

# Ocean treasure stored at Texas A&M's IODP repository

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Priceless treasure from the bottom of the sea is locked away at Texas A&M University, stacked on floor-to-ceiling racks and kept secure in 15,000 square feet of refrigerated space.

Although it's not gold bullion or precious gems, this treasure dazzles oceanographers, geologists, geophysicists and other geoscientists who come from around the world to College Station to sample it. One piece is even on permanent display at the Smithsonian.

The treasure is a library of more than 106 kilometers (nearly 66 miles) of 1.5-meter-long cylindrical sections of rock drilled from the floor of the world's oceans. It is housed at the Integrated Ocean Drilling Program's Gulf Coast Repository in Research Park ([iodp.tamu.edu/curation/gcr](http://iodp.tamu.edu/curation/gcr)).

The repository is now one of only three permanent archive locations that house all cores taken by the Integrated Ocean Drilling Program (IODP, 2003 to present) and its two predecessors, the Deep Sea Drilling Project (DSDP, 1968-1983) and the Ocean Drilling Program (ODP, 1983-2003). The other two repositories are the Bremen Core Repository in Germany and the Kochi Core Center in Japan.

Last fall, IODP and its lead government funding agencies completed a strategic move to realize efficiencies and save costs by redistributing the older collections of cores housed at two other U.S. repositories, the East Coast Repository at Lamont-Doherty Earth Observatory at Columbia

University in New York and the West Coast Repository at Scripps Institution of Oceanography in San Diego. Those repositories officially closed their doors last Sept. 30. The core redistribution took three years to complete, but it is estimated that the long-term savings to IODP will exceed \$300,000 per year.

With the start of IODP in 2003 - and the associated expansion of the program's reach and global partnerships - program curators established an alignment scheme for storing cores based on their geographic origin. The redistribution of the older cores recovered during DSDP and ODP also followed this geographical distribution plan.

The Gulf Coast Repository now houses cores from the Pacific Ocean (Pacific plate east of the western boundary), the Caribbean Sea, the Gulf of Mexico and the Southern Ocean. All cores from the Atlantic and Arctic Oceans are housed at the Bremen Core Repository. The Kochi Core Center houses cores from the Pacific Ocean (Pacific Plate west of the western boundary), the Indian Ocean, all of the Kerguelen Plateau, and the Bering Sea.

The Gulf Coast Repository's design and methods of core storage and preservation have become a benchmark to the science community. Visitors from as far afield as China, Japan, and Europe have traveled to the Repository to learn how best to construct their own core repositories. The Repository was recently chosen as the storage and sampling facility for the prestigious San Andreas Fault Observatory at Depth core collection. It also houses several other small core collections from Texas A&M and industry, all of which are available to be studied and sampled by the international scientific community.

Almost 107,000 meters of core in 90,000 sections are preserved and meticulously archived in the Repository. Each section is shrink-wrapped with a unique barrier film that helps eliminate the loss of water vapor

and oxygen from the core. Cores are then sealed in specially designed containers and kept refrigerated at 4 degrees C (39 degrees F) to minimize the potential for mold growth and desiccation. Cores, or subsections of the cores, can also be kept frozen in large freezers at minus 80 degrees C. Biologists use these to extract DNA material for the characterization of microorganisms found within the cores.

"The true value of the Repository is that it gives scientists access to core samples that are unique," said Repository Superintendent Phil Rumford. "Any scientist anywhere in the world can have free access to this library of rock and use it to interpret the earth's scientific secrets such as climate change and tectonic processes."

Over the past 40 years, the ocean drilling program has collected a total of over 330 kilometers (1 million feet) of cores. The collection expands continually as the repositories receive new cores from each IODP drilling expedition.

"One of my jobs is to make sure we get the most value from the core by advising scientists on the appropriate size sample for the type of analyses they want to do," Rumford said. "That can range from a scraping, to a 10 cm (4 inch) chunk, to as long as 1.5 m (5 feet). Every sample we take has its own code and is cross referenced to the requesting scientists, the analyses performed on it, and the publications resulting from those analyses. In this way we can eliminate the possibility of duplicating existing work."

Rumford estimates that the program as a whole provides about 100,000 samples from the working core collection to investigators worldwide each year. Even though such a vast number of samples are harvested, only a tiny percentage (6-8 percent) of the collection has been depleted.

"We also average three to four scientists a month who come here to

examine and study the cores," Rumford said, "and cores are loaned to schools and museums for educational displays. One of our most famous core sections has been the centerpiece of a display at the Smithsonian Museum because it's so detailed and well preserved. It's a slice through the layers deposited during the Cretaceous/Tertiary (K/T) boundary interval period when it is thought that a meteorite impact might have caused the extinction of the dinosaurs."

The Repository is used for other educational activities including A&M Geology lab courses, tours for educational groups and schools, and IODP's annual School of Rock teacher workshops that give teachers detailed knowledge of drilling operations and the significance of IODP's work.

Source: Texas A&M University

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