Scientists find evidence of catastrophic sand avalanches, sea level changes in Gulf of Mexico

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An international team of marine research scientists working for the Integrated Ocean Drilling Program (IODP) have found new evidence that links catastrophic sand avalanches in deep Gulf waters to rapid sea level changes. By analyzing downhole measurements and freshly retrieved sediment cores, IODP scientists are reconstructing the history of a basin formed approximately 20,000 years ago, when sea level fell so low that the Texas shoreline shifted almost 100 miles to the south. The data are important to reconstructing climate change history and gathering insights about the development and placement of natural resources, particularly gas and oil deposits.

"The basin we chose to study is the ultimate sink of sediments transported by the Brazos and Trinity Rivers," explains cochief scientist Peter Flemings of Pennsylvania State University's Geosciences Department. "Over the last 120,000 years, the basin accumulated enough sand and mud to cover the entire city of Houston with a 20-foot thick layer."

During the last glacial period, sediments discharged by rivers such as the Brazos and Trinity formed beaches and deltas near the continental shelf's edge. Catastrophic submarine sand avalanches, called turbidity currents, carried the sediments into the deep-water Gulf of Mexico, where they accumulated in bowl-shaped basins. A map of the area under study is online at iodp.tamu.edu/scienceops/expeditions/exp308.html

Carlos Pirmez, a research geologist with Shell International E&P in Houston and a member of the science party explains, "Bowl-shaped basins such as the Brazos Basin IV are now buried thousands of meters beneath the Gulf of Mexico seafloor and host billions of barrels of oil and gas. Sediment records we acquire from the young basin off Texan shores will boost our understanding of how deeply buried reservoirs are formed, and how oil and gas can be drained from them more effectively."

Jan Behrmann, Fleming's cochief and a professor at Germany's University of Freiburg emphasizes that, "The goal of this expedition is not to explore or drill for oil, which lies much deeper than the sediments we recovered. But in the next several months, this science party will analyze sediment samples and will gain understanding of when and how turbidites form. We will then have a better picture of why and where these important deposits are formed."

The expedition scientists plan to obtain detailed measurements of changes in sediment and fluid properties to enable prediction of the mechanics of catastrophic underwater flows known as turbidity currents. These currents are akin to underwater avalanches and carry large amounts of sand and mud in suspension, sometimes for hundreds of miles, at speeds up to 70 miles per hour near the seabed. Sediments from these currents constitute an important piece of evidence in the study of sea level and climate change. Often, large petroleum reservoirs are found in the porous and permeable turbidite sands in deep water.

The expedition is operating from the JOIDES Resolution, the U.S.-operated riserless drillship operated for IODP by the JOI Alliance: the Joint Oceanographic Institutions, Texas A & M University, and the Lamont-Doherty Earth Observatory of Columbia University. The expedition is expected to return to port on July 10.

Source: Integrated Ocean Drilling Program Management International