Opportunity Title: EPA Building the Next Generation Air Quality Model Fellowship
Opportunity Reference Code: EPA-ORD-NERL-IO-2019-01-A

Organization U.S. Environmental Protection Agency (EPA)

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How to Apply **This is a repost of a previous posting. If you previously submitted your application to this reference code without the "-A" at the end, then you do not need to reply. Example: If you applied to "EPA-ORD-NERL-IO-2020-13" you do not need to reapply to "EPA-ORD-NERL-IO-2020-13-A".**

A complete application consists of:

- An application
- Transcript(s) – For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. All transcripts must be in English or include an official English translation. Click here for detailed information about acceptable transcripts.
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations. Click here for detailed information about recommendations.

All documents must be in English or include an official English translation.

Application Deadline 6/26/2020 3:00:00 PM Eastern Time Zone

Description ***Applications may be reviewed on a rolling-basis and this posting could close before the deadline.** Click **here** for information about the selection process.

EPA Office/Lab and Location: A research opportunity is currently available at the Environmental Protection Agency (EPA), Office of Research and Development (ORD), Center for Environmental Measurement and Modeling (CEMM), Atmospheric and Environmental Systems Modeling Division (AESMD), Atmospheric Dynamics and Meteorology Branch (ADMB) located in Research Triangle Park, North Carolina. EPA ORD recently reorganized and these are the newly named Centers/Divisions/Branches. This was formerly in the National Exposure Research Laboratory (NERL), Immediate Office (IO).

Research Project: The Community Multiscale Air Quality (CMAQ) model is a 3-D chemical transport model (CTM) that is used in regulatory applications at the US Environmental Protection Agency (EPA) and air quality (AQ) research throughout the world. CMAQ has been developed at US EPA since late 1990s and it is a comprehensive atmospheric chemistry and transport model that numerically integrates a set of independent chemical conservation of mass equations on a series of 3D nested Eulerian grid meshes. The CMAQ model employs operator splitting to modularize the various physical and chemical processes including: subgrid turbulent vertical transport, horizontal and vertical advection, horizontal diffusion, cloud processes (i.e. aqueous chemistry, subgrid convective transport, wet deposition), gas-phase chemistry, and aerosol chemistry and dynamics. The CMAQ system includes anthropogenic emission rates processed by the

Sparse Matrix Operator Kernel Emissions (SMOKE). Plume rise, biogenic emissions and dry deposition are modeled by sub components within CMAQ. Both sources (emissions) and sinks (deposition) are applied as mass tendencies in the vertical diffusion calculation.

This research project is focused on building the next generation air quality model, including re-examining the current CMAQ modeling system, exploring potential methodology to streamline calculation, better utilizing latest machine architecture, adopting robust numerical techniques, I/O paradigms. The research participant will collaborate with CMAQ model research and development team and linking with different meteorological models, WRF and MPAS in contributing to the construction of the next generation air quality model that will be used at the US EPA and around the world.

Learning Objectives:

- Learning how to run CMAQ model
- Profiling existing CMAQ model
- Testing various potential numerical solvers
- Optimizing model source code
- Building coupler to communicate between models

The research participant may acquire hands-on experience in optimizing a scientific application, developing the next generation air model that could link with various scales (regional or global) of meteorological model, and in understanding the intricacies of air quality modeling in real scenarios. The research participant may provide oral presentations, and have the opportunity to give a technical presentation at a scientific conference/workshop. The research participant's research activities may contribute to a manuscript to be submitted to a peer-reviewed journal.

Mentor(s): The mentor for this opportunity is Dr. David C. Wong (wong.david-c@epa.gov). If you have questions about the nature of the research please contact the mentor(s).

Anticipated Appointment Start Date: Summer/Fall 2020. All start dates are flexible and vary depending on numerous factors. Click **here** for detailed information about start dates.

Appointment Length: The appointment will initially be for one year and may be renewed up to three additional years upon EPA recommendation and subject to availability of funding.

Level of Participation: The appointment is full-time.

Participant Stipend: The participant will receive a monthly stipend commensurate with educational level and experience. Click **here** for detailed information about full-time stipends.

EPA Security Clearance: Completion of a successful background investigation by the Office of Personnel Management (OPM) is required for an applicant to be on-boarded at EPA.

ORISE Information: This program, administered by ORAU through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and EPA. Participants

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do not become employees of EPA, DOE or the program administrator, and there are no employment-related benefits. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE.

Questions: Please see the FAQ section of our website. After reading, if you have additional questions about the application process please email EPArpp@orau.org and include the reference code for this opportunity.

Qualifications

The qualified candidate should have received a master's or doctoral degree in one of the relevant fields, or be currently pursuing the degree and will reach completion by the start date of the appointment. Degree must have been received within five years of the appointment start date.

Preferred skills:

- Strong programming skills (knowledge Fortran is a plus)
- Strong parallel programming knowledge, MPI, OpenMP, or hybrid
- Good communication skills
- Understand numerical techniques

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Master's Degree or Doctoral Degree received within the last 60 months or anticipated to be received by 9/1/2020 11:59:00 PM.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (2 👁)
  - **Earth and Geosciences** (7 👁)
  - **Engineering** (6 👁)
  - **Environmental and Marine Sciences** (2 👁)
  - **Mathematics and Statistics** (1 👁)
  - **Physics** (1 👁)
- **Veteran Status:** Veterans Preference, degree received within the last 120 month(s).