

## **U.S. CEDAR Program – Coupling, Energetics and Dynamics of Atmospheric Regions**

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Chair of the CEDAR Science Steering Committee  
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Dr. Edward Weiler  
Associate Administrator for the Science Mission Directorate  
National Aeronautics and Space Administration  
Washington, DC 20546-0001 U.S.A.

Dear Dr. Weiler:

The members of the National Science Foundation's (NSF) Coupling, Energetics and Dynamics of Atmospheric Regions (CEDAR) science steering committee express our enthusiastic support for the Neutral-Ion Coupling Explorer (NICE) mission. As will be demonstrated, the NICE mission science goals complement those of the CEDAR program, adding unique value to resolving grand challenges within upper atmosphere physics. The lack of a dedicated aeronomic U.S. space mission to regions of the earth's ionosphere has severely limited progress in this field.

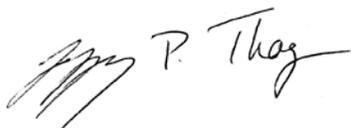
The CEDAR program funded by the NSF is an element of the U.S. Global Change Program which started in 1986 to undertake coordinated collaborative studies of the Earth's upper atmosphere. Its primary objective is to understand the energetic and dynamic processes that determine the composition and structure of the atmosphere above 60 km, particularly how energy, momentum, and chemical processes from the magnetosphere, and those originating in the lower atmosphere, couple to and affect the mesosphere, thermosphere and ionosphere. CEDAR scientific efforts involve researchers, students and technicians studying aspects of the upper atmosphere and ionosphere through modeling, data analysis and ground based observations.

The CEDAR program has reached the level of icon status and is recognized around the world as the leading forum for upper atmosphere research. CEDAR's outstanding track record has naturally served to facilitate the training and education of our current and future US space scientists and engineers. In this role, the CEDAR community is preparing its future research plan. The community recognizes the rapidly changing research landscape and the potential new opportunities to advance upper atmosphere research. This has led the CEDAR community to take on a more holistic view of upper atmosphere processes. It is the vision of the CEDAR community that the physics and chemistry of the upper atmosphere be fully integrated with the response and evolution of the whole sun-earth system. Fundamental to this cause is understanding the interaction of the thermosphere gas with the ionosphere plasma.

In its low inclination (24°) 550-km circular orbit, NICE will often measure F-region ion drifts on magnetic field lines that map directly down to the location of the neutral wind and density measurements remotely sensed by NICE instruments. With thousands of such conjunctions, NICE will perform a very detailed study of the F-region effects of the dynamo electric fields produced by neutral winds in the lower ionosphere. Ground-based measurements will compliment the NICE mission, which will make repeated, daily passes over the well-instrumented Caribbean and South American regions familiar to CEDAR scientists. NICE hopes to boost this collaboration with the additional selection of a SMEX-"Science Enhancement Option" to select a site in Northern Brazil for new instrumentation to specifically study gravity waves that modify the neutral winds in the E region. The addition of NASA-supported, ground-based measurements has recent precedent with the successful deployment of 20 semi-autonomous all-sky camera and magnetometer observatories for the THEMIS mission. This effort clearly benefits from the existing network of facilities supported by NSF and international partners, and would allow NICE to expand its science investigation into more areas of current interest to CEDAR. The NICE mission signifies the only thermosphere and ionosphere mission within NASA's small explorer program.

The numerous interesting and surprising scientific discoveries made in the course of the past decade of aeronomical research, combining space- and ground-based assets to gain system-level understanding, make a strong case for the continuation of this successful approach to geophysical research. The CEDAR Science Steering Committee requests that the benefits of NICE to the atmospheric and space science community worldwide be given substantial weight as decisions are made with regard to the future of this mission.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeffrey P. Thayer". The signature is fluid and cursive, with the first name being the most prominent.

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Concurring Committee Members:

**Dr. Bill Bristow**, Geophysical Institute, Alaska; **Mr. Jonathon Fentzke**, University of Colorado, **Dr. Larisa Goncharenko** MIT, Haystack Observatory; **Dr. Diego Janches**, Colorado Research Associates; **Dr. Hanli Liu**, NCAR; **Mr. Marco Milla**, Univ. Illinois Urbana-Champaign; **Dr. John Noto**, Scientific Solutions Incorporated; **Dr. Meers Oppenheim**, Boston University; **Dr. John Plane**; University of Leeds, England; **Dr. Mike Ruohoniemi**, Virginia Tech; **Dr. Susan Skone**, University of Calgary, Canada; **Dr. Lara Waldrop**, Univ. of Illinois Urbana-Champaign