

As the Dead Sea dries, drilling shows it's not the first time

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Sediment cores taken from the Dead Sea indicate the area has dried up almost completely, probably in conjunction with the recession of glaciers. In the middle of a relatively dry period, the lake is under additional stress now from human consumption. (Photo: Adi Torfstein)

(PhysOrg.com) -- In the first project of its kind, scientists are drilling deep into the bed of the fast-shrinking Dead Sea, searching for clues to past climate changes and other events that may have affected human history back through Biblical times and before. In one early discovery, they have found that the sea has come and gone in the past—a revelation with powerful implications for the current Mideast.

Spanning Israel and Jordan, the inland [Dead Sea](#) is earth's lowest-lying spot on land, with shores some 1,400 feet below ocean level, and hyper-salty waters going down another 1,200 feet or more. Beneath lie deep deposits of salts and sediments fed by the Jordan River drainage. The drilling, some 10 years in the making, is being conducted by investigators from Israel, the United States, Germany, Japan, Switzerland and Norway.

Scarce water is an explosive issue here; the Dead Sea has been shrinking rapidly over past decades, as Syria, Israel, Jordan and the Palestinian Territories all pull water from the Jordan for agriculture and other uses. Along the sea's shores lie huge evaporation ponds, where Israel and the Palestinians mine salt. If changing climate further dries the region, pressure on the water supply will increase.

Steven L. Goldstein, a geochemist at Columbia University's Lamont-Doherty Earth Observatory and one of the project leaders, says that early drill cores show that the Dead Sea has already dried up at least a couple of times without human intervention in the past couple of hundred thousand years. "Drying up by itself means that this water resource that people depend on now basically stopped by itself," he said. "Just imagine what this means if a warming climate results in the present day water supply becoming scarcer and scarcer."

Previous research along the Dead Sea's shores has determined that water levels have fluctuated with the coming and going of ice ages over the last several hundred thousand years, rising during glaciations to the north, when the region's climate was much wetter than today, and receding as glaciers pulled back. As shown by tall bluffs signaling former, higher shorelines, it is now hundreds of feet lower than it was during the height of the last glaciation, about 20,000 years ago.



Drill crews work 24 hours a day, seven days a week to dig into the Dead Sea floor. Researchers hope to reach down hundreds of thousands of years into the past. (Photo: Adi Torfstein)

The drilling is in about 900 feet of water about 5 miles off the Israeli shore. It began Nov. 21, and is scheduled to go around the clock for 40 days and 40 nights. This period was determined not by ancient texts, but rather the limited time the rig is available from the International Continental Scientific Drilling Program, which is sponsoring the project and covering a third of the \$2.5 million price tag. If more money becomes available, the drilling will continue longer. Goldstein says the team hopes to drill down 1,500 feet or more, and recover cores of sediment laid down over the last million years. “This is looking at climate at a very important place in human history,” he said. Among other things, the region is thought to have been the corridor for various human migrations, and may have been the route by which early people spread out from Africa.

Salts that precipitate out and settle to the bottom of the Dead Sea during

annual dry seasons contain uranium isotopes that will allow researchers to date sediment layers not only year by year, but season by season. Dark, muddy deposits wash down from the surrounding hills in the wet seasons. When there is prolonged drought, thicker layers of gypsum and salt deposits show up. From these deposits, researchers can find evidence of water chemistry, prevailing winds and changing climate. At two points, the researchers have already come across levels composed of tiny pebbles like those found on a beach; these indicate that the middle of the Dead Sea was, in fact, a beach, having dried up completely. The cores have not yet been accurately dated, but these events could coincide with the end of the last glacial period around 13,000-14,000 years, and an earlier interglacial period 75,000 years ago.

Other levels show evidence of earthquakes: The typically flat layers of sediment are twisted into convoluted shapes. With precise dating, these should form a detailed picture of the ancient history of earthquakes in the region. “An earthquake was almost certainly the source of the story of Jericho, when the walls came tumbling down,” Goldstein says. Information from the sediments could thus form valuable context for this and other ancient stories.

The drilling rig is about a 45-minute boat ride from the Israeli kibbutz of Ein Gedi . Drillers and scientists work 12-hour shifts, pulling up nine-foot plastic pipes holding cores about 5 inches across.

The scientists examine each core as it comes up, slicing it into 1.5-meter segments, describing and labeling as they go. The cores are sent ashore at the end of each shift for further evaluation, and eventually will go to a storage facility at the University of Bremen, Germany, for future study.

The chief scientist on the project is Mordechai Stein of the Geological Survey of Israel; others come from Tel-Aviv University, the GFZ German Research Center for Geosciences, Hebrew University of Jerusalem, the Swiss Federal Institute of Technology in Zurich, the

International Research Center for Japanese Studies in Kyoto, and the University of Minnesota. The team is hoping to involve scientists from Palestine and Jordan as well.

Adi Torfstein, a Lamont postdoctoral research scientist, spent two weeks out on the rig. “The most remarkable finding is that the Dead Sea had dried up before,” he says. “When and why this happened is still something that needs to be found out, but nevertheless, this is astonishing to me, and a sign of the fantastic information that will no doubt be found from these cores.”

More information: The progress of the project may be followed on its [Facebook page](#).

Provided by Columbia University

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