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Salty Secrets Of The Earth's Greatest Megaflood Revealed

An immense megaflood is thought to have followed a period where the Mediterranean dried out, and a new explanation has been provided for the strange salinity record left behind.

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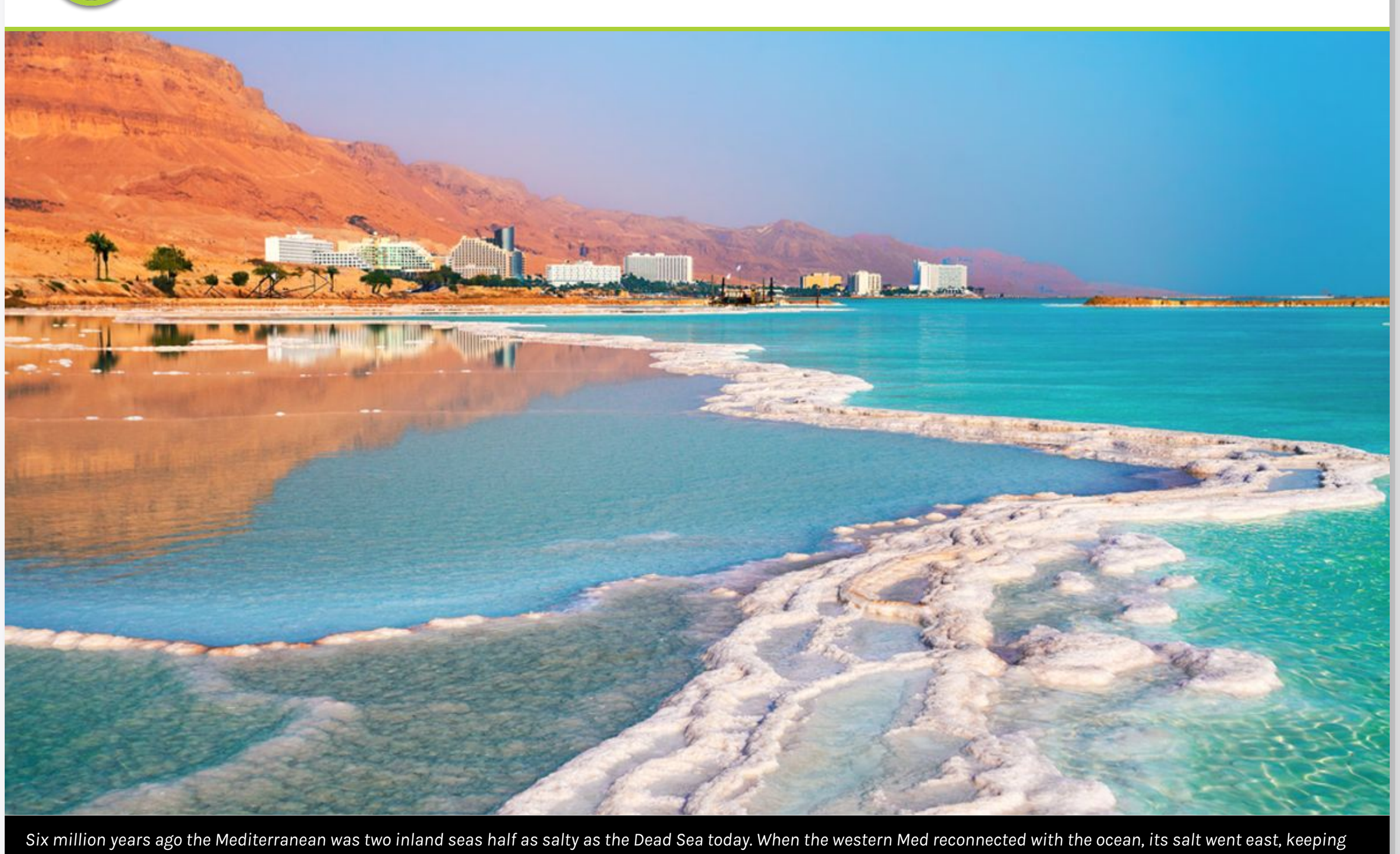

Six million years ago the Mediterranean was two inland seas half as salty as the Dead Sea today. When the western Med reconnected with the ocean, its salt went east, keeping the eastern basin salty for 26,000 more years. Image credit: vvvita/Shutterstock.com

Around 6 million years ago tectonic forces are thought to have blocked the Strait of Gibraltar, cutting the Mediterranean off from the global ocean. Evaporation within the Mediterranean basin exceeded rainfall and inflow from rivers, so the water level dropped until it was 1.5-2 kilometers (0.9-1.3 miles) below the level of the Atlantic and extremely salty, known as the Messinian Salinity Crisis. New modeling supports the idea of a megaflood far larger than anything else we know of. The work also explains previously puzzling differences on the sea floor in the Mediterranean's eastern and western sections.

According to one theory, popularized in the Saga of Pliocene Exile science fiction series, the Zanclean megaflood (as it is known) dwarfed anything else we know of in Earth's history. The combination of a drop double that of Angel Falls in Venezuela and thousands of times the water flowing over the Iguazu Falls in Argentina and Brazil, released almost 200,000 times the energy of Niagara Falls.

Not everyone accepts this claim, however, pointing to inconsistencies in the evidence from the floor of the Mediterranean. Australian National University PhD student Udara Amarathunga and co-authors have updated the megaflood idea in a new paper in Nature Geoscience. Their work explains why the eastern Mediterranean sea floor has a layer indicative of a long period of oxygen deprivation after the flood, while the western basin does not.

According to Amarathunga, during the period of its isolation, the Mediterranean was divided by a second sill, running between what is now Sicily and Tunisia (still present as the Sicily sill). When the Zanclean channel opened, that water rushed through with such force that it swept much of the contents of the western basin over the sill through the Noto Canyon in a second immense waterfall, taking with it most of the salt.

Consequently, soon after the megaflood the western Mediterranean basin, now connected to the Atlantic, had a salinity not very different from other oceans. Meanwhile, the eastern part inherited much of the western basin's salt, maintaining its hypersaline status.

"Our work indicates it took another 26,000 years to remove all the excess salt to the Atlantic Ocean and return the Mediterranean to a normal marine basin," Amarathunga said in a statement.

Amarathunga told IFLScience the team was alerted to the possibility by the presence of a sapropel (organics-rich mud) layer in the eastern basin, with no counterpart in the west. This indicated that for a long period after the megaflood the water was so dense in eastern areas oxygenated surface water could not penetrate, preventing the decomposition of material that fell to the bottom.

The flood would have been caused by erosion eating away at the barrier shielding the basin from the Atlantic, Amarathunga told IFLScience. "It starts very slowly and then at a certain point it reaches a threshold and unleashes a huge amount of energy that exponentially increases the amount of inflow."

Although the idea of a megaflood has captured the public imagination, Amarathunga told IFLScience that the nature of the Messinian Salinity Crisis is still heavily disputed among scientists. "There are two major groups… one believes the Mediterranean never laregely desiccated," he said. By explaining some of the anomalous observations that had been used to cast doubt on the megaflood idea, Amaranthunga and co-authors have solidified the case for the most dramatic event since the dino-killing asteroid.

The effects were felt globally – during the Messinian Salinity Crisis about 6 percent of salt in the global ocean was deposited beneath the Mediterranean. As the basin reflilled from the megaflood, global sea-level fell by around ten meters.

The work opens up other interesting lines of research, such as the climate and biological effects of such a large and salty sea on surrounding lands.

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