ARCSS Program | Message from the ARCSS Committee

ARCSS Note #8 (20 November 2006): ARCSS Committee Recommendations on Data Management

Message from the ARCSS Committee

Dear Colleague:

The purpose of this letter is to summarize ARCSS Committee (AC) discussions regarding the emerging needs of ARCSS data management and recommendations for approaches that will advance the ARCSS research agenda and increase its utility to a variety of stakeholders. Below we summarize the AC recommendations for moving towards a redesigned ARCSS data management structure. The points below are organized by three fundamental issues: (I) the scientific rationale for a new approach to ARCSS data management; (II) identified priorities for data management that advances system-scale science; and (III) ways in which the research community could plan strategically for the future of ARCSS Program data management.

I. New Directions in Arctic Science Demand New Approaches to Data Management

The NSF ARCSS Program is moving to increasingly interdisciplinary, interscale, and integrative approaches to understanding the arctic system. Synthesis has become a central component of the program, integrating and modeling large, complex, and disparate data sets to answer questions about how the Arctic functions as an integrated system. Simply managing and making accessible the data sets collected in the past has been a challenge. Dealing with the data sets and data needs of the future raises even greater challenges, but also greater opportunities for synthetic science.

ARCSS must develop mechanisms to identify, ingest, visualize, and process what could ultimately be terabytes of data from sources as diverse as satellite remote sensing imagery to local hunter's game tags. ARCSS data management must now support new modes of inquiry, such as intercomparison studies, data integration and assimilation, arctic and Earth system modeling, and cross-disciplinary data merging.

Several developments are now acting in concert to place this issue squarely before us: a well-documented record of rapid and systematic arctic environmental change, an increasingly vocal national and international policy debate surrounding such change, breakthroughs in complex modeling capabilities, the current wealth of new and legacy data sets requiring analysis, and the major influx of information anticipated from initiatives such as the Study of Environmental Arctic Change (SEARCH), the Arctic Observing Network (AON), and the International Polar Year (IPY). It is clear that the time to develop new approaches to managing data is now—the need is urgent and immediate.

II. Priorities for Data Management that Advances System-Scale Science

To meet these emerging realities, the ARCSS research community has identified several priorities for data management to support the best science and decision-making, including:

- An efficient process for researchers to submit data and metadata to a long-term archive;
- Minimal delay in the online availability of submitted data and metadata via a long-term archive;
- A coherent and comprehensive venue for data discovery, whereby data can be searched through a number of user-friendly methods;
- Standardized, open, and interoperable metadata and data formats;
- Data management structure, process, and tools that enable data organization, retrieval, and analysis across multiple sources and formats to facilitate consolidation of otherwise disparate disciplinary data sets; and
- An organizational structure that fosters data and allied data analysis and modeling activities that are closely connected to synthetic science questions.

III. Ways to Move Forward: Redefining ARCSS Data Management

The ARCSS Committee has recommended that the NSF ARCSS Program undertake community-based strategic planning activities to formulate a new data system design. Activities led by the ARCSS Committee in the past year include the re-constitution of the Data Working Group to the *ad hoc* Data and Modeling Working Group and an online community data meeting (see: **http://www.arcus.org/ARCSS/ETM/march_06/data/** (**http://www.arcus.org/ARCSS/ETM/march_06/data/**)). Future activities planned to guide ARCSS data management include:

Open Town Meeting at AGU on Arctic Data Needs and Priorities
At the AGU Fall Meeting held in San Francisco from 11–15 December 2006, the ARCSS Committee is sponsoring an open meeting to discuss challenges faced in arctic data management, approaches to manage those challenges, and recommendations for infrastructure improvements. This open meeting is tentatively scheduled for Thursday, 14 December from 6:30 p.m. – 8:00 p.m. at the San Francisco Marriott Hotel. More information will be announced via the ARCSS Listserve shortly.

Data/Modeling Workshop in January 2007
A small workshop is planned for January 2007 to identify innovative approaches for uniting data management and assimilation, recent developments in technology, and modeling that will advance synthesis studies of the arctic system. Invited participants will include diverse representation from data providers and users as well as information technology experts and knowledge brokers. The broader community will be invited to participate in several workshop sessions through teleconferencing and/or online meeting tools.

The workshop will consider a set of key discussion questions:

- What are the data and modeling needs to advance synthesis-focused arctic system science?
- What's currently working and what is not in terms of applying data and modeling for analysis to advance science? What are the existing impediments limiting the assimilation of disparate data sources needed to advance arctic synthesis studies, and what are the keys to success?
- What are the practical steps forward as far as mechanisms, approaches, tools and procedures, organization, standards, and related issues?

The workshop will result in a community-reviewed report summarizing key issues, common challenges, and general lessons that emerged during the workshop; the workshop report will include recommendations for NSF investments in this arena.

More information on this workshop, and how the broad community can participate, will be announced via the ARCSS Listserve in the coming weeks.

Longer-Term Activities
In addition to the near-term activities above, the ARCSS Committee has discussed holding a larger workshop at a time that would be conducive to broader planning and implementation of an ARCSS Data Management design. This larger workshop would partner with other programs in the environmental sciences (Study of Environmental Arctic Change [SEARCH], the Arctic Observing Network [AON], and the National Ecological Observatory Network [NEON], for example) that face similar challenges, with increased participation from private industry to consider creative approaches to implementing arctic data identification, access, and use.

The ARCSS Committee intends to continue the dialogue with the research community on this important issue through various discussion venues. We also hope that you will feel free to contact any of us with concerns or recommendations on how the ARCSS Program may improve data management to advance arctic science.

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