



American Geophysical Union Fall 2009 San Francisco, CA

Background: ORNL DAAC

- Oak Ridge National Laboratory (ORNL)
ORNL is a multi program science and technology laboratory under the U.S. Department of Energy. Big place, many people, diverse projects , since 1940s. <http://www.ornl.gov/>
- Distributed Active Archive Center (DAAC)
Data center for biogeochemical and ecological data and models useful in environmental research. <http://daac.ornl.gov/>

Today's Agenda

- What is Mercury?
- What can Mercury do for you
- Quick look at Mercury model's
- Searching data
- Key search features
- Mercury Demonstration

Finding data – Types of users

I know what I want. Do you have it?

Searching with predefined selection criteria

I am not sure what I want. I need to see what you have available

Browsing a hierarchy of availability summaries

I will know what I want when I see it

Searching with a combination of predefined selection criteria and visual review of data plots

I need to read about what you have, then I will decide

Discover areas of interest by browsing the ORNLDAAC web documentation and collect items of interest

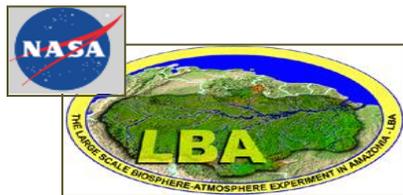
What is Mercury

- Distributed metadata management, data discovery, and access system
- Based on a combination of open source and ORNL developed software
- Standards based – XML, FGDC, Z39.50, Dublin-Core, Darwin-Core, GCMD, EML and ISO19115

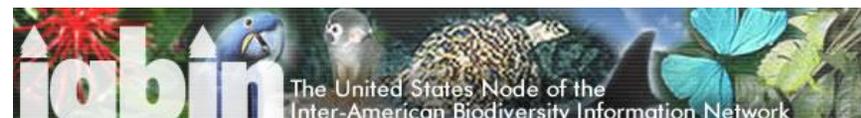
What can Mercury do?

- Provide a **single portal** to information contained in disparate data management systems
- Provide **free text, fielded, spatial, and temporal search** capabilities
- Allow individuals and database managers to **distribute their data** while maintaining complete control and ownership
- **Leverage investment** in existing information systems and research

Projects using Mercury



NASA Project Office
LBA-Hydrometeorology



CPTEC
Centro de Previsão de Tempo
e Estudos Climáticos
Brazil



Southern Africa



Two Mercury Models

- The Virtual Internet Database

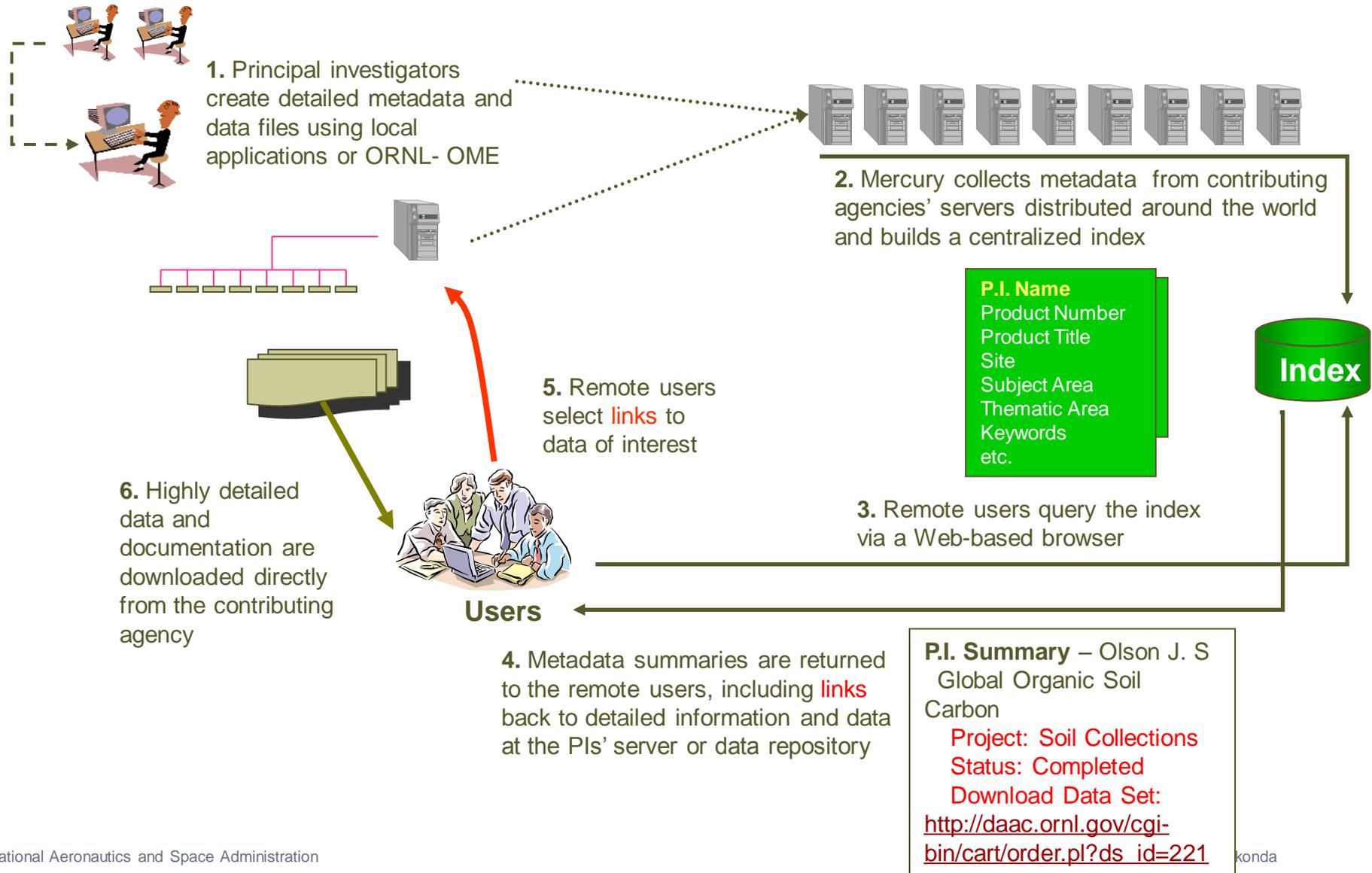
Organizes a new collection of data from informal systems spread across the Internet

- The Virtual Aggregate Database

Harvests information from existing formal separate DBMS

- Many hybrids

Mercury – A Virtual Internet Database



Mercury - key features

- ORNL DAAC – Simple Search & Advanced Search
- Flexible architecture - can handle multiple search services, scalable, easily extendable
- Rich client user Interfaces
- Detailed results summary - Filtering, dynamics sorting, and book marking of search results
- Has the ability to provide the harvested metadata to other applications (e.g., Google, GCMD, GeoOneStop, NBI Biobot)
- Semantic web integration support (thesaurus service)
- Seamless data ordering/data extraction functionalities
- External data visualization tools integration
- User Statistics Collection
- SOAP (Simple Object Access Protocol) based design supports Web services

ORNL DAAC Mercury Instance

- **Search Technology using popular open source tools**
- **More than 8000 searchable metadata records**

Currently Archiving data from:

- ORNL DAAC (Distributed Active Archive Center) Archived Data
- Regional and Global Data
- Land Validation Data
- LTER Data (Long Term Ecological Research)
- Organization of Biological Field Stations
- Land Processes Distributed Active Archive Center (LP DAAC)

Simple Mercury Search (google like search)

- <http://mercury.ornl.gov/ornlDaac/index.jsp?tab=simple>
- <http://daac.ornl.gov>



The screenshot displays the DAAC Metadata Search System interface. At the top, the DAAC logo is visible with the text "for biogeochemical dynamics" and "DISTRIBUTED ACTIVE ARCHIVE CENTER Oak Ridge National Laboratory". Below this is the "Metadata Search System" header with the Mercury and NASA logos. The interface has three tabs: "Simple Search" (selected), "Advanced Search", and "Browse". The main search area is titled "Search entire document for" and contains a search input field with the text "carbon". Below the input field is a hint: "Hint: boolean operators, wildcards and phrases are allowed. ex: precipitation or (rain* and \"moisture content\")". A section titled "Query being built:" shows the constructed query: "Entire Document : carbon and from sources: All". Below this, there is a "Not Editable" label and a "Results/Page" dropdown menu set to "10". At the bottom, there are three buttons: "SEARCH", "CLEAR QUERY", and "HELP".

Advanced Mercury Search

- <http://mercury.ornl.gov/ornldaac/index.jsp?tab=advanced>

The screenshot shows the 'Advanced Search' tab of the Mercury search interface. It features four main search sections: 'Search by Keywords', 'Search by Date Range', 'Search by Spatial-Coordinate', and 'Search from Data Sources'. A 'Query being built' section at the bottom shows the constructed search query. Callouts highlight specific features: 'Type-a-head functionality' points to the keyword input field, 'Date range search' points to the date range selection, and 'Draw a bounding box' points to the map and coordinate input fields.

Simple Search | **Advanced Search** | **Browse**

Search by Keywords

Project: Hint: wildcards and phrases are allowed. Ex: %" or BIGFOOT;BOREAS

[Help](#) | [clear](#)

Search by Date Range

during thru
mm/dd/yyyy mm/dd/yyyy

[Help](#) | [clear](#)

Search by Spatial-Coordinate

List Areas in:
USA WORLD

Search Area:

overlaps encloses

North

West East

South

[Help](#) | [clear](#)

Search from Data Sources

- ORNL DAAC Archived Data (ORNL DAAC) [\(i\)](#)
- Land Validation Data (LandVal) [\(i\)](#)
- Regional and Global Data (RGD) [\(i\)](#)
- Long Term Ecological Research (LTER) Network [\(i\)](#)
- Organization of Biological Field Stations [\(i\)](#)

**deselect the boxes to limit the search*

Query being built:

Not Editable

`project = lba and encloses coordinates (n,w,s,e) = (13.7,-84.9,-57.6,-32.4) and during 02/01/1999 to 02/21/2008 and from sources: All`

Results/Page:

Type-a-head functionality

Date range search

Draw a bounding box

Web browse Tree



View All gives all possible results for the **Sensor: air temperature** present in the metadata

All Parameters for the Sensor: **barometer** in the Site: Amazon Basin

All Sensors for the Site: Amazon Basin

All Sites present in the metadata

- MetaData Files
- Parameter / Source / Site
- Site / Sensor / Parameter
 - AFRICA [View All](#)
 - ALASKA [View All](#)
 - ALASKA CANADA E
 - AMAZON BASIN [View All](#)
 - [\(View All\)](#)
 - air thermometer [\(View All\)](#)
 - analysis [\(View All\)](#)
 - avhur [\(View All\)](#)
 - barometer [\(View All\)](#)
 - air temperature
 - precipitation amount
 - sea level pressure
 - surface pressure
 - carbon analyzer [\(View All\)](#)
 - human observer [\(View All\)](#)
 - kjeldahl digestion [\(View All\)](#)
 - model analysis [\(View All\)](#)
 - ph meter [\(View All\)](#)
 - rain gauge [\(View All\)](#)
 - stream gauge [\(View All\)](#)
 - sun photometer [\(View All\)](#)
 - temperature sensor [\(View All\)](#)
 - AMAZON BASIN BRAZIL SOUTH
 - AMAZONAS (MANAUS) - EMBR...

Typical Mercury Search Results Screen

Search result can be bookmarked, emailed or used as an RSS feed

Filtering the search results

Sorting and navigating the results

Brief results with links to order the data or view full metadata record

DISTRIBUTED ACTIVE ARCHIVE CENTER Oak Ridge National Laboratory

Metadata Summary

Bookmark Email Help RSS

Your search found: 1472 documents.
Query: fullText:carbon AND datasource:(daac landval rgd lter obs)

Filter by data providers

- [LTER Data \(1015\)](#)
- [ORNLDAAC Archived Data \(294\)](#)
- [Regional and Global Data \(145\)](#)
- [Land Validation Data \(12\)](#)
- [Organization of Biological Field Stations \(6\)](#)

Filter by parameter

- [biomass \(117\)](#)
- [primary production \(114\)](#)
- [carbon \(92\)](#)
- [carbon dioxide \(89\)](#)

Filter by sensor

- [analysis \(163\)](#)
- [weighing balance \(102\)](#)
- [quadrat sampling frame \(70\)](#)
- [soil coring device \(60\)](#)

Filter by topic

- [biosphere \(292\)](#)
- [atmosphere \(199\)](#)
- [land \(182\)](#)
- [surface \(182\)](#)
- [hydrosphere \(41\)](#)

Filter by project

- [boreas \(98\)](#)
- [net primary productivity... \(74\)](#)
- [safari 2000 \(27\)](#)
- [fife \(25\)](#)

Viewing Documents 1 - 10 out of 1472
Prev 1 2 3 4 5 6 7 8 9 10 Next

Return to Search Show Cart

Sort By: **Index Rank** Period of record Source Project

BOREAS TE-06 NPP FOR THE TOWER FLUX, CARBON EVALUATION, AND AUXILIARY SITES 01/01/1985 - 12/31/1995
Datasource: ORNLDAAC ARCHIVED DATA
Project: BOREAS

The BOREAS TE-06 team collected several data sets to examine the influence of vegetation, climate, and their interactions on the carbon fluxes for boreal forest species. This data set contains estimates of the biomass produced by the plant species at the TF, CEV, and AUX sites in the SSA and NSA for a given year. Temporally, the data cover the years of 1985 to 1995. The plant biomass production (i.e., aboveground, belowground, understory litterfall), spatial coverage, and temporal nature of measurements varied between the TF, CEV, and AUX sites as deemed appropriate by BOREAS principal investigators.

★★★★★☆☆☆☆☆ [Get data](#) [View full metadata](#)

NPP BOREAL FOREST: FLAKALIDEN, SWEDEN, 1986-1996 01/01/1986 - 12/31/1996
Datasource: ORNLDAAC ARCHIVED DATA
Project: NET PRIMARY PRODUCTIVITY (NPP)

The NPP Database contains documented field measurements of NPP for global terrestrial sites compiled from published literature and other extant data sources. The NPP Database contains biomass dynamics, climate, and site-characteristics data georeferenced to each intensive site. A major goal of the data compilation is to use consistent and standard well-documented methods to estimate NPP from the field data. Other important components of the database include a summary, investigator contact information, and a list of key references for each site. As far as possible, the original principal investigator's name is included.

★★★★★☆☆☆☆☆ [Get data](#) [View full metadata](#)

NPP BOREAL FOREST: JADRAAS, SWEDEN, 1973-1980 01/01/1973 - 12/31/1980
Datasource: ORNLDAAC ARCHIVED DATA
Project: NET PRIMARY PRODUCTIVITY (NPP)

The NPP Database contains documented field measurements of NPP for global terrestrial sites compiled from published literature and other extant data sources. The NPP Database contains biomass dynamics, climate, and site-characteristics data georeferenced to each intensive site. A major goal of the

ORNL DAAC Mercury Demo

Search Scenario

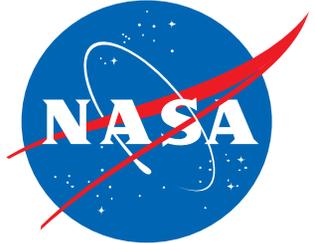
1. Search for "Climate data" for data source: ORNL DAAC and find '**VEMAP 2: U.S. ANNUAL CLIMATE CHANGE SCENARIOS**' dataset
 2. Select a bounding box around North America and do an advanced search; do the same using other search engines (Example: Google) and compare the results
- <http://mercury.ornl.gov/ornldaac>

MERCURY Homepage:

- <http://mercury.ornl.gov>

-Detailed information about Mercury and Mercury Projects

-Access to Metadata Editors



References:

Palanisamy, G.; Wilson, B. E.; Devarakonda, R.; Green, J. M. (2007) Mercury- Distributed Metadata Management, Data Discovery and Access System, American Geophysical Union, Fall Meeting 2007, abstract #IN31C-05

Devarakonda R, Palanisamy G, Green J, Wilson, B E (2008) Mercury: An Example of Effective Software Reuse for Metadata Management, Data Discovery and Access, AGU, 89(53), Fall Meet. Suppl., IN11A-1019

Devarakonda R, Palanisamy G, Green J, Wilson, B E (2009) Mercury: Reusable software application for Metadata Management, Data Discovery and Access, Eos Trans. AGU 90(52), Fall Meet. Suppl., Abstract #IN11C-1060

Devarakonda R, Palanisamy G, Wilson B E, Green J, Mercury: reusable metadata management, data discovery and access system; Earth Science Informatics (2010) 3:87–94, DOI: 10.1007/s12145-010-0050-7

Mercury Home page: <http://mercury.ornl.gov>

Daac Home page: <http://daac.ornl.gov>