



# EarthCube

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## Context

The EarthCube program has grown out of a partnership between the National Science Foundation's Geosciences Directorate (GEO) and the Office of Cyberinfrastructure (OCI) to address the multifaceted challenges of modern, data-intensive geoscience research and education. In 2009, the Advisory Committee for GEO issued the GeoVision report, which recommended that "the geosciences community commit to developing a framework to understand and predict responses of the Earth as a system—from the space-atmosphere boundary to the core, including the influences of humans and ecosystems." This has been echoed by the NSF Cyberinfrastructure for the 21st Century (CIF-21) effort, which places significant emphasis on computational and data-rich science and engineering to provide the nation with a sustainable, community-based and open cyberinfrastructure for researchers and educators.

EarthCube is envisioned as a potentially multi-agency approach to create an integrated framework to allow a holistic view of the Earth system. The fact that such a system does not yet exist has not been for lack of investment in CI by NSF, other agencies, or international partners. Rather, it is an outcome resulting from a long history of making needed tactical investments in sub-disciplines of geosciences. Many geoscience communities have come to depend upon the developed infrastructure created through the investments, and overall the community has established a strong CI foundation and user-savvy CI culture. However, efforts have often been siloed into sub-disciplines. Recent surveys and community dialog have revealed a frustration with CI incompatibilities across the geosciences and a readiness to strategically address upcoming approaches. The challenge faced by funding agencies lies in transforming substantial previous CI ventures in collecting, curating, and disseminating geosciences data so that these investments can become more "interworkable" and be shared more uniformly with a myriad of end users.

EarthCube is NSF's effort to:

- 1) Accelerate the convergence process between multiple geoscience CI approaches;
- 2) Frame a system that is scalable as ever more complexity is investigated; and,
- 3) Transform geoscience research and education in order to take advantage of emerging technologies.

NSF is facilitating a community dialog with a goal of transforming the conduct of research in geosciences by supporting the development of a community-guided CI to integrate data and information for knowledge management across the geosciences. The purpose of the project is to significantly increase the productivity and capability of researchers and educators by integrating all geosciences data, information, knowledge, and practices in an open, transparent, and inclusive manner.

## Early Efforts and Current Status

EarthCube is an experiment in community building and an attempt to create a new style of interaction with NSF. A Dear Colleague Letter (DCL) initiated EarthCube in June 2011 (<http://www.nsf.gov/pubs/2011/nsf11065/nsf11065.jsp>), and was followed by several WebEx-enabled dialogs with the community to introduce the fundamental concept of a cross-geoscience, CI-based approach that would be directed by the community, which would seek involvement of the best ideas regardless of their source (academia, lab, or industry), all the while emphasizing a culture of openness and collaboration. In September, a website to foster community collaboration (<http://earthcube.ning.com>) was launched. The website continues to be the keystone for discussion and announcements for the program. It provides updated information, resource documents, and discussion forums for community collaborations.

The first EarthCube Charrette was held November 1-4, 2011. The meeting provided the opportunity for the community to come together (face-to-face and virtually) to clarify the breadth and scope of EarthCube, to identify potential new science that could be accomplished within a future framework, and to develop the set of capabilities that would be needed to realize the EarthCube vision. The meeting was open to the public, active in style, and aided by a set of facilitators. Details of the event, including an agenda with all presentations and notes attached, is available at <http://earthcube.ning.com/page/charrette>. One of the major outcomes of the November Charrette was the definition of a set of 60 capabilities for the project to address over its lifespan.

A second Dear Colleague Letter was released on December 16, 2011, (<http://www.nsf.gov/pubs/2012/nsf12024/nsf12024.jsp>), which provided the guidance for submitting Expressions of Interest (EoI) to NSF to request funding for exploring transformational ideas to enable EarthCube. This has resulted in a first set of concept grants as well as the development of Community Groups. The funded groups can be tracked online at <http://earthcube.ning.com/groups>. Additional EoI can be submitted to NSF through April 2, 2012.

Another Charrette is being planned for June 12-14, 2012, in Arlington, VA. The meeting will be open to participation from all geoscientists and other interested parties. This will be an opportunity to shape EarthCube priorities and approaches. There are three expected outcomes for the event: long-term roadmaps for the feasibility studies to develop into potential prototypes; roadmaps and guiding principles for standing working groups on essential components to build EarthCube; and an identification of what is missing. For example, are there areas that require working groups that were not identified before the event, and how can these be developed? All meeting outcomes will be posted on the website, and will be available for community comments.

In addition, NSF is continuing to facilitate a broad-based community dialogue through a variety of modern and traditional methods to further develop a strategic framework for EarthCube and encourage convergence of collaborations within the geosciences and beyond. We strongly recommend that interested members of the community join the website at <http://earthcube.ning.com>, where regular updates on EarthCube progress are posted.