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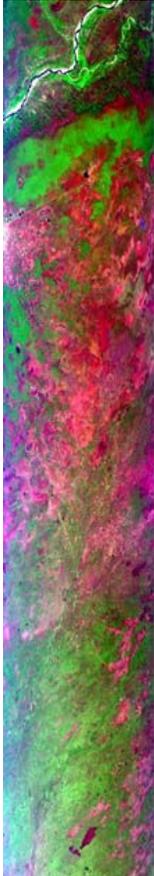
## The Mercury System and the Search for Earth Science Data <sup>[1]</sup>

by Annette Varani  
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"We were working to identify regional and global data sets that relate to the function of global ecosystems. Vast amounts of data are out there, but they were hard to locate," said Jon Foley, director for the Center for Sustainability for the Global Environment and professor of environmental studies and atmospheric sciences at the University of Wisconsin. "There was no system for one-stop-shopping," he said.

A new search tool eases data acquisition.

- [About ORNL DAAC](#) <sup>[2]</sup>



Flight #00-180 in the SAFARI 2000 campaign, acquired on September 25, 2000 (Image courtesy of MODIS Airborne Simulator Field Experiment)

The drive toward "one-stop shopping," has motivated a number of innovations and collaborations among the NASA Distributed Active Archive Centers (DAACs) to develop search interfaces and work closely with data directories to help shorten the search for Earth science data. For instance, the DAACs use a search tool named the EOS Data Gateway (EDG), that is effective in finding data across all the DAACs. Each DAAC also has a variety of search tools, indexes, and online information services to help sort individual holdings.

Measurements, wherever they are taken and analyzed, yield data that may be relevant to earth science or global ecosystem studies elsewhere. However, these data may be kept by the researchers or their institutions. The data may not become part of the holdings of a DAAC for years to come, if ever. For instance, soil temperature studies in New Zealand could result in an ideal information set for a researcher in Alaska hoping to compare thawed states with permafrost, if only he or she knew it existed and where to get it. Enter Oak Ridge National Laboratory DAAC and Mercury.

The ORNL DAAC developed Mercury in 1998 and 1999 in support of the EOS Land Validation and Large Scale Biosphere-Atmosphere Experiment in Amazonia - Ecology (LBA-E) projects. Operational by June 1999, this Web-based system assists researchers in locating data holdings around the world and links users directly to the archives of scientific investigators who can provide the data and information users need.

Mercury uses commercial off-the-shelf software, to which ORNL has added custom-written components as needed. It supports metadata standards and is interoperable with several international data-sharing initiatives.

Mercury's Metadata Editor prompts researchers to write an abstract and fill in a minimum set of fields. For instance, depending on the data set, a researcher may list the data source, sensor, measurements taken, region, and other facts that collectively categorize and describe the data. In the process, he or she establishes the "metadata" or basic facts and keywords users need to search for data. Once a researcher has registered data with Mercury, the system then automatically gathers or updates metadata from Web sites, organizes it into a searchable index at ORNL, and allows users with Web browsers to search the ORNL system for data of interest.

Foley, a member of the ORNL DAAC User Working Group (independent scientists appointed to advise the DAAC) was aware of the system's success and offered to help expand Mercury's catalog of data sets pertaining to interactions between the biological, geological, and chemical components of the Earth's environment.

"We worked with Oak Ridge to create the metadata for approximately 60 global data sets," Foley said. "We tried not to make subjective judgments about the quality of the data sets, but instead focused on obtaining a representative sample of data." For example, starting with vegetation and advancing to soil properties and on to related parameters, Foley and colleague Veronica Fisher located a variety of data from satellites, field measurements, and maps, already published and peer reviewed.

To register these findings in Mercury, the team developed a standard set of metadata compliant with the Federal Geographic Data Committee's (FGDC) geospatial metadata standards and wrote abstracts for each data set. "In each case we contacted the original authors of the data sets. We sought each author's acknowledgment and permission, and obtained reviews of the metadata and abstracts from the original investigators," Foley said.

"I personally feel Mercury is a very good model, especially in the case of small data sets," Foley said, "because we leave data in the hands of the scientists who created them, who can best answer questions and provide updated information in a timely way."

Bob Cook, ORNL DAAC scientist, concurs. "Mercury complements the EDG." The EDG exists as an access mechanism of data from DAACs and affiliated data centers; many of the new Mercury data sets are not held by a DAAC or affiliated data centers. "Users can access Mercury to find data wherever it may be, and the system allows the Oak Ridge DAAC to help users find data that might otherwise be difficult to find."

"For a couple of projects such as LBA-E and SAFARI 2000, we subsetted regional and global data, providing value-added data products through Mercury in response to investigator suggestions," Cook said. "These data sets are in a simple ASCII grid format, which is a convenient form for researchers working with relatively small GIS data sets."

Mercury offers a real advance because of its native efficiency and ease of use. Cook said. "If someone pulls together a data set it can be in the Mercury system in a day. The metadata are simple, and the data can reside anywhere around the world. We encourage data providers to link to the most direct site for the data -- not to the home page for the data."

It is worth noting that, since Mercury updates on a daily basis, withdrawing data from the Mercury system is simply a click on the data set registration page.

Mercury will become the primary interface for accessing all ORNL DAAC data, as well as similar data registered in Mercury by researchers around the world. By extending the system to interface with NASA's new EOS Clearinghouse (ECHO), the ORNL DAAC's next version of Mercury will allow users to find and order data from any DAAC.

"In addition, Mercury will be a major element for interoperability for the Earth Science Information Partners (ESIP) Federation," Cook said. The ESIP Federation is a partnership of government agencies, national laboratories, universities, non-profit organizations and commercial businesses scattered across the United States. "Mercury will play an integral role in ensuring that all ESIP products and services can be found," he said.

## Comment(s)

Do you have biogeochemical or ecological data you would like to make more widely known? Contact the ORNL DAAC ([ornl\\_daac@ornl.gov](mailto:ornl_daac@ornl.gov) [3]); such data may be appropriate to be registered in Mercury.

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