



**EARTHcube**  
TRANSFORMING GEOSCIENCES RESEARCH

# EarthCube Science Committee and Cyberinfrastructure Resources

# EarthCube

**EarthCube (EC) is a community-driven activity to transform research in the academic geosciences community.**

**Geoscience  
Directorate  
(GEO)**



**Computer,  
Information Science  
& Engineering  
Directorate  
(CISE)**

# EarthCube

**Key principles guiding community-driven development of EarthCube cyberinfrastructure:**

- **Promote standards for interoperability;**
- **Leverage advanced technologies to better integrate, visualize, and analyze data;**
- **Democratize and improve access to data**



# EarthCube Community



2,500 contributors



# EarthCube Organization: Science Committee

- **Maintains a connection between EC academic, geoscience, and technology communities**
- **Ensures that end-user geoscientist needs, requirements, and aspirations are identified and prioritized.**



# EarthCube Organization: Technology and Architecture Committee

- **Facilitates and stewards development of the EarthCube technology and ongoing architecture.**
- **Coordinates with the Science Committee to ensure that scientific research needs drive EarthCube architecture.**

# EarthCube Organization: Council of Data Facilities

- Provides a collective voice for member data facilities to the NSF
- Identifies, and promotes standards and best practices
- Identifies and supports the development/use of shared infrastructure
- Fosters innovation through collaborative projects

# EarthCube-Driven Projects

## Funding projects since 2013:

- **RCNs - Bring communities together to formally articulate cyber needs (10),**
- **Building Blocks - Tools and technologies that address those needs and gaps in current Geo CI (26),**
- **Conceptual Designs - Explore possible cyber architectures (3),**
- **Integrative Activities - Engage scientists to solve domain CI challenges (20),**
- **Data Infrastructure - Fill gaps in community data capabilities (2)**



# EarthCube-Driven Projects

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More...

**NSF-Funded EarthCube Projects**

The National Science Foundation has funded the development of EarthCube through individual EarthCube awards since 2013. In 2016, NSF awarded 11 new EarthCube activities, for a total of 51 awards, categorized into:

1. Building Blocks (BBs), to develop novel infrastructure capabilities and demonstrate their value in a science context;
2. Research Coordination Networks (RCNs), to engage the science community around joint goals;
3. Conceptual Designs (CDs), to develop broad architecture design and explore integrative systems;
4. Integrative Activities (IAs), to explore concepts for the design of an enterprise architecture, and;
5. Data Infrastructures (DIs), to lay the groundwork for shared data.

For more information on this solicitation, please see the [NSF EarthCube Website](#). To see a full listing of NSF EarthCube Awards, [click here](#).

### Funded Projects

Keywords  Funded Group Type  Year Funded

Project Title	PI and Co-PI	Group Page   NSF Abstract
<b>A Broker Framework for Next Generation Geoscience (BCube)</b>	Sir Jodha Khalsa, National Snow and Ice Data Center Stefano Nativi, Ruth Duerr, Jay Pearlman, Françoise Pearlman	<a href="#">BCube</a> <a href="#">Abstract</a>

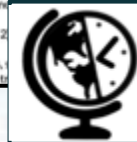
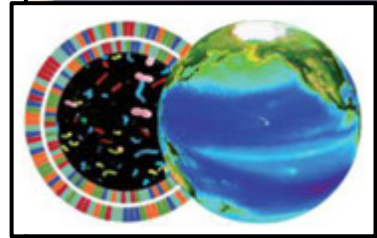
<https://www.earthcube.org/info/about/funded-projects>

# EarthCube-Driven Projects

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A screenshot of the EarthCube Tools Inventory website. The header includes navigation links: About, EarthCube Projects, Get Involved, News, Events, Documents, Contact, and a Login/Register button. The main heading is "EarthCube Tools Inventory" followed by "EarthCube Tools Designed for Scientists as End Users". Below this, a paragraph states: "These are finished tools (or nearly finished tools) that were designed for scientists as end users rather than as internal components of an EarthCube architecture. Links: (YouTube playlist of EarthCube Tools.)". A "Table Key" section defines a "Readiness" scale from 1 to 5: 1/2/3 - "in progress", 4 - "almost ready", and 5 - "ready to use". Several tool cards are visible, including "NetCDF-IO and gridded data", "Advancing netCDF-CF Short Tool Description: Increase the types of data that can be represented as netCDF-CF data to better support a", "CHORDS Portal", and "Data Discovery Studio".



**CHORDS**



<https://www.earthcube.org/tools-inventory>

# EarthCube: Community Resource



**The nexus of science and cyber technology**



# EXTRA Science Committee Slides...

You put data into CHORDS like this:

[http://myportal.org/measurements/url\\_create?instrument\\_id=25&wdir=038&wspd=3.2](http://myportal.org/measurements/url_create?instrument_id=25&wdir=038&wspd=3.2)

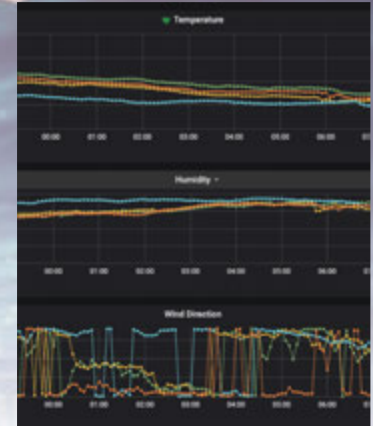
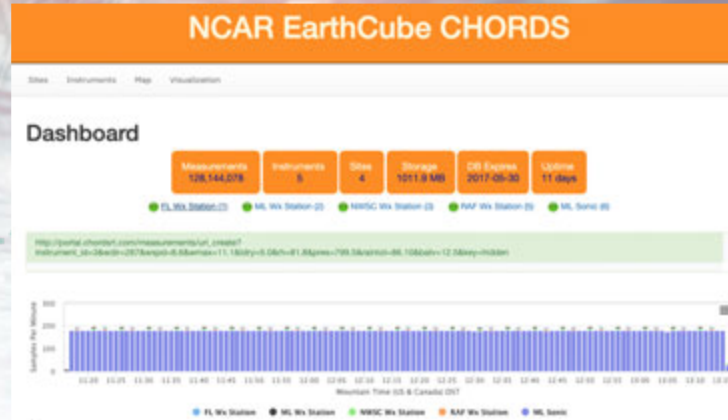
You get data out of CHORDS like this:

<http://myportal/api/v1/data/3.csv?last>

The diagram illustrates the data flow from sensors to a server and then to a dashboard. Three thermometers (blue, red, green) are connected by yellow arrows labeled 'HTTP' to a server icon. The server is connected by another yellow arrow labeled 'HTTP' to a dashboard icon. The dashboard shows a 'Dashboard' section with various metrics and a line graph.

[http://myportal.org/measurements/url\\_create?instrument\\_id=25&wdir=038&wspd=3.2](http://myportal.org/measurements/url_create?instrument_id=25&wdir=038&wspd=3.2)

<http://myportal/api/v1/data/3.csv?last>



# GeoCODES

Geoscience Cyberinfrastructure for Open Discovery in the Earth Sciences

GeoCODES is an emerging resource discovery platform comprised of intuitive web-based tools, REST APIs, and Python, R, and MATLAB notebook integration for a variety of services.

The GeoCODES platform will enable resource registration, discovery, and access by applying web standard practices, community engagement, and cloud-based technologies and interfaces.

GeoCODES is a computational services platform for accelerating multi-domain geoscience research and is the integration of four subaward projects managed and led by the EarthCube Science Support Office at UCAR in Boulder, CO.

<https://www.earthcube.org/geocodes>



# EarthCube Data Registry

**An EarthCube resource for finding and accessing data through the following data providers:**

**BCO-DMO • MagIC • Open Typography • UNAVCO**  
**Open Core Data • IEDA • Linked Earth • Neotoma • BALTO**  
*R2R • CHORDS • IRIS • Arctic Data Center • CUAHSI*

*\*in progress*

# EarthCube Resource Registry

**A developing EarthCube resource for finding and accessing cyberinfrastructure components, tools, and data access points developed through 60+ EarthCube funded projects (and possibly others).**

# Discussion Guidance





# 1. Leverage Existing Resources

Review EarthCube End-User  
Workshop summaries

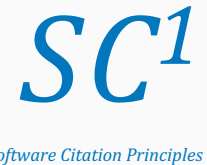
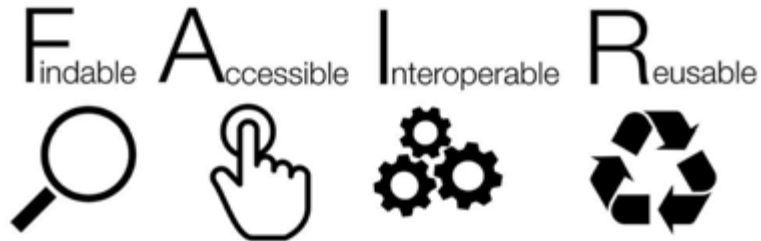
Be aware of existing  
community standards and  
specifications

# EarthCube End-User Workshop Summaries

<https://www.earthcube.org/info/about/end-user-workshops>

- Meetings of Young Researchers in Earth Science (MYRES) V: The Sedimentary Record of Landscape Dynamics
- Envisioning Success - A Workshop for Next Generation EarthCube Scholars and Scientists
- Structural Geology and Tectonics
- EarthScope
- Experimental Stratigraphy
- Shaping the Development of EarthCube to Enable Advances in Data Assimilation and Ensemble Prediction
- Engaging the Critical Zone Community to Bridge Long Tail Science with Big Data
- Envisioning a Digital Crust for Simulating Continental Scale Subsurface Fluid Flow in Earth System Models
- Cyberinfrastructure for Paleogeoscience
- Education
- Petrology and Geochemistry
- Sedimentary Geology
- Community Modeling
- Integrating Inland Waters, Geochemistry Biogeochemistry and Fluvial Sedimentology Communities
- Deep Seafloor Processes and Dynamics
- Integrating Real-time Data into the EarthCube Framework
- Ocean 'Omics
- Developing a Community Vision of Cyberinfrastructure Needs for Coral Reef Systems Science
- Bringing Geochronology into the EarthCube Framework
- Articulating Cyberinfrastructure Needs of the Ocean Ecosystem Dynamics Community
- Engaging the Atmospheric Cloud/ Aerosol/ Composition Community
- Developing a Community Vision of Cyberinfrastructure Needs for Coral Reef Systems Science
- Rock Deformation and Mineral Physics Research
- Science-Driven Cyberinfrastructure Needs in Solar-Terrestrial Research
- Increasing the Access to and Relevance of Marine Seismic Data

# 3. Emphasize Community Principles



<https://www.force11.org/software-citation-principles>

<https://doi.org/10.25490/a97f-egykh>