NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

NSF 23-057

Dear Colleague Letter: Novel Approaches to Critical Minerals Research in the Geosciences (GEO-CM)

February 22, 2023

Dear Colleagues:

The National Science Foundation's Directorate for Geosciences (GEO) Divisions of Earth Sciences (EAR), Ocean Sciences (OCE), and Atmospheric and Geospace Sciences (AGS), as well as the Office of Polar Programs (OPP) encourage the submission of innovative, high-impact proposals on fundamental research to facilitate discovery, characterization, extraction, and separation of critical minerals, as noted in Section 10359 of the CHIPS and Science Act 2022 (42 U.S.C. 19067). Such research is a key component in ensuring availability of the essential metals and rare earth elements (REE) required for the Nation and world to achieve a clean-energy future through the transition to the New Green Economy and Net Zero Carbon. We encourage proposals that bring together academic researchers and experts from partner organizations, including those in relevant industries.

Research topics of interest include but are not limited to the following:

- Research leading to advanced understanding of the geologic and geochemical processes through which critical minerals form and are concentrated into economically viable deposits.
- Research that advances our understanding of in situ biogeochemical processes that may lead to more efficient, economical, and environmentally sustainable approaches for mobilizing, concentrating, and separating critical minerals.
- Research that leads to the development of innovative prospecting approaches/technologies to aid in the identification and characterization of critical mineral resources in Earth's crust and/or on the ocean floor.
- Research that advances understanding of the processes that control the leaching and concentration of critical minerals and associated contaminants from anthropogenically transformed geologic environments (e.g., mine tailings, oil fields, ash deposits fields, ash deposits).
- Research related to sustainable use of water resources in regions where critical

minerals are mined, particularly those susceptible to anthropogenic stressors and water scarcity.
- Research leading to advanced understanding of how environmental contaminants from critical mineral exploration and extraction affect atmospheric and water quality, including effects on surface and groundwater systems and how subsurface stress and pore pressure redistribution may cause ground subsidence or induce seismicity.
- Research advancing understanding of the biological / ecological impacts on Arctic plant and animal communities, and/or the socioeconomic impacts on human communities in the Arctic due to critical mineral exploration and extraction.

Research proposals submitted in response to this DCL must fall within the scope of programs in the Directorate for Geosciences. For example, proposals with a primary focus on optimizing engineering solutions, operations or management of engineered systems are not appropriate. Proposers are strongly encouraged to reach out to participating programs before submission to confirm programmatic fit.

Successful projects will include sustainable, creative, integrative, and effective broader impacts activities developed within the context of the mission, goals, and resources of the organizations involved, and should be reflected in the expertise of collaborators, the proposal budget, and budget justification. Proposers are encouraged to integrate training and research opportunities for undergraduate and graduate students to prepare the next generation of scientists, researchers, and professionals with expertise in critical minerals.

PROPOSAL PREPARATION, SUBMISSION, AND MERIT REVIEW

Proposals submitted in response to this DCL should focus on fundamental science approaches and hypothesis-driven research. They may be single- or multi-discipline, with innovative collaborative approaches being encouraged. This is not an announcement of a new funding opportunity; proposals should be submitted to the most relevant program participating in this DCL (see below). Projects that could benefit from co-review may be shared among multiple programs.

Proposals should be prepared and submitted in accordance with the general guidelines contained in the NSF Proposal & Award Policies & Procedures Guide (PAPPG) and the relevant Program Description or Program Solicitation (see below). Proposals must have a title that is prefaced with "GEO-CM:" after any solicitation-specific title requirements to indicate that the proposal is to be considered in response to this DCL.

PARTICIPATING PROGRAMS AND SOLICITATIONS

- EAR Geobiology and Low-Temperature Geochemistry:https://new.nsf.gov/funding/opportunities/geobiology-low-temperature-

geochemistry
- EAR Hydrologic Sciences: https://new.nsf.gov/funding/opportunities/hydrologic-sciences
- EAR Petrology and Geochemistry: https://new.nsf.gov/funding/opportunities/petrology-and-geochemistry-ch-0
- EAR Geophysics: https://new.nsf.gov/funding/opportunities/geophysics-ph-0
- EAR Geomorphology and Land-use Dynamics: https://new.nsf.gov/funding/opportunities/geomorphology-and-land-use-dynamics
- EAR Sedimentology Geology and Paleobiology: https://new.nsf.gov/funding/opportunities/sedimentary-geology-paleobiology-sgp-0
- EAR Instrumentation and Facilities: https://new.nsf.gov/funding/opportunities/earth-sciences-instrumentation-facilities-earif
- OCE Marine Geology and Geophysics: https://new.nsf.gov/funding/opportunities/marine-geology-geophysics-mgg
- OPP Arctic Research: https://new.nsf.gov/funding/opportunities/arctic-research-opportunities
- OPP Antarctic Research (limited to the first research topic listed above): https://new.nsf.gov/funding/opportunities/antarctic-research-not-requiring-us-antarctic or https://new.nsf.gov/funding/opportunities/antarctic-research-requiring-us-antarctic-program
- AGS Atmospheric and Geospace Sciences (all relevant programs) https://www.nsf.gov/funding/programs.jsp?org=AGS

Questions concerning this opportunity may be emailed to:

- Laura Lautz, Earth Sciences: Hydrologic Sciences, llautz@nsf.gov
- Jennifer Wade, Earth Sciences: Petrology and Geochemistry, jwade@nsf.gov
- Elizabeth Hearn, Earth Sciences: Geophysics, ehearn@nsf.gov
- Justin Lawrence, Earth Sciences: Geomorphology and Land-use Dynamics, jlawrenc@nsf.gov
- Alberto Perez Huerta, Earth Sciences: Sedimentary Geology and Paleobiology, and Geobiology and Low-Temperature Geochemistry, aperezhu@nsf.gov
- David Lambert, Earth Sciences: Instrumentation and Facilities, dlambert@nsf.gov
- Gail Christeson, Ocean Sciences: Marine Geology and Geophysics, gchriste@nsf.gov
- Erica Hill or Marc Stieglitz, Polar Programs: Arctic Research, erhill@nsf.gov or mstiegli@nsf.gov
- Michael Jackson, Polar Programs: Antarctic Research, mejackso@nsf.gov
- Soumaya Belmecheri, Atmospheric and Geospace Sciences (all relevant programs), sbelmech@nsf.gov

Sincerely,

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