DARTMOUTH

Mr. Brian Stone, Acting Director
National Science Foundation
2415 Eisenhower Avenue
Alexandria, VA 22314

Dear Acting Director Stone,

We, the undersigned researchers of Dartmouth College, write in response to the NSF Dear Colleague Letter on its intent to restructure critical weather infrastructure. As a UCAR member institution since 2015, we urge NSF to preserve the integrated structure and university-serving mission of the NSF National Center for Atmospheric Research (NCAR). This is not some matter of institutional loyalty. Instead, we write because of the essential research, teaching, and workforce development our faculty and students rely on from NCAR. We also write because those capabilities would not be replicated by distributing them across other entities, public or private.

Fundamentally, NCAR is a force multiplier for the research conducted by universities like Dartmouth. Dartmouth is the smallest-enrollment institution in the Ivy League, with approximately 4,500 undergraduates and a graduate school (Guarini School of Advanced Studies) established only in 2018. We do not have and cannot maintain the infrastructure that NCAR provides to the research community, from global Earth system models, to rapidly awarded high-performance computing allocations, to specialized observational platforms, to essential research training programs. Herein is NCAR's reason for being; the center furnishes these resources both because their provision is beyond the scope of any one institution, while ensuring that there is little needless duplication.

Faculty and students across eleven departments and programs at Dartmouth—spanning Geography, Earth and Planetary Sciences, Physics and Astronomy, Mathematics, Biology, Environmental Studies, Engineering, the Irving Institute for Energy and Society, and the Institute for Arctic Studies—depend on NCAR resources. This includes the Community Earth System Model (CESM) and the Weather Research and Forecasting (WRF) model, which our faculty use in both research and the classroom; high-performance computing resources, which support both graduate research and undergraduate courses in Earth system modeling; the SOARS and SIParCS programs, which provide critical research training for our undergraduates; and the Advanced Study Program, which has supported extended research visits by our faculty and PhD students to NCAR laboratories including HAO and CGD. Over the past decade, Dartmouth faculty have secured hundreds of millions in externally funded Earth system science research from NSF, NASA, DOE, NOAA, and other agencies. A significant portion of the success of that investment in Dartmouth

depends on the models, data, computing, and collaborative infrastructure that NCAR maintains. Absent the resource from NCAR, much of this research could become wasted or inefficient investment, undermining the federal government's wider research support priorities.

To be clear, these are not abstract dependencies. Dartmouth faculty hold active research collaborations with scientists across multiple NCAR laboratories, including CGD, RAL, and HAO. Dartmouth physicists serve as Senior Research Associates at HAO, with joint NSF- and NASA-funded research on space weather and heliophysics that is directly relevant to protecting the power grid and satellite operations. Dartmouth climate scientists collaborate with CGD staff on drought science supported by NOAA and the National Academies and contribute to the NCAR Climate Data Guide. Many Dartmouth faculty are products of NCAR training, recent PhDs have taken postdoctoral positions at NCAR, undergraduates have done summer internships there, and many NCAR alumni have joined the Dartmouth community. This bidirectional pipeline is the UCAR model working as designed: a centralized hub that strengthens distributed university research, and a university community that feeds talent and ideas back to the national center.

Dartmouth has particular expertise in Arctic and cold-regions science that depends on NCAR integration. Our Institute for Arctic Studies, established in 1989, and our proximity to the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, NH, position Dartmouth as a natural partner for research on Arctic climate change, permafrost dynamics, cryosphere processes, and high-latitude weather prediction. This is not hypothetical: Dartmouth engineering faculty collaborate directly with NCAR scientists to use the CESM Large Ensemble to simulate sea ice conditions for the international MOSAiC Arctic expedition and funded by NSF. That research exemplifies the kind of university-NCAR collaboration that only works when modeling infrastructure, computing resources, field campaigns, and scientific expertise are co-located in a vertically integrated collaboration. Arctic research of this kind requires coupled Earth system models capable of resolving polar processes at scales relevant to sea ice, permafrost, and high-latitude weather. Fragmenting NCAR's modeling and observational capabilities would be particularly damaging for Arctic science at a moment when the United States needs to strengthen, not weaken, its predictive capacity in the high latitudes for both scientific and national security reasons.

Fragmenting NCAR would not save money; it would destroy invested value. The economic logic of NCAR is that of a shared public good: a single integrated investment pipeline that produces returns for 130 member universities and multiple federal agencies. CESM alone has over a thousand active contributors across the university community and is used by DOD, NOAA, NASA, DOE, and FAA. WRF has over 71,000 registered users worldwide. These are not assets that can be parceled out to individual universities or private contractors and retain their value. They are of and for the research community, and this integration is key to their value: the same institution that develops the model also maintains the computing infrastructure to run it, trains the workforce to use it, and connects the observational science that evaluates and improves it. Sloughing off these functions to other parts of NSF or the government would impose massive coordination costs, fragment institutional memory, and erode the very synergies that make the system work and make NCAR the enviable benchmark for Earth science research the world over.

The timing of this proposed restructuring is concerning and could degrade U.S. operation forecast capacity. The Model for Prediction Across Scales (MPAS), developed at NCAR, has been

announced as the likely foundation for NOAA's next-generation operational prediction system. Dismantling the institution that built this model precisely when it is being adopted for operations, would directly undermine the national priority of U.S. leadership in numerical weather prediction. Especially at a moment where U.S. interests, materiel, and assets are deployed abroad in a geopolitically uncertain world. Our international competitors are investing heavily in both conventional and AI-based forecasting; the EU's AIFS, for example, is rapidly becoming an astounding public resource. Where is the equivalent U.S. competitor? NCAR is the U.S. institution best positioned to integrate AI methods with the physical understanding required to ensure those methods are reliable for high-impact weather events. Dismantling that capability at this moment of needed investment would cede scientific ground that will be extraordinarily difficult to recover.

The workforce implications of shunting NCAR to various institutions cannot be overstated. Dartmouth's Climate Change Science minor, our Climate Collaborative, the Earth and Planetary Sciences and EEES doctoral programs, as well as the Institute for Arctic Studies and Irving Institute for Energy and Society all prepare students for careers in atmospheric and Earth system science. Many of these students build essential skills through NCAR training programs, workshops, and computing resources. If these pathways are disrupted, the damage will not be hypothetical: it will manifest as a smaller, less capable pipeline of scientists entering universities, agencies, and the private sector at exactly the time when demand for weather and climate expertise is growing across the economy.

We recognize that NSF may be operating under directives that require reform or efficiency improvements. If adjustments are necessary, they should focus on strengthening coordination, improving performance metrics, and increasing cost transparency within the existing integrated model. They should not fragment the very architecture that makes NCAR effective. The current structure of university governance through UCAR supporting NSF stewardship, ensures scientific independence, merit-based access, and alignment with the research community's needs. Transferring stewardship to a federal agency with an operational or regulatory mandate, or to a private entity, would fundamentally alter this mission in ways that would diminish the value of the investment to the nation. It would be an astounding loss to dismantle a global scientific flagship like NCAR, precisely as other nations around the world work to emulate its model.

NCAR is not some collection of assets to be redistributed. It is an integrated scientific ecosystem, built over six decades, that serves the national interest in ways no other institution can replicate. It is, like the earth system itself, greater than the sum of its parts. It is essential that NSF preserve it.

Sincerely,

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