

Dear Colleagues,

This is an open letter to the atmospheric sciences community from an ad-hoc Committee on Cyberinfrastructure for Research and Development in the Atmospheric Sciences (CyRDAS), sponsored by the National Science Foundation (NSF) inviting the broadest possible participation in the development of a strategic plan for the future of cyberinfrastructure (CI – see “What is Cyberinfrastructure?” below) in support of research and education in the atmospheric sciences. In essence, we are asking the community to consider the questions,

- How could the development, availability and application of CI lead to more rapid and substantial progress, including major breakthroughs, in atmospheric sciences research?
- What applications of CI could provide for more efficient and effective atmospheric sciences education?
- What CI barriers are impeding progress in the atmospheric sciences?

In seeking answers to these questions, we will develop a report that documents the current and future CI requirements in the atmospheric sciences and provide prioritized recommendations for meeting them. We expect this report to inform the discussion of CI in the atmospheric science and geoscience communities, and to be helpful input to the more formal planning process of the NSF’s Advisory Committee to the to the Directorate for Geosciences (AC-GEO) and the Advisory Committee for Environmental Research and Education (AC-ERE). Similar planning efforts are underway in the oceanic, Earth, and environmental sciences with the four related committees maintaining a high level of coordination.

The purposes of this letter are to inform the community that these planning activities are underway and to provide an opportunity to contribute to the process. A draft overview document with some questions to stimulate discussion and input from the community, will be posted at www.cyrdas.org. The document and questions reveal the broad themes and issues to be addressed by CI initiatives in the future, and are summarized later in this open letter. The questions are not meant to be exhaustive but are representative of the types of information the committee is interested in gathering to inform the plan. Your response to these questions and any other input you may want to provide can be submitted to the committee in several ways:

1. Via email to the committee at cyrdas@cyrdas.org.
2. By responding to the questions online at the CyRDAS website at www.cyrdas.org.
3. Through participation in one of six regional focus group meetings that are planned. A schedule of locations and dates is attached. All interested individuals are encouraged to attend.
4. By participating in town meetings tentatively planned at the Fall American Geophysical Union meeting in San Francisco in December 2003 and the Annual Meeting of the American Meteorological Society in Seattle in January 2004.

We encourage all members of the atmospheric sciences community to get actively involved in this process. It provides a great opportunity to influence the decision making process about future investments in CI that can both support our field in both frontier research and education. All constructive suggestions, concerns and other forms of input from members of the community are welcome.

The CyRDAS Committee

What is Cyberinfrastructure?

In simple and general terms, CI includes hardware, software and people: the computers, networks, software tools, programmers, system administrators and training that make it possible to conduct cutting edge research and to provide for more effective inquiry-based education settings for improving research skills. Definitions of CI are provided in several recent reports (it does not have a single definition), including the NSF Blue Ribbon Advisory Panel report, *Revolutionizing Science and Engineering Through Cyberinfrastructure* (http://www.communitytechnology.org/nsf_ci_report/), and a short "white paper" from the AC-ERE (http://www.nsf.gov/geo/ere/ereweb/ac-ere/ac-ere1_ECI.pdf). More specifically, CI can range from more widespread installation and adoption of conventional components, such as a cluster of data processing computers or a faster network connection, to application of quite sophisticated CI such as distributed "Grid" software tools, virtual reality software or telepresence and collaboratory capabilities. CI can provide the means to access the next generation of information technology tools that enable, for example, more rapid computations; more efficient modeling, analysis and management of data; improved ability to merge models and data from multiple observatories; maintenance of the longevity and interoperability of research data collections; more efficient development and testing of new models; more rapid flow of information among scientists and support for collaboration among scientists and with students.

Background.

As described in the NSF long-range planning report, *NSF Geosciences Beyond 2000: Understanding and Predicting Earth's Environment and Habitability* (http://www.geo.nsf.gov/adgeo/geo2000/geo_2000_summary_report.htm), implementing the strategy for accelerating progress in research and education in the geosciences will require "...a commitment to improve and extend facilities to collect and analyze data on local, regional, and global spatial scales and appropriate temporal scales," including real-time observing systems, and modern computational facilities to support rapid computation, massive data archiving, distribution, analysis and management. The report states that, "The challenges for the future in infrastructure and technology include:

- Maintaining and upgrading existing facilities for airborne, shipboard, space-based, and ground-based instrumentation and platforms;
- Establishing data collection programs with a commitment to long-term observations;
- Providing computational infrastructure necessary to support the increasing demands of modeling, data analysis and archival, and research;
- Stimulating emerging technologies to build better observational, communications, and computational tools."

To address the CI issues associated with the challenges described in that report, ad hoc community planning activities have begun in ocean, Earth, environmental and atmospheric sciences. For the atmospheric sciences, an ad hoc committee, called the Cyberinfrastructure for Research and Development in the Atmospheric Sciences (CyRDAS) Committee, was formed late in 2002. A summary of the committee's purpose and charge follows. The CyRDAS Committee has met several times to develop a process for the gathering of requirements and the formulation of recommendations, which will be done through an open letter to the research and education community and a series of regional focus group meetings that will occur in Fall 2003. The Committee expects to complete its report in January 2004.

Ad Hoc Committee for Cyberinfrastructure Research and Development in the Atmospheric Sciences (CyRDAS)

Purpose

To inform the discussion and develop a strategic planning process for the development of cyberinfrastructure for the atmospheric sciences.

Charge

The ad hoc committee for Cyberinfrastructure Research and Development in the Atmospheric Sciences (CyRDAS) is charged with

- A. Assessing:
 1. The opportunities for advances in atmospheric science research that are made possible by current or anticipated advances in information technology and computer science
 2. The opportunities for advances in science that might result from of collaborative research between atmospheric scientists and computer scientists
 3. Ways in which cyberinfrastructure can contribute to formal and informal education in atmospheric science
 4. The cyberinfrastructure needs of the atmospheric science research community
- B. Recommending strategies that will help the academic research community to exploit the opportunities identified in the assessments A.1, A.2 and A.3 above.
- C. Developing an implementation plan for a distributed cyberinfrastructure that will meet the needs of the academic atmospheric science research community and which includes the flexibility to grow smoothly as that research advances and CI needs grow.

Members

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