A Research Opportunity is currently available at EPA's National Exposure Research Laboratory in Research Triangle Park, North Carolina. This appointment will be served in the Emissions and Model Evaluation Branch within the Atmospheric Modeling and Analysis Division (AMAD). Applications for the current review cycle are due on February 1, 2015.

Numerical air quality models simulate the complex interactions between pollutant precursor emissions, meteorology, atmospheric chemistry, and deposition. These models are designed to predict atmospheric concentrations of a large number of gaseous (O3, NO2, etc.) and particulate (sulfate, carbon, etc.) pollutants in an Eulerian grid-based framework. The models are used for both scientific study of the fate of air pollutants as well as the development of abatement strategies to reduce their levels.

Model evaluation is an area of active research in air quality modeling, providing a link between model development and model application. In 2009, scientists from North America and Europe launched the Air Quality Model Evaluation International Initiative (AQMEII) as a forum to monitor the state-of-the-science in regional-scale air-quality models and model evaluation methodologies. Since its inception, AQMEII researchers have conducted two model evaluation and intercomparison studies over both continents. Among other key findings, both studies reaffirmed the critical importance of specifying realistic lateral boundary conditions that reflect large-scale pollutant concentrations which can be affected by intercontinental transport of air pollution.

In its next phase, AQMEII will contribute to the modeling and analysis activities performed under the umbrella of the Task Force on Hemispheric Transport of Air Pollutants (TF HTAP). The objectives of this research are to systematically intercompare the performance of global and regional air quality models using a variety of surface and upper air datasets and to perform sensitivity simulations with global and regional models that reflect perturbed emissions in key source regions. These two elements are aimed at determining the differences between the two modeling approaches in quantifying long range transport of air pollution and its impact on local air quality.

This research opportunity will involve the application and evaluation of the Community Multiscale Air Quality (CMAQ) model for an annual base case and several sensitivity simulation over the continental U.S. under the planned AQMEII/HTAP collaboration. Some of the sensitivity simulations are expected to involve downscaling emission perturbation scenarios from global and/or hemispheric chemical transport models to the continental U.S. Additional research activities may include the use of alternate modeling techniques for providing estimates of the effects of intercontinental transport on regional and local air pollution under current and future climate scenarios. These alternate approaches may include instrumented modeling techniques available in CMAQ such as the Integrated Source Apportionment Method (ISAM) or the Decoupled Direct Method in three Dimensions (DDM-3D), and/or the use of nested CMAQ domains covering scales from hemispheric to local.

The Associate should have training and significant experience in the application and evaluation of sophisticated numerical models, and be comfortable with software programming (FORTRAN, R, NCL, scripting, etc.) in the Linux environment. The Associate should also have background in and knowledge of the chemical and physical processes that drive air pollutant formation, transport, and deposition. Finally, the Associate should possess good technical writing and communication skills as evidence from recent publications and presentations.

Please see the NRC website for additional information:

http://nrc58.nas.edu/RAPLab10/Opportunity/Opportunity.aspx?LabCode=22&ROPCD=220110&RONum=B7996

http://sites.nationalacademies.org/pga/rap/

http://sites.nationalacademies.org/pga/RAP/PGA_046398.htm

http://sites.nationalacademies.org/PGA/RAP/PGA_046587.htm