

FY20 AC4 Program Information Sheet

Program Name

Atmospheric Chemistry, Carbon Cycle and Climate (AC4) Program

Program Mission

AC4 program sits within the Earth System Science and Modeling (ESSM) Division of the NOAA Office of Oceanic and Atmospheric Research (OAR) Climate Program Office (CPO). 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 enhance 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 FY20

Urban atmosphere in a warming climate: chemistry, carbon and composition

Funding for FY20

Pending availability of funds in FY2020, AC4 anticipates a funding allocation of \$1.5M per year for three years for this competition. Most proposals should budget for up to \$600K total over 3 years (average \$200K/year), but a handful of well-justified, larger awards (up to \$1 million total budget) could be made to accommodate team efforts or larger-scale field projects.

Competition Information

Multiple linkages connect air quality and climate change, none more so than in the urban atmosphere. Climate change, favoring more heat waves and episodes of stagnant air, may deteriorate air quality by increasing ozone and fine particulate matter (PM_{2.5}) concentrations and high pollution episodes. A majority of U.S. cities has seen dramatic improvements in air quality due to emission reductions of air pollutants, although in some cases tempered by the “climate penalty” - higher than expected air pollution levels because of the changing climate. While great progress has been made in limiting the anthropogenic emissions of ozone and aerosol precursors, millions of people in the United States are still exposed to harmful levels of air pollution, and significant air quality challenges remain, for example in intermountain valleys in the western United States., Fairbanks, Alaska and other places. In addition to improving air quality in the past few years, some cities have committed to climate change mitigation. In fact, a large number of U.S. cities have set city-wide targets for CO₂ reductions. There is rising interest in understanding, and potentially managing, carbon fluxes within urban areas. Several cities have been closely studied already, e.g. Indianapolis, Los Angeles, Boston, Salt Lake City and

San Francisco, and scientists across the United States are piecing together a larger, national picture of urban carbon, especially CO₂ and methane fluxes.

For air quality and carbon management purposes, urban areas are both a source of pollutants, and the best place to focus research to inform mitigation efforts, given the geographic concentration of emissions. To inform those mitigation efforts, more observations, more coordination and information exchange among scientists measuring different aspects of the urban atmosphere are needed. In addition to studying previously identified emission sources, and chemical and deposition mechanisms, there is a need to revisit the urban atmosphere as changing emissions are resulting in different chemical compounds and altered chemical mechanisms. Urban vegetation and its interaction with the atmospheric composition, both as a source and a sink of various compounds, is in need of improved fundamental understanding through measurements. Rising temperatures, with the added impact of the urban heat island effect and potential changes to urban humidity, only add to the complexity of the urban atmosphere, its evolution in recent decades and potential future changes.

In FY20, to continue and expand its investments in the urban atmosphere, the AC4 program invites proposals focused on one or more of the following:

- Research that builds on previously developed resources, e.g. CO₂-USA network, or existing infrastructure to analyze or otherwise explore in depth recently studied cities across the United States
- Multispecies approach to understanding the urban environment
- Research with the potential to inform mitigation strategies, especially with regard to co-benefits for air pollution and greenhouse gas reduction
- Participation in upcoming field efforts in U.S. cities or exploration of novel chemistry and tracers of urban air, although an FY21 solicitation for field efforts is also anticipated
- Investigation of the evolution of urban air composition in a warming climate

Proposals exploring urban areas outside of the United States could be considered if they employ satellite data or otherwise available data sets, and especially if they shed light on chemical regimes and emission source types using multiple species or other proxies, and draw comparisons with U.S. cities.

Although information is needed on all temporal and spatial scales, the research solicited with this announcement should be at the resolution that is relevant to local and regional understanding of the urban atmosphere.

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.