To: NSF Office of the Director
Subject: Feedback to NSF 26-203 Dear Colleague Letter NSF Intent to restructure Critical Weather Infrastructure

We write this letter as 111 researchers in all aspects of earth science (atmosphere, ocean, and land). We are from universities and other institutions all around the U.S., from Alaska to Florida. We have conducted investigations related to severe and hazardous weather and have been successful because of the powerful observational equipment and expert guidance of the staff of the National Science Foundation's National Center for Atmospheric Research (NSF NCAR).

We are also aware that NSF NCAR is at a point where it is evolving to meet nation's needs to address severe thunderstorms, atmospheric rivers, tornadoes, hail, hurricanes, floods, wildfires, and drought. To protect against these events, multiple disciplines need to work together in teams. In this letter, we advocate for a particular aspect of NSF NCAR that has worked well in the past and should be retained and strengthened, namely, its role in providing coordination of observational facilities and models to solve the biggest problems of severe and hazardous weather. It is now obvious that severe and hazardous weather events in the US are influenced by upstream conditions (e.g., atmospheric rivers, El Niño). The ocean, land surface, topography, and river runoff all act together with the atmosphere to set the stage for these events. Teams of oceanographers, meteorologists, hydrologists, modelers, and instrumentation experts must work together in increasingly complex scenarios. The task of coordination is correspondingly greater than ever.

Prediction of extreme weather events is a problem too large for individual institutions. For more than six decades NSF NCAR has served as the central facility for coordinating research aimed at improving these predictions. We and hundreds of others have made use of NSF NCAR as a central facility to advance research advancing the nation's resilience to severe and hazardous weather. As currently configured, NSF NCAR has provided an efficient way to address these massive problems, which are so large that team science is essential to addressing them. Distributing weather research infrastructure and coordination expertise will weaken the weather enterprise because team science will not be sustained at the appropriate level.

NSF NCAR not only coordinates investigators from multiple universities, it has the capacity to link university investigators to the most appropriate partners to form multi-agency projects. NSF NCAR has already played this role in projects studying weather systems by coordinating ocean observing fleets operated by the US and other countries, research aircraft platforms including those of NSF NCAR and other federal agencies, and land-based observing systems including NSF NCAR's radars, dropsondes, other instruments of both NSF NCAR and other federal agencies, and uncrewed atmospheric and ocean observing platforms managed by federal, academic and private sectors.

NSF NCAR's coordination capability includes field operation management of observational facilities. Once a project involving multiple federal agencies and universities with diverse observational facilities and even other countries has been put in place, an operational center is crucial for its success. NSF NCAR has successfully functioned as such an operational center in coordinating major programs like GATE, TOGA COARE, DYNAMO, and others. It is essential for NSF NCAR to retain this function.

Upon completion of projects, NSF NCAR serves as the central depository and library for the data collected so that the investment in the project is long-lived for researchers on severe and hazardous weather.

Another key coordination role of NSF NCAR is providing community modeling, AI-enabled data science, and forecasting testbeds, which can be run both during and after project completion.

In these ways, NSF NCAR delivers end-to-end capability for national projects with measurable public value.

We are now at the cusp of understanding the atmosphere and its societal dangers, with an Earth System Science framework in which air, sea, and land processes operate together. We need NSF NCAR to continue to bring together researchers and enable them in forming multidisciplinary teams. Restructuring NSF NCAR should be a step forward. Breaking up NSF NCAR in a way that limits or destroys its ability to enable teams to form and address the big problems of earth science prediction for the benefit of society through applications of new knowledge seems like a step backward.

Over the last six decades weather prediction and warning have improved, and NSF NCAR has been an important part of that. For example, projects led and coordinated by NSF NCAR have solved the problem of airline crashes due to thunderstorm microbursts. NSF NCAR's facilities and leadership have led to understanding better how tornadoes form, why some storms produce tornadoes while others don't, and how strong they can be. But these problems are not fully solved, and problems such as wildfires, flash flooding, hurricane storm surge, and others have taken on new and urgent importance that has been far from fully addressed. Moreover, the problems of severe and hazardous weather are increasingly crucial to agriculture, electric grids, coastal communities, and mountainous areas. These are costing the U.S. economy greatly.

NSF NCAR's experience in deploying facilities efficiently and serving as the venue and mechanism for the community to collaborate as teams at a common place to solve weather-related problems for the benefit of the U.S. is important to maintain.

From its beginning, NSF NCAR was to facilitate the possibility of individual institutions, mainly universities, to come together in a common venue to address the biggest problems of atmospheric science. We urge NSF to keep to this mission by not breaking up facilities and their associated project coordination ability.

Sincerely,

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