Cover page

RDF Application 2020: Enhancing Airborne Particle Measurement Capabilities of Center for Atmospheric Chemistry and the Environment (CACE)

Lead contact for RDF Application:

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Key Participating Units: The Center for Atmospheric Chemistry and the Environment, the College of Geosciences (Dept. of Atmospheric Sciences, Dept. of Oceanography, Dept. of Geology and Geophysics, GERG, the TAMU Lightning Network), the College of Engineering and the College of Medicine (Engineering Medicine [EnMed]), the College of Architecture (Landscape Architecture and Urban Planning), the School of Public Health (Dept. of Environmental and Occupational Health), the College of Agriculture and Life Sciences (Dept. of Ecology and Conservation Biology), and all the members of CACE.

Anticipated Request Amount ($): $939,608

Executive summary of this application to utilize Research Development Funds:

The mission of the Center for Atmospheric Chemistry and the Environment (CACE) is to facilitate the development and execution of large scale interdisciplinary projects that would otherwise not be realizable or feasible for faculty and research groups at Texas A&M. As such, CACE's goal is to provide both intellectual space for the development of interdisciplinary projects requiring diverse expertise and to house deployable equipment and measurement platforms which will be used in a wide variety of collaboration projects. This proposal supports and strengthens CACE and its ability to serve TAMU research through 2 specific aims.

1. To ensure that CACE provides the best available technology, we propose to purchase, maintain, and provide training for state-of-the art instruments for shared usage.

2. To reinvigorate CACE and expand of the CACE user base. TAMU is home to many world class experts in chemistry, engineering, and applied sciences whose research need atmospheric samples. However, the majority of these expert experimentalists focus exclusively on relatively simple samples which can be analyzed in their respective laboratories, while the real world atmospheric samples are complex and need advanced techniques to be fully characterized. We envision CACE serving as a bridge between superior technologies used in the TAMU laboratories and the most relevant real-world samples whose characterization will be used to address key questions in geosciences, chemistry, health sciences, and engineering. To do so, we propose to make available the necessary technology for size-resolved aerosol sampling and aerosol sample preservation to TAMU PIs, as part of the shared CACE resources.

Recently, there is an urgent growing need to quantify the composition and concentrations of aerosol particles in order to enhance and facilitate current research topics, including testing of facemask performance during the COVID pandemic, the development of medical chambers for virus-free safety procedures, indoor and outdoor air quality studies, storm development, shipborne and airborne field measurements to understand climate change, and well-laboratory studies on the aerosol fundamentals properties. Herein we propose to purchase instrumentation needed to determine the concentration, size, and chemical composition of aerosols that can be applied to a wide range of interdisciplinary studies, specifically a TSI Scanning Mobility Particle Sizer (TSI, Inc. nano-SMPS) and a Soot Particle Long Time-of -flight High Resolution Aerosol Mass Spectrometer (SP-L-ToF-HR-AMS). CACE will add size and time resolved DRUM impactor samplers (DRUMAir, LCC.) and -80 °C freezers to the resources available to its members and additional users. This proposal supports TAMU research infrastructure by enabling TAMU responsiveness to large scale interdisciplinary challenges faced by leading scientists and citizens today. This RDF will also significantly enhance external funding, particularly CACE's competitiveness in obtaining larger external grants, including NSF Midscale Infrastructure funds, DOE research campaign funds, and large NIH funding opportunities.