encountered and or resolved, and future direction/recommendations. Include status of ENVPREDSYS work including progress on goals, specific deliverables, and status as to performance measures.

What is the environmental outcome? This project provides for the underlying data needed to drive a suite of air quality prediction and forecasting tools. These tools are used for forecasting air quality in the Pacific Northwest and also for assessing the impacts to air quality resulting from direct emission reduction activities (e.g. burn bans, smoke management, daily air quality forecasts). As a result, this project provides critical data essential to air quality planning and daily operations of air quality management programs. These activities will result in improved air quality as well as improved warnings to allow protection of vulnerable populations.

Project Period: July 1, 2018 through June 30, 2019
Project Sponsor: Lance Giles, Lane Regional Air Protection Agency
Project lead or technical lead/number: Dr. Clifford Mass, University of Washington