Highlights of (Non-DOE) Community Cyberinfrastructure of likely interest to ESS Cyberinfrastructure efforts

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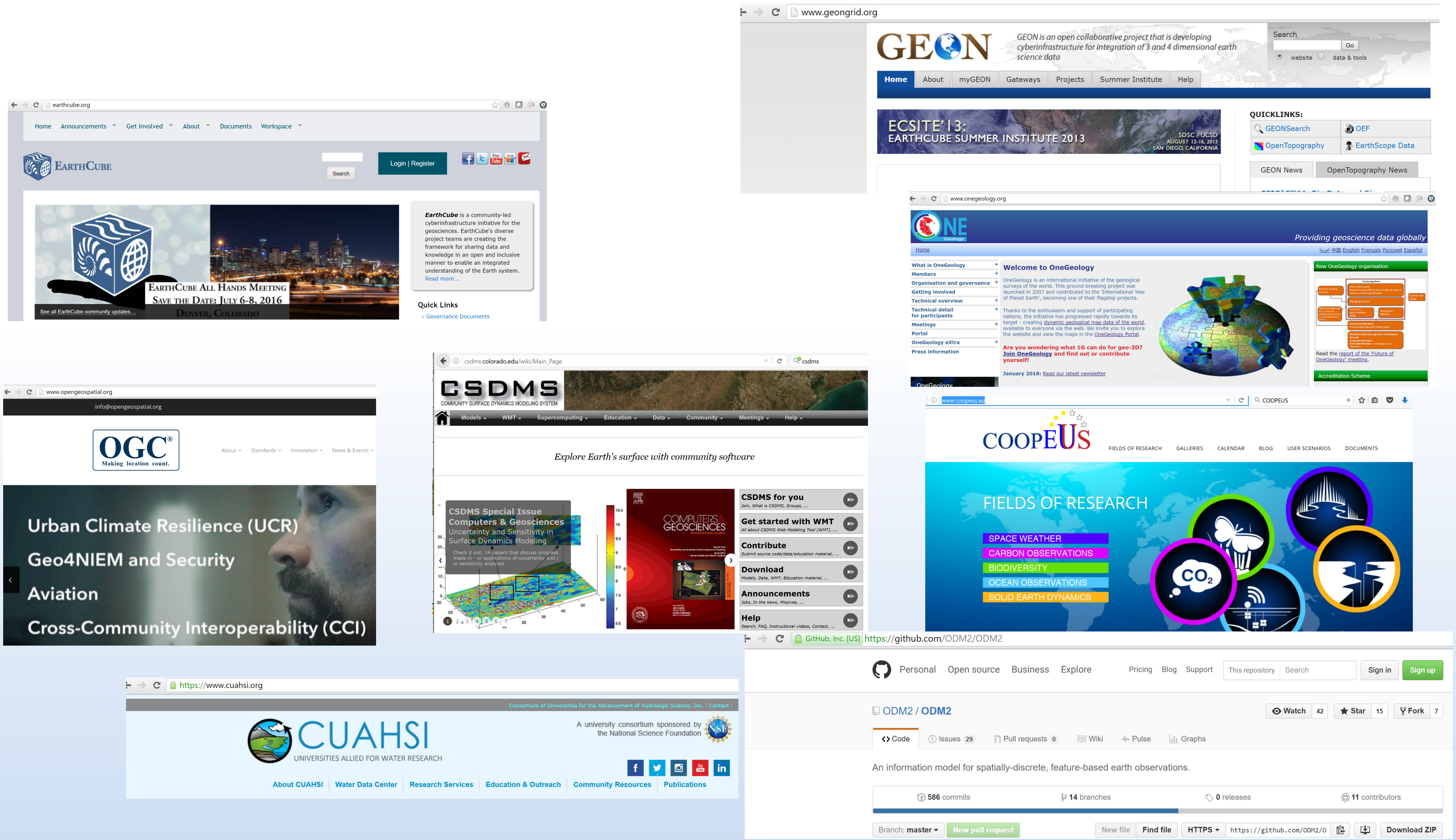
Subsurface INSIGHTS

Community cyberinfrastructure

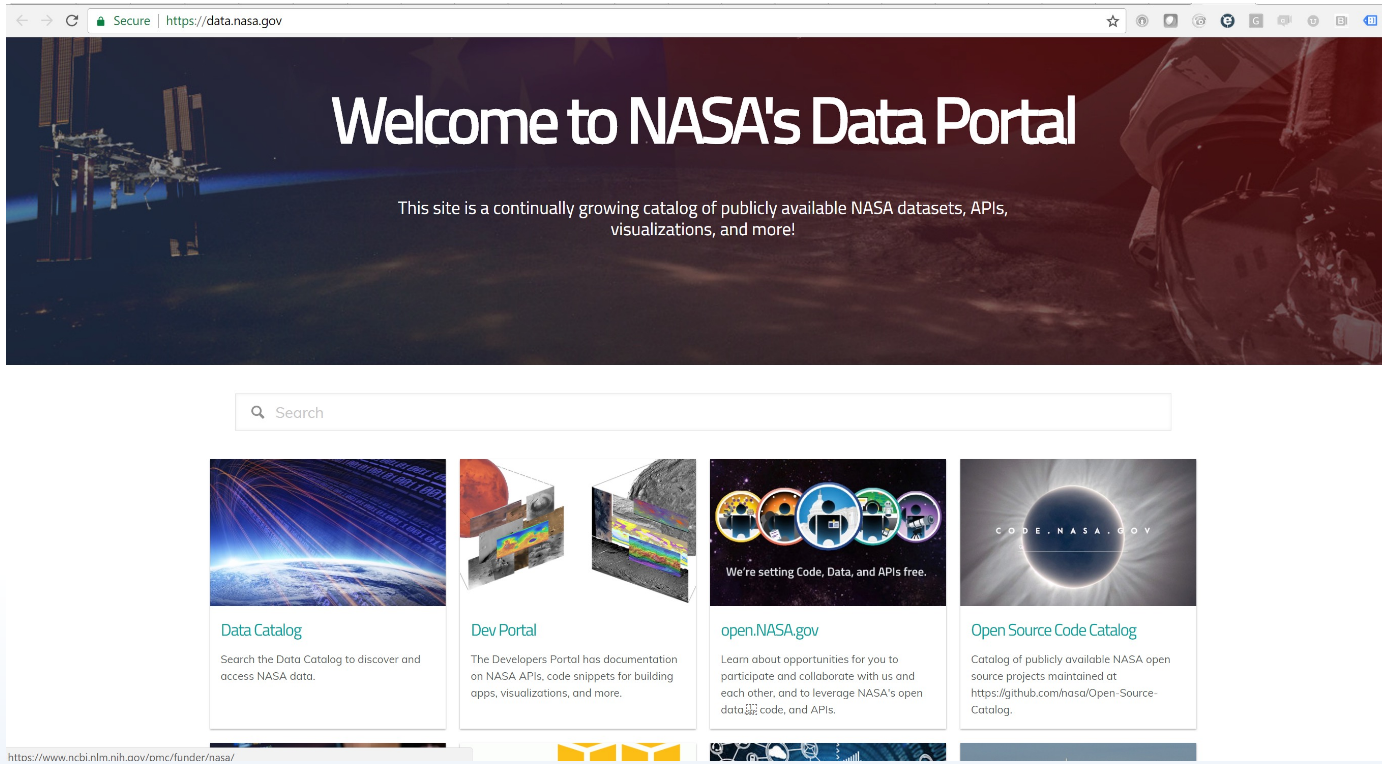
- Two kind of efforts
  - Funded efforts (NSF, European Union) – typically funds universities to develop capabilities
  - “in house” efforts by agencies
- Similar trends in both efforts

Some projects



Trend #1

- Making data discoverable and available through rich services is increasingly the norm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This site is a continually growing catalog of publicly available NASA datasets, APIs, visualizations, and more!
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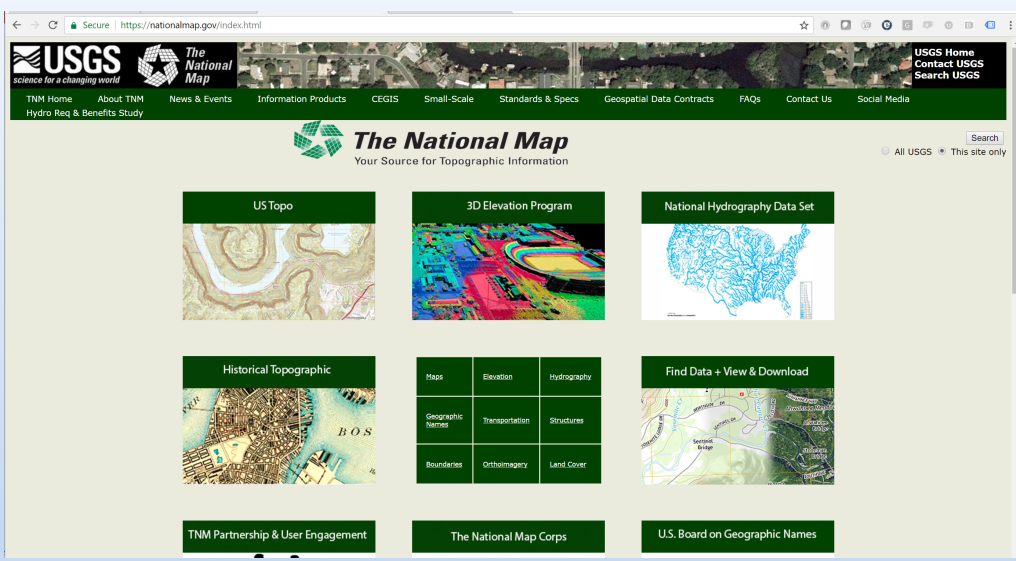
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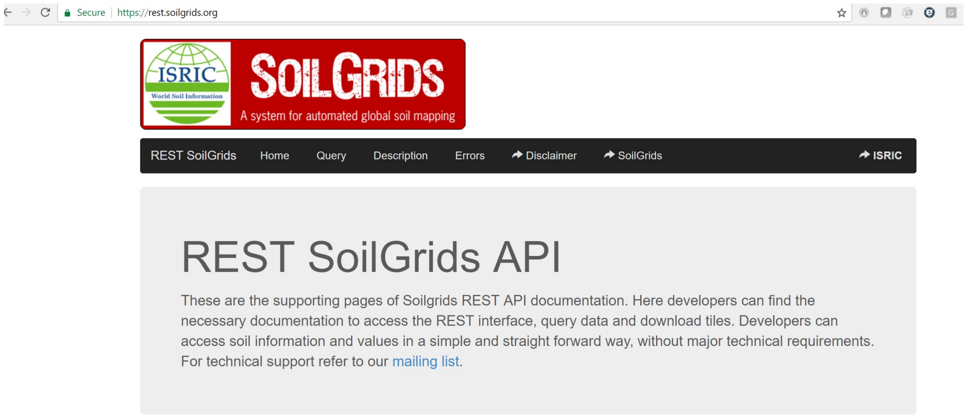
TNM Partnership & User Engagement
The National Map Corps
U.S. Board on Geographic Names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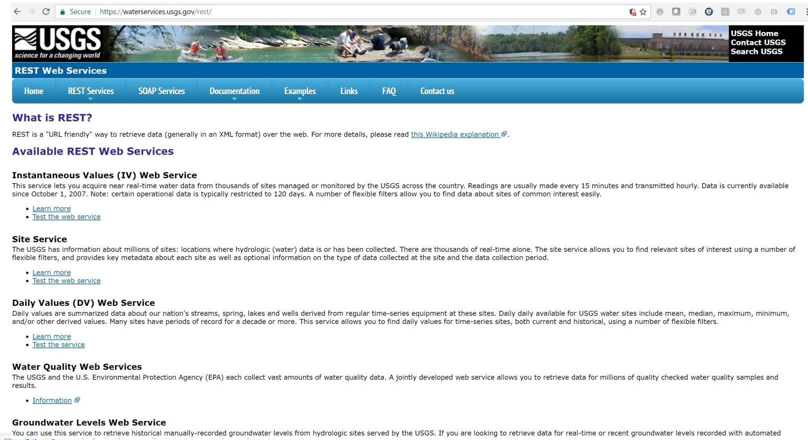
REST SoilGrids API
These are the supporting pages of Soilgrids REST API documentation. Here developers can find the necessary documentation to access the REST interface, query data and download tiles. Developers can access soil information and values in a simple and straight forward way, without major technical requirements. For technical support refer to our mailing list.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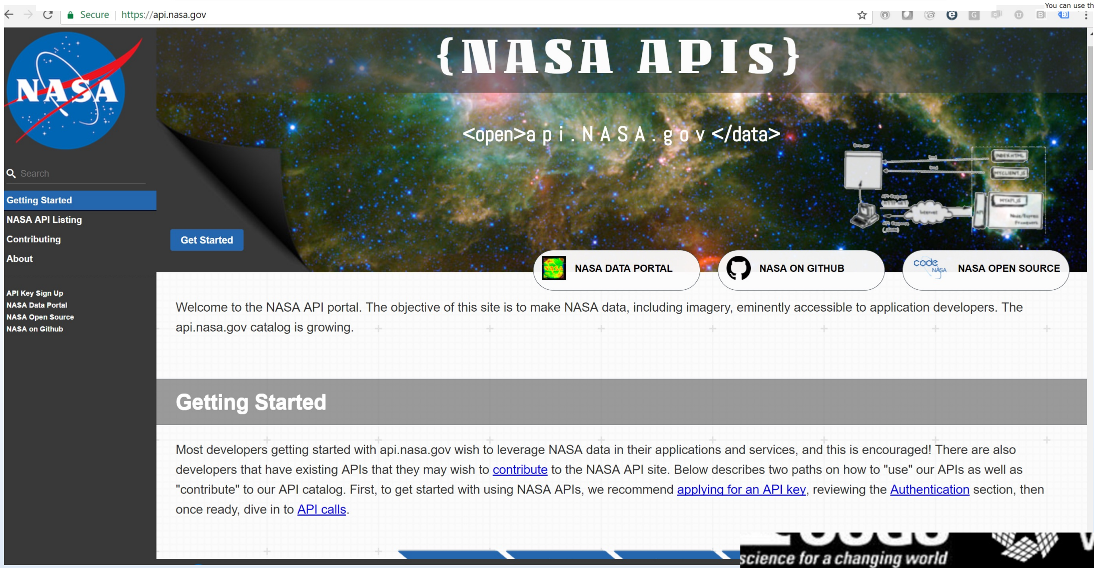
What is REST?
REST is a "URL friendly" way to retrieve data (generally in an XML format) over the web. For more details, please read this Wikipedia explanation.
Available REST Web Services
Instantaneous Values (IV) Web Service
This service lets you acquire near real-time water data from thousands of sites managed or monitored by the USGS across the country. Readings are usually made every 15 minutes and transmitted hourly. Data is currently available since October 1, 2007. Note: certain operational data is typically restricted to 120 days. A number of flexible filters allow you to find data about sites of common interest easily.
Learn more
Test the web service
Site Service
The USGS has information about millions of sites: locations where hydrologic (water) data is or has been collected. There are thousands of real-time alone. The site service allows you to find relevant sites of interest using a number of flexible filters, and provides key metadata about each site as well as optional information on the type of data collected at the site and the data collection period.
Learn more
Test the web service
Daily Values (DV) Web Service
Daily values are summarized data about our nation's streams, spring, lakes and wells derived from regular time-series equipment at these sites. Daily daily available for USGS water sites include mean, median, maximum, minimum, and/or other derived values. Many sites have periods of record for a decade or more. This service allows you to find daily values for time-series sites, both current and historical, using a number of flexible filters.
Learn more
Test the service
Water Quality Web Services
The USGS and the U.S. Environmental Protection Agency (EPA) each collect vast amounts of water quality data. A jointly developed web service allows you to retrieve data for millions of quality checked water quality samples and results.
Information
Groundwater Levels Web Service
You can use this service to retrieve historical manually-recorded groundwater levels from hydrologic sites served by the USGS. If you are looking to retrieve data for real-time or recent groundwater levels recorded with automated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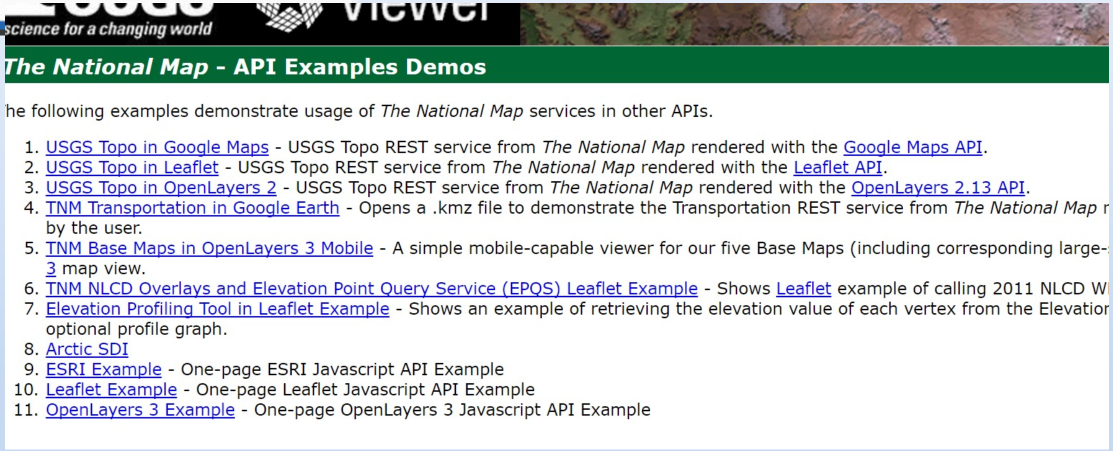
Get Started
NASA DATA PORTAL
NASA ON GITHUB
NASA OPEN SOURCE
Welcome to the NASA API portal. The objective of this site is to make NASA data, including imagery, eminently accessible to application developers. The api.nasa.gov catalog is growing.
Getting Started
Most developers getting started with api.nasa.gov wish to leverage NASA data in their applications and services, and this is encouraged! There are also developers that have existing APIs that they may wish to contribute to the NASA API site. Below describes two paths on how to "use" our APIs as well as "contribute" to our API catalog. First, to get started with using NASA APIs, we recommend applying for an API key, reviewing the Authentication section, then once ready, dive in to API calls.


science for a changing world
The National Map - API Examples Demos
he following examples demonstrate usage of The National Map services in other APIs.
1. USGS Topo in Google Maps - USGS Topo REST service from The National Map rendered with the Google Maps API.
2. USGS Topo in Leaflet - USGS Topo REST service from The National Map rendered with the Leaflet API.
3. USGS Topo in OpenLayers 2 - USGS Topo REST service from The National Map rendered with the OpenLayers 2.13 API.
4. TNM Transportation in Google Earth - Opens a .kmz file to demonstrate the Transportation REST service from The National Map r
by the user.
5. TNM Base Maps in OpenLayers 3 Mobile - A simple mobile-capable viewer for our five Base Maps (including corresponding large-
3 map view.
6. TNM NLCD Overlays and Elevation Point Query Service (EPQS) Leaflet Example - Shows Leaflet example of calling 2011 NLCD W
7. Elevation Profiling Tool in Leaflet Example - Shows an example of retrieving the elevation value of each vertex from the Elevatio
optional profile graph.
8. Arctic SDI
9. ESRI Example - One-page ESRI Javascript API Example
10. Leaflet Example - One-page Leaflet Javascript API Example
11. OpenLayers 3 Example - One-page OpenLayers 3 Javascript API Example

Trend # 2 - Python

- Development of novel python tools for geo processing (e.g. Landlab)
- Exposure of existing functionality through python API (QGIS, Google Earth Engine)
- Publication of python notebooks for data processing (reproducible research, easy starting point)

Example IOOS (Integrated Ocean Observing System)

Secure | https://ioos.github.io/notebooks_demos/

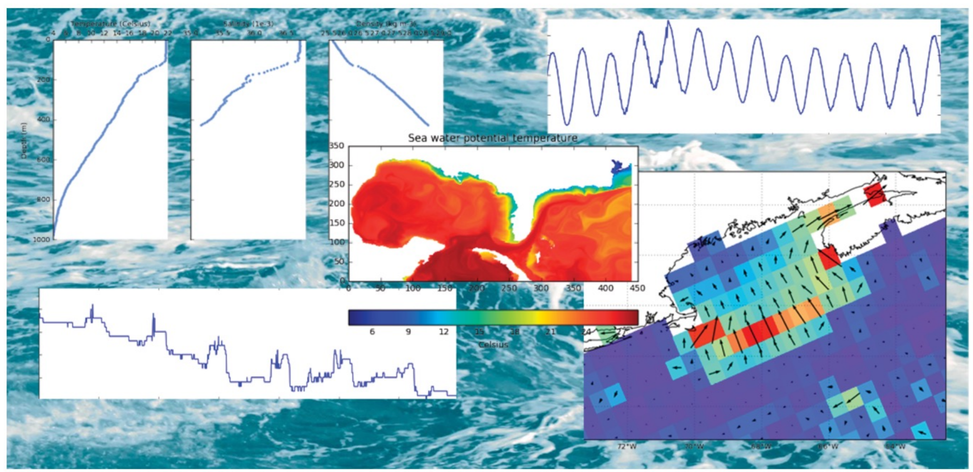
IOOS

The IOOS Data Demo Center | Code Gallery | Video Tutorials | Contact Us

OTHER RESOURCES

1. Installing the IOOS conda environment
2. Opening netCDF files - hints from AODN
3. Unidata Jupyter notebook gallery
4. Extracting and enriching OBIS data with R
5. USGS-R examples

The IOOS Data Demo Center



The IOOS Notebook Gallery is a collection of tutorials and examples of how to access and utilize the many IOOS technologies and data sources available. This site is geared towards scientists and environmental managers interested in “diving deep” into the numbers and creating orginal plots and data analysis. Most notebooks will be examples using Python code. Over time, we plan to include notebooks with Matlab, R, and Arc GIS code as well. The notebooks will come from a variety of authors including IOOS Program Office Staff, Regional Association data managers, and other IOOS partners. If you think you have a nice example you would like to share please let us know!

Trend #3

- Improved information models and ontologies
- Information model: representation of concepts and the relationships, constraints, rules, and operations to specify data semantics
- Motivated by the recognition that existing information models were limiting

Example 1

- Parameter names are typically ambiguous
- Not a problem in single PI situation, but fundamental roadblock for collaborative science
- => motivated drives for unambiguous naming scheme
- => scope and achieving consensus is challenge

Example 2

- Need to formally represent support volumes of measurements in information model
- Example – outflow at basis of watershed is point measurement, but represents integration across space and time

GitHub, Inc. [US] | https://github.com/ODM2

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Observations Data Model 2

An information model and supporting software ecosystem for feature-based earth observations.

http://www.odm2.org

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Pinned repositories

odm2-software-ecosystem

A meta-repository to help navigate the many repositories under the ODM2 GitHub Organization.

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WOFpy

Forked from swtools/WOFpy

An implementation of CUAHSI's Water One Flow service stack in python

Python ★ 1 10 Updated 2 days ago

Top languages

Python PLpgSQL HTML Batchfile Jupyter Notebook

www.geoscienceontology.org

Geoscience Standard Names Ontology

Welcome to the *Geoscience Standard Names Ontology* website! We are happy you are here.

EARTHCUBE NSF

This site is currently under construction, but here is some basic information about this project.

What is the Geoscience Standard Names Ontology?

The **Geoscience Standard Names Ontology** is a schema for describing computational models (and data sets) in a standardized way. It uses Semantic Web technologies and best practices (e.g. RDF, OWL, SKOS) to formalize the concepts needed to provide a *deep description* of a resource. This information can then be used to discover, compare, use and connect geoscience resources into workflows. You may access our SPARQL endpoint at http://www.geoscienceontology.org:3030/ds/query, and can download the full ontology here. The endpoint was implemented with Apache Jena Fuseki. To help get you started with querying our service, we've provided an endpoint interface here. Please note that while our server awaits an upgrade, only a portion of the ontology is available. Thank you for your patience!

The GSN is a formal ontology that was derived from and dramatically extends the CSDMS Standard Names. The CSDMS Standard Names (CSN) is a set of rules and controlled vocabularies described in Peckham (2014a). Both the GSN and the CSN have been funded almost entirely within NSF EarthCube projects, including:

Earth System Bridge	OntoSoft / GeoSoft	GeoSemantics
EarthCube website	EarthCube website	EarthCube website
Main website	Main website	Main website

Standardized Metadata for Models

Standardized metadata for models is the key to reliable and greatly simplified coupling in model coupling frameworks like CSDMS (Community Surface Dynamics Modeling System). This model metadata also helps model users to understand the important details that underpin computational models and to compare the capabilities of different models. These details include simplifying assumptions on the physics, governing equations and the numerical methods used to solve them, discretization of space (the grid) and time (the time- stepping scheme), state variables (input or output), model configuration parameters. This kind of metadata provides a "deep description" of a computational model that goes well beyond simple discovery/citation metadata (e.g. author, purpose, scientific domain, programming language, digital rights, provenance, execution) and captures the science that underpins a model. Basic metadata for discovery and citation is already well-served by projects like Dublin Core (main site) and DataCite.

Convergence of three factors

- Data volume and availability
- Tool availability and capability
- Social change – data and tool sharing is now the norm

Things are changing – and the rate of change is accelerating