



NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

NSF 23-120

Dear Colleague Letter: Critical Research on GreenHouse Gas Transport and Fate in the Planetary Boundary Layer and Above (GHG-PBLA)

June 15, 2023

Dear Colleague:

The Division of Atmospheric and Geospace Sciences (AGS) at the National Science Foundation (NSF) encourages the U.S. research community to submit innovative proposals for fundamental research to better understand **GreenHouse Gas** mixing/exchange, transport, and fate throughout the atmosphere in the **Planetary Boundary Layer and Above** (GHG-PBLA).

It is a general consensus, both nationally and internationally, that a better and more accurate measuring, monitoring, reporting, and verification (MMRV) program is needed to quantify emissions and removal of GHGs from the atmosphere across all geographic regions and all sectors of the economy, to mitigate climate change in a meaningful way. In furtherance of this objective, NSF will support fundamental research needed to provide science-based knowledge, requirements, and technologies for policy and decision makers.

In November 2022, the Cooperative Programs for Advancement of Earth System Science (CPAESS) at the University Corporation for Atmospheric Research (UCAR) held a community workshop on this topic. The workshop report identified gaps in current technologies, modeling, and measurements of GHGs, particularly in the atmospheric boundary layer. Gaps in measurement techniques and modeling prevent reliable estimates of GHG mixing/exchange, transport, and atmospheric fate. Two specific knowledge gaps were discussed in the workshop report: 1) sub-mesoscale processes, including turbulent eddies and atmospheric chemistry; 2) the "scale-up" of how smaller scale processes translate to mesoscale, large-scale, and global scale mixing and transport processes of GHGs in the atmosphere.

To address these gaps, NSF-AGS is inviting proposals from the U.S. research community in the following priority areas:

- Atmospheric modeling for improved understanding of GHG distribution processes to provide reliable GHG estimates and minimizing of concentration uncertainties.
- Measurement opportunities for improved understanding of planetary boundary layer (PBL) processes and reduction of GHG source attribution uncertainties.
- Modeling and parameterization to bridge the scale gaps and to better depict GHG transport and fate.
- Protocols for robust inter-comparison and assessment of the modeling of PBL processes and GHG exchanges between Earth's surface and its atmosphere.

This DCL does not constitute a new competition or program. Rather, proposals submitted in response to this DCL should be prepared and submitted in accordance with the general guidelines contained in the [NSF Proposal & Award Policies & Procedures Guide](#) (PAPPG) and instructions for relevant programs. Proposals may be submitted at any time, with funding expected in FY24 and FY25. Proposals will be evaluated using the standard NSF merit review criteria of intellectual merit and broader impacts. In addition to being responsive to NSF PAPPG requirements, proposals submitted in response to this call should focus on the scientific research relevant to the above-listed scientific areas. Depending on the proposal focus, research topic, and scale of the science problem, proposals may be submitted to any AGS Atmosphere Section core program, which includes [Physical and Dynamic Meteorology](#) (1525), [Atmospheric Chemistry](#) (1524), [Climate and Large-scale Dynamics](#) (5740), and [Paleoclimate](#) (1530). To determine a proposal's programmatic fit, reference the relevant AGS program description on the NSF website and/or contact the cognizant program director.

Sincerely,

Alexandra R. Isern
Assistant Director
Directorate for Geosciences