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Research unveils Kinneret's geological enigmas, may help predict quakes

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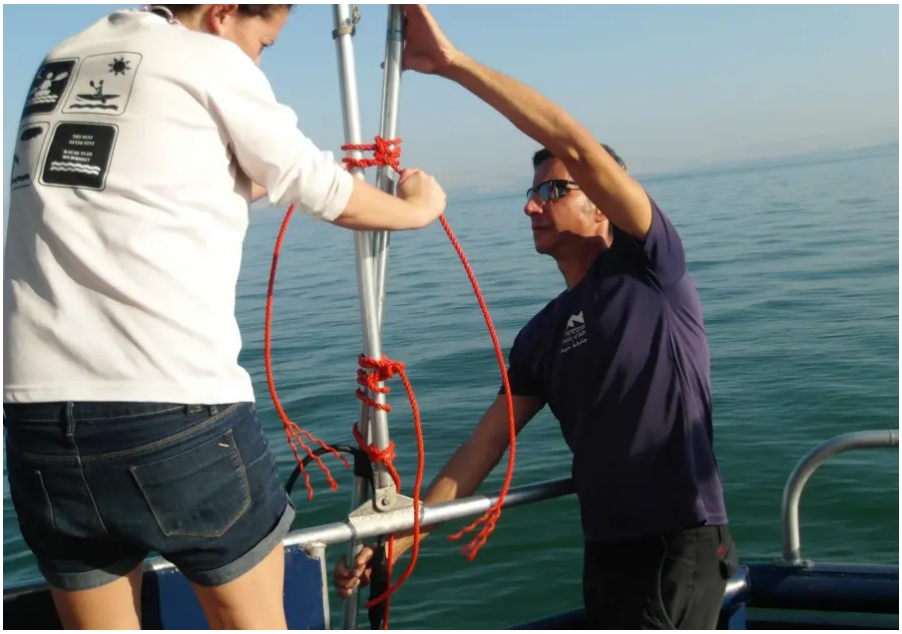
By ROSSELLA TERCATIN AUGUST 11, 2020 10:54

Adriano Mazzini (University of Oslo, Norway) collects water sample for geochemical measurements (photo credit: NAAMA SARID)

New research by a group of Israelis and international scientists has produced a geological map of the Kinneret that might help predict earthquakes. The findings of the interdisciplinary project were recently published in the journal Scientific Reports.

“The Kinneret is a unique place in terms of the geology and the seismicity tectonics,” Dr. Michael Lazar of the University of Haifa’s Department of Marine Geosciences told The Jerusalem Post. “Further south, we have a clear idea of what happens in the Dead Sea and the Dead Sea fault.

But the lake has remained a mystery for many years due to the presence of a layer of gas in the sediment on the seafloor, which has caused havoc with the conventional methods of looking into the subsurface.”



Naama Sarid and Michael Lazar installing the sonar on the boat in the Sea of Galilee. (Naama Sarid)

In the past, this obstacle made collecting good data very difficult, he said. For this reason, the group approached the problem with a combination of several methodologies.

“We employed the classic geophysical method, which is what we call seismic reflection, using sound waves to penetrate the sea floor and receive information from the shallow subsurface,” Lazar said.

Since they knew that in this case, when the gas interferes with the sound waves, the data would become unreliable, they employed this technique to identify both areas where this did happen and “good areas” where it did not, he said, adding: “We also reprocessed all the data collected up to the end of 1990s with more modern methods in our lab.”

Moreover, 12 seismic monitoring stations were installed in different parts of the Kinneret, which registered all the minor earthquakes that occurred in the span of a year.

“At the same time, another colleague measured the geochemistry, i.e., the chemical properties, of the waters from the springs around the Sea of Galilee and further north,” Lazar said. “The 12 stations told us where the earthquakes occurred; the geochemistry whether they were coming from the water sipping out from the faults through the cracks deep in the earth or from a more shallow source.”

Luca Gasperini (National Research Council, Bologna Italy) installs the sonar device in the Kinneret. (Luca Gasperini)

The combination of the findings allowed the group to produce the map of the Kinneret and its faults.

“In the past, many maps have been proposed, and each one looked different,” Lazar said. “A good map of the potentially active faults, along which earthquakes can potentially occur, is essential to work on seismic hazards, risk assessment, insurance, early warning systems and so on.”

“In the past, many believed that most of the seismic activity happened along the eastern shore of the Kinneret, which is where the main branch of the Dead Sea fault, the big tectonic fault in the area, enters the lake,” he said. “We discovered that the fault actually branches off to the northwest, cuts through the lake and causes a lot of activities that could be felt also on the western shores.”

Guy Lang (University of Haifa) installs a seismometer in the ground. (Naama Sarid)

While the last large earthquake in Israel dates back to 1927 and occurred in the Dead Sea, one of the things that the researchers propose in the paper is that even earthquakes in Lebanon and Syria have some effect on the area around the Kinneret because there is probably some connection between the faults that they mapped out and what is happening further north.

For the future, the scientists hope to use the data collected by the seismic monitoring stations to look at what is happening in the Kinneret at deeper depths than they managed to map so far.

“For me personally, the goal is to find nonconventional geophysical methods to try and see if our map is accurate as well as provide additional information,” Lazar said.