



NATIONAL SCIENCE FOUNDATION  
2415 EISENHOWER AVENUE  
ALEXANDRIA, VIRGINIA 22314

**NSF 23-151**

## Dear Colleague Letter: CO<sub>2</sub> Removal and Solar Radiation Modification Strategies: Science, Governance and Consequences

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September 12, 2023

Dear Colleagues:

The National Science Foundation's (NSF) Directorates for Geosciences (GEO), Social, Behavioral and Economic Sciences (SBE), and Office of International Science and Engineering (OISE) jointly support research to address the twenty-first century global challenge of climate change by seeking to increase understanding of Carbon Dioxide (CO<sub>2</sub>) Removal (CDR) and Solar Radiation Modification (SRM) science, governance, and consequences. While the rapid reduction of CO<sub>2</sub> and other greenhouse gas (GHG) emissions remains a top priority, the scientific community has urged federal agencies to support research on additional potential solutions and their consequences, including strategies that may ameliorate anthropogenic climate change <sup>1-3</sup>. In addition, recent U.S. Government reports <sup>4-5</sup> seek to mobilize the Federal Government and civil society toward enhancing current understanding of potentially effective and innovative climate mitigation strategies. This Dear Colleague Letter (DCL) seeks to encourage submission of proposals on the fundamental understanding and assessment of environmental processes, and/or social, cultural, and ethical impacts of CDR and SRM.

CDR and SRM encompass a broad and growing range of strategies, each with specific potential environmental, and societal impacts and unintended consequences <sup>1-3</sup>. Effective strategies need to be co-developed in an environmentally and socially responsible manner that includes community-engaged research promoting and adhering to open scientific research aligned with FAIR <sup>6</sup> and CARE <sup>7</sup> principles of data sharing and data use. This DCL welcomes proposals in relevant areas of research that align with participating divisions, with particular interest on projects that integrate research programs from both GEO and SBE. Examples include projects that have integrative engagement with ethical frameworks, governance structures, and/or environmental justice issues that help guide research and potential scaling and deployment of CDR and SRM measures. Requests to form and foster interdisciplinary national and international research teams are particularly encouraged

through submission of types of proposals described in Chapter II.F of the [NSF Proposal & Award Policies & Procedures Guide](#) (PAPPG), including planning, workshop <sup>8</sup>, Grant Opportunities for Academic Liaison with Industry (GOALI), and Research Advanced by Interdisciplinary Science and Engineering (RAISE), and to existing program solicitations including [Research Coordination Network \(RCN\)](#), [AccelNet](#), and [Global Centers](#).

This DCL does not constitute a new competition or program. Rather, interested proposers should prepare and submit proposals in accordance with the guidance contained in the PAPPG and any solicitation or program specific instructions for the relevant programs.

All relevant programs within participating Divisions/Offices:

GEO/Division of Atmospheric and Geospace Sciences

GEO/Division of Earth Sciences

GEO/Division of Ocean Sciences

GEO/Office of Polar Programs

SBE/Division of Behavioral and Cognitive Sciences

SBE/Division of Social and Economic Sciences

OISE

Questions concerning this opportunity may be emailed to:

[cdr-srm@nsf.gov](mailto:cdr-srm@nsf.gov)

Sincerely,

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**References:**

[1] National Academies of Sciences, Engineering, and Medicine. 2019. *Negative Emissions Technologies and Reliable Sequestration: A Research Agenda*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25259>.

[2] National Academies of Sciences, Engineering, and Medicine. 2021. *Reflecting Sunlight: Recommendations for Solar Geoengineering Research and Research Governance*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25762>.

[3] National Academies of Sciences, Engineering, and Medicine. 2022. *A Research Strategy for Ocean-based Carbon Dioxide Removal and Sequestration*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26278>.

[4] Ocean Policy Committee. March 2023. *Ocean Climate Action Plan. A Report by the Ocean Policy Committee*. Washington, DC. [https://www.noaa.gov/sites/default/files/2023-03/Ocean-Climate-Action-Plan\\_Final.pdf](https://www.noaa.gov/sites/default/files/2023-03/Ocean-Climate-Action-Plan_Final.pdf).

[5] Office of Science Office of Science and Technology Policy. 2023. *Congressionally Mandated Research Plan and an Initial Research Governance Framework Related to Solar Radiation Modification*. Washington, DC. <https://www.whitehouse.gov/wp-content/uploads/2023/06/Congressionally-Mandated-Report-on-Solar-Radiation-Modification.pdf>.

[6] Wilkinson, M., Dumontier, M., Aalbersberg, I., et al. 2016. The FAIR *Guiding Principles for scientific data management and stewardship*. *Science Data* 3, 160018. <https://doi.org/10.1038/sdata.2016.18>.

[7] The CARE Principles for Indigenous Data Governance: <https://www.gida-global.org/care>.

[8] Also referred to as conferences in PAPPG Chapter II.F.9.