

Opportunity Title: Characterization of Atmospheric Aerosol in the US Southeast from Ground and Space-Based Measurements, and GEOS-Chem Model

Opportunity Reference Code: 0113-NPP-NOV23-JPL-EarthSci

Organization National Aeronautics and Space Administration (NASA)

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Application Deadline 11/1/2023 6:00:59 PM Eastern Time Zone

Description The Southeast US (SEUS) region shows detectable cooling over the 20th century, in contrast to the warming trends observed in surface air temperature in most other US regions. Biogenic and secondary organic aerosols (SOA) have been suggested as one of the underlying causes of regional cooling. This hypothesis is supported by strong winter-to-summer seasonality in satellite-derived aerosol optical depth (AOD) that is large enough in the summer to provide cooling through aerosol direct and indirect effects. The amount of summertime particulate matter (PM_{2.5}) in the SEUS, dominated by ammonium sulfate and organic matter, has declined in the last decade due to urban emission controls. The satellite record also shows a negative trend in AOD, but with a much smaller slope than observed for PM_{2.5}, indicating either a compensating decadal summertime increase of aerosol at higher altitudes, or the possibility that the surface aerosols are only a small contribution to the total aerosol column in the summer.

To unravel the complex nature of aerosol effects on the surface temperature in the SEUS region we will investigate how SEUS aerosol with observationally constrained optical properties and vertical distributions impact surface temperatures. We will analyze in-situ, aircraft, and satellite data from the Studies of Emissions and Atmospheric Composition, Clouds and Climate Coupling by Regional Surveys (SEAC4RS) 2013 field campaign in conjunction with GEOS-Chem transport model in order to:

- Quantify vertically resolved microphysical (size distribution) and optical properties (refractive index, SSA) of summertime aerosols in aerosol-dominated regions of the SEUS;
- Generate a multi-year record of region-specific aerosol products, and establish a relation to decadal temperature trends;

This work will allow us to evaluate the impact of aerosol in the SEUS, and establish whether aerosols are the primary driver of temperature trends in the region.

Location:

Jet Propulsion Laboratory
Pasadena, California

Field of Science:Earth Science

Advisors:

Olga Kalashnikova
Olga.Kalashnikova@jpl.nasa.gov



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818-393-0469

Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of the United States. A complete list of Designated Countries can be found at: <https://www.nasa.gov/oiir/export-control>.

Eligibility is currently open to:

- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Eligibility Requirements

- **Degree:** Doctoral Degree.