Opportunity Title: EPA Long-Wave Radiative Effects of Aerosols Fellowship
Opportunity Reference Code: EPA-ORD-CEMM-AESMD-2020-02-A

Organization U.S. Environmental Protection Agency (EPA)

Reference Code EPA-ORD-CEMM-AESMD-2020-02-A

How to Apply

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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 3/1/2021 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 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) located in Research Triangle Park, North Carolina.

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.

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Throughout the years, CMAQ has advanced by incorporating state-of-art science improvements in gas and aerosol chemistry as well as adding realism by including radiative aerosol direct effects through the development of the two-way coupled WRF-CMAQ model with where WRF (Weather Research Forecasting) is a regional meteorological model. In addition, studies have shown the importance of interactions among different parts of the world, expanding the focus of AQ modeling from local, to regional, and even to global scales. Currently we are developing a coupled system linking the global meteorological model MPAS with CMAQ. The aerosol direct short-wave radiative effect has been implemented in both model systems. As short-wave radiation from the sun hits particles present in the atmosphere, some gets scattered and some gets absorbed. Particles that absorb short-wave radiation will emit long-wave radiation. Also, a portion of the incoming short-wave radiation reaching the ground gets absorbed and re-emitted as long-wave radiation. Long-wave radiation is an essential component in the energy budget of the atmosphere and surface. At least one group of researchers (J. Kushta et al 2014) have included long-wave radiative effects of aerosols in their coupled model. We would also like to implement the direct effects of aerosols on long-wave radiation in our two coupled models to provide a more complete picture of the interactions between aerosols and radiation.

The primary focus of this research project will be on including LW aerosol effects in the RRTMG radiation scheme. We are also interested in applying AI (Artificial Intelligence) into a specific area of research. Research in this direction will be a small portion of the research opportunity.

Learning Objectives: The participant will 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 will have the opportunity to provide oral presentations, and give a technical presentation at a scientific conference/workshop. The research participant will have the opportunity to contribute to a manuscript, to be submitted to a peer-reviewed journal.

Mentor(s): The mentor for this opportunity is David 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: Winter/Spring 2021. 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.

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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 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 one of the degrees and will reach completion by the appointment start date. Degree must have been received within five years of the appointment start date.

Preferred skills:

- Proficiency in Fortran language
- Strong knowledge in radiation schemes in particular RRTMG and calculations
- Good communication skills
- Understanding of numerical techniques
- Knowledge or experience with AI

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 5/31/2021 11:59:00 PM.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (1 👁)
  - **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).

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