

FY21 AC4 Program Information Sheet

NOAA Climate Program Office

Program Name

Atmospheric Chemistry, Carbon Cycle and Climate (AC4) Program

Program Missions

AC4 is a competitive research program that incorporates research on atmospheric chemistry and the carbon cycle. In collaboration with the NOAA Laboratories and the academic community, the AC4 program supports research to determine the processes governing atmospheric concentrations of trace gases and aerosols in the context of the Earth System. The program aims to contribute a process-level understanding of the Earth System through observation, modeling, analysis, and field studies to support the development and improvement of models, and to inform carbon and air pollution management efforts.

Focus for FY21

Emissions, Air Quality, and Heat in Urban Areas

Funding for FY21

Proposals should budget for up to \$200K per year over 2-3 years

Competition Information

Despite decades of decline in ground-level ozone and fine particulate matter (PM_{2.5}), many U.S. metropolitan areas still violate the 8-hour ozone standard as regulated under the Clean Air Act. This could be a result of unanticipated trends in emissions, increasing influence of regional background sources, long-range transport, changes in atmospheric chemistry, and/or a consequence of a changing climate with heat waves in the United States becoming more frequent, longer in duration, and more intense. In fact, warming climate and increasing episodes of extreme heat--because they exacerbate air quality--require higher emission reductions to meet air quality standards, and present their own challenges due to various impacts of extreme heat.

Recent research has revealed major gaps in our understanding of urban chemistry. In urban atmospheres, volatile chemical products (VCPs = coatings, adhesives, inks, personal care products, cleaning agents, etc.) are emerging as a major source of volatile organic compounds (VOCs). The emissions and impacts of VCPs on atmospheric chemistry are not well understood. In the presence of nitrogen oxides (NO_x), VOCs undergo chemistry that lead to the formation of ground-level ozone and aerosols. In a pilot study, field measurements in New York City revealed that fragranced consumer products and other VCPs account for over half of the anthropogenic VOC emissions, and enhance formation of ground-level ozone during a heatwave event.

To improve our understanding of emissions and chemical reactions that affect urban air quality and climate, the NOAA Chemical Sciences Laboratory is planning the [Atmospheric Emissions and Reactions Observed from Megacities to Marine Areas \(AEROMMA\)](#) aircraft based field campaign to collect new observations from megacities to marine environments, currently scheduled for the summer of 2021. The chemical instrumentation that will be used on the WP-3 NOAA aircraft will address gaps in both urban and marine chemistry. It is anticipated that the field observations will:

- (1) Provide timely information to urban planners and stakeholder groups on emissions from VCPs and fossil fuel sources that impact air quality and climate;
- (2) Reduce uncertainties in global climate models due to marine aerosols from biogenic sulfur emissions;
- (3) Provide urban and marine datasets to improve the representation of emissions and chemical and physical processes in the next generation NOAA weather-chemistry models.

The Climate Program Office is pursuing a new integrative and interdisciplinary initiative that will apply its core capabilities and align investments with partners in a set of climate-related risk areas including extreme heat. The immediate focus is on Urban Climate Science to promote Heat-Healthy Cities.

In FY21, the AC4 program will focus on a subset of AEROMMA by seeking to support studies of emissions and chemical transformation in the urban atmosphere. Specifically, AC4 plans to support the types of projects that:

- Determine organics emissions and chemistry, including of understudied VCPs to better understand the impact on ozone and aerosol formation, and to study their relative importance on urban air quality compared to other sources of VOCs such as from energy-related, cooking, and biogenic sources.
- Determine reactive nitrogen emissions and chemistry in urban corridor(s) (i.e., urban core to suburban and outlying rural areas) to understand the current importance of combustion and non-combustion sources, continue the trend analysis and determine changes in the reactive nitrogen cycle chemistry and its influence on ozone and aerosol formation.
- Determine the fraction of urban VOC and NO_x emissions associated with emissions of CO₂ and methane (CH₄) from transportation, buildings, industry, and landfills to quantify co-benefits of managing for both air quality and carbon emissions in urban settings.
- Investigate urban meteorology, to better understand extreme heat on urban air quality, urban heat islands, and the role of long-range transport versus local sources of air pollution.

Each proposal is required to have a support letter outlining project participation in AEROMMA and/or its contribution to New York City. The scope of the competition is limited to the New York City region, unless measurements aboard the aircraft(s) allow for sampling in other areas.

All funded project PIs associated with AEROMMA effort are encouraged to include in their budget, as appropriate, travel to 1 meeting, nominally in Boulder, CO, for a science team meeting/data workshop. Two- to three-year proposals are welcome, spanning data collecting and mapping to data collection and analysis.

This solicitation focuses primarily on in situ data collection, analysis, modeling, and translation to usable environmental intelligence in New York City, but demonstrating the utility of satellite data could also be of relevance.

Contact:

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Data Archiving

Data Accessibility: The AC4 Program requires that public access to grant/contract-produced data be enabled in the following way:

Funding recipients will establish their own data hosting capability (describe in proposal)

Technical recommendations: There is no specific technical guidance; however, proposals are to describe their proposed approach. Use of open-standard formats and methods is encouraged.

Resources: Proposals are permitted to include the costs of data sharing or archiving in their budgets.