

Curating and Maintenance of the Sediment Library and Dredge Collection

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LONG-TERM GOALS

The Lamont-Doherty (L-DEO) Deep-Sea Sample Repository (D-SSR) houses a collection of the most diversified as well as the largest number of different sites of deep-sea sediment cores in the world (Figure 1). The material is used primarily for climate research, but also for studies such as cosmic impacts, magnetic reversals, volcanism, sea-level variations, and much more. The D-SSR has as an overall purpose to provide curatorial support for this collection of core and dredge material entrusted to

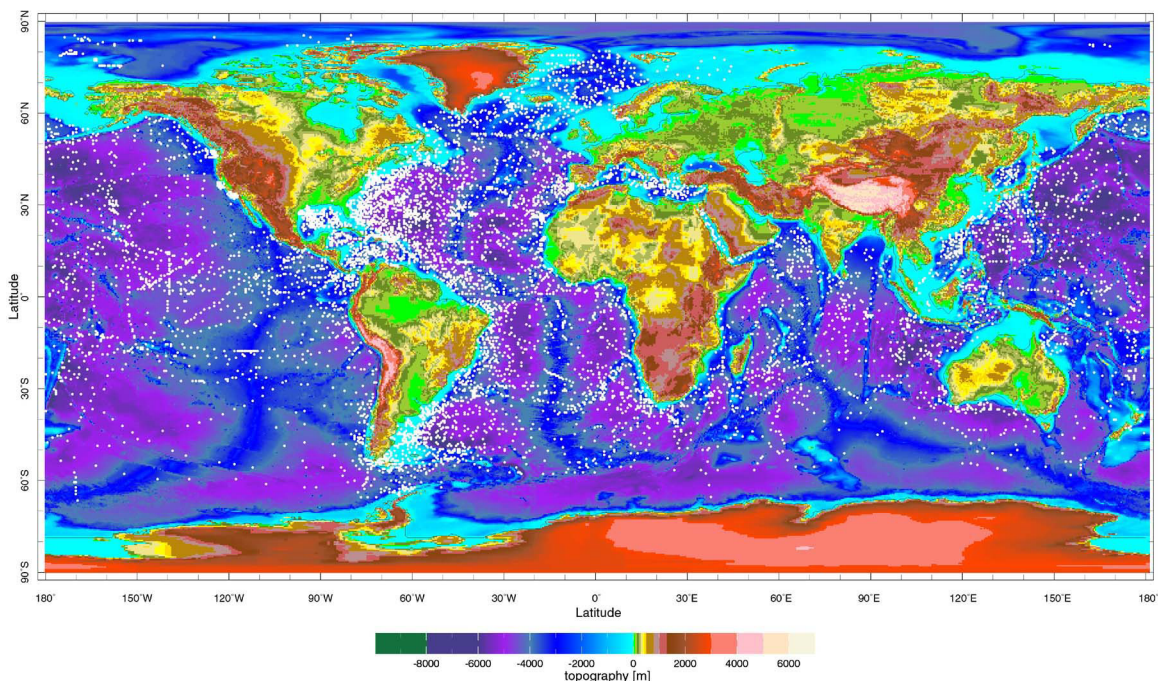


Figure 1. Core Location Map
[Each white dot represents one of the nearly 13,000 sites where a core was taken and is archived at Lamont's Deep-Sea Sample Repository.]

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us by our funding agencies and the research community. This responsibility consists of three major efforts: first to expedite the curation of new material; second to accommodate sampling of the material and its data by investigators within and outside Lamont-Doherty; and third, preserve and rehabilitate when needed the material in such a way as to maintain its value to the research community.

OBJECTIVES

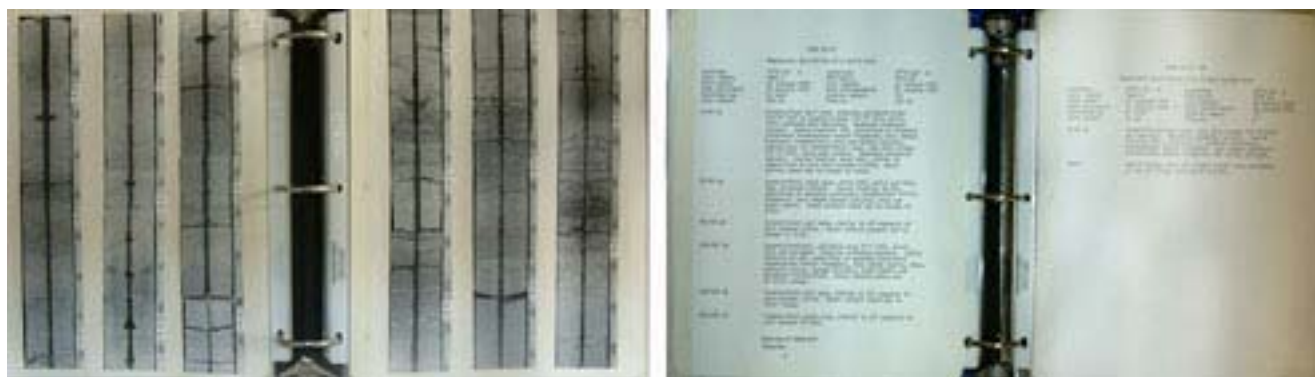
The sustained value and use of the Lamont collection is directly linked to the careful archive of each core since inception of the Core Repository along with preservation of the cores and their metadata. Each core is split open, photographed, and megascopically described. Metadata on all the cores keyed to micropaleontology and mineralogical content of the sediment has been on a database since the early 1970's. This database has been an invaluable tool for scientists. Long-term preservation of the collection and archive data as well as expanding the content of the database and having it all available on the web has been a continued goal. Our objectives are to digitize all analog data in order to expedite access to this extraordinary resource of information.

An integral part of the function of the Core Repository is dissemination of information. Requests for information can be for core locations, cores in certain areas, photos, megascopic descriptions, the sampling history of a core or suite of cores, data, publications on cores, on-going research and so much more. Other than the Lamont Core Database of metadata on the cores, which has been in existence for well over 30 years, historically, other data has been produced by a laborious search through old hand-written or typed files of data (Fig. 2).



Figure 2. Lamont Core Repository library of analog core/dredge data
[The core logs contain data of every core and dredge since 1947. There are several aisles containing over 1,000 of these volumes of analog photos, and typed or hand-written shipboard logs, opening logs and Megascopic Descriptions. All of this data has either been digitized and is on-line, or is currently being digitized for the web.]

Every core entering the collection since the inception of LDEO has been photographed. The original appearance of a core as revealed in its photograph is frequently used as a guide for reconnaissance work before a larger program is initiated. The photos themselves are used for gray scale analyses which has have proved indispensable as a sampling guide, or for reconstruction of valuable but heavily sampled cores, especially in the case of the older, dry-stored cores. Information on sediment is logged by interval for lithology; mass properties such as texture, color; structure such as bedding, burrows; composition including carbonate content; paleontology and mineralogy; and nature of basal contact to next interval. Dredge descriptions generally have been prepared by the Principal Investigator in charge of the acquisition. The data represented by thousands of pages of data and images is available in analog format in the core logs (Fig. 3).



***Figure 3. Pages from volumes containing Core Photos and Megascopic Descriptions.
[The Logs contain mounted original analog photos (left), and Megascopic Descriptions (right) that
were typed or hand-written.]***

We have extensive logs of data on sampling history that have been maintained for the past 55 years by typing the information on rollodex cards (Fig. 4). Information on the core name, researcher, reason, and sample intervals has all been recorded cross-referenced to researcher and core name. Not every sampling of a core produces useable data. The sediment can be taken and processed, but the results may reveal that the core or section of core is not suitable for that particular endeavor. That information can be invaluable to someone else considering the core for similar work. In addition, there is a vast amount of unpublished data on Lamont cores collected long before national databases were in existence. Because of the extensiveness of the Lamont core collection, and the nearly 1,000 volumes of sampling history, finding the data can take many steps, all manually. A program for entering the sampling history is well under way, with several thousand sampling records already entered through support from the ONR.

The support for digitization of data has contributed positively to the function of the Repository. Two of the most frequently requested forms of information are for the above mentioned history of sampling on a particular core, and digitized core photos. Availability of this information on the web has enabled more investigators to independently research information on material; this is indirect feedback to the Repository in that we are thus free to enter more data into the databases! There remains much more to digitize before we are totally electronic.



Figure 4. Fifty-five-year-old system of maintaining data.
[These rollodex (plus many others) contain hundreds of thousands of typed records of sampling. They are presently being entered into an on-line sample history database.]

APPROACH

New cores are currently digitally imaged as they are opened, and are database-ready. The older black and white photos are in the process of being scanned and prepared for entry into the database. All new megascopic Descriptions are digital; older analog descriptions have all been digitized and are available on the web. Sample History is now recorded digitally. The work is mostly carried out using computers, scanners, and software presently in the Repository. The preparation of the data and images for scanning, and final entry into databases is carried out by Ramona Lotti. Technical staff supported by other sources do the actual scanning. All data is backed up in a mass storage unit for digital archive while other copies are prepared for on-line use.

WORK COMPLETED

Thanks to previous ONR funding, many of the older photos have already been scanned, and we are far into the sample history data entry. The work continued on schedule this FY. Other sources have provided funding to set up the database for inclusion of the photo images.

RESULTS

A computer programmer funded by other sources is finalizing the adjustments in the database to accept the core photos into the website. The Repository website showing our operations, core database with digitized Megascopic Descriptions and sample history can be found at:

http://www.ldeo.columbia.edu/CORE_REPOSITORY/RHP1.html.

IMPACT/APPLICATIONS

The Lamont Repository has set standards for curation over the years. Cores in the collection taken over fifty years ago are currently being sampled for research. The fact that the cores were photographed at the time of their collection, megascopically described, and preserved and maintained impeccably over those years makes this possible. We continue to develop new methods for preservation. Digitization of the core photos is a most recent endeavor in preservation and upgrading. The ready availability of the images along with the digitized Megascopic Descriptions and sample history are a great aid to researchers seeking information on the cores.

TRANSITIONS

The Repository website is instructional as well as informational and receives a tremendous number of visitors. Many educational institutions from lower grade levels through graduate, and many environmental organizations link to it. The site goes into great detail to explain what we are doing and most importantly, why. There are pages explaining what we find in sediments and the significance of the findings. Pages describe techniques for studying the sediment and links to many other sites offer explanations of procedures, how we use the information from the cores to explain climate, to explore the earth's atmosphere, search for extraterrestrial events, and much more. There are links to data provided to us by researchers, publications resulting from work on cores. A page threads through a full research cruise from beginning to end including details of retrieving cores.

RELATED PROJECTS

All metadata on the cores is sent to the National Geophysical Data Center for inclusion in the National Geophysical Database at: <http://www.ngdc.noaa.gov:80/mgg/curator/curator.html>.

HONORS/AWARDS/PRIZES

One of us, Gerard C. Bond from Lamont-Doherty Earth Observatory of Columbia University, was the 2003 Ewing Medalist. The medal was co-awarded by the American Geophysical Union and the US Navy in recognition of his significant contributions to deep-sea exploration.