More Than One Asteroid Could Have Spelled Doom for the Dinosaur

By Daniel Stolte, University Communications, and Heriot-Watt University - August 17, 2022

Scientists have found evidence of an asteroid impact crater beneath the North Atlantic Ocean that could force researchers to rethink how the dinosaurs reached the end of their reign.
The team believes the crater was caused by an asteroid colliding with Earth around 66 million years ago – around the same time that the Chicxulub asteroid hit Earth off the coast of today's Yucatan, Mexico, and wiped out the dinosaurs.

Spanning more than 5 miles in diameter, the crater was discovered using seismic measurements, which allow scientists to probe what lies deep below Earth's surface.

Veronica Bray [2], a research scientist in the University of Arizona Lunar and Planetary Laboratory [3], who specializes in craters found throughout the solar system, is a co-author of a study in Science Advances detailing the discovery.

Named after a nearby seamount, the Nadir crater is buried up to 1,300 feet below the seabed about 250 miles off the coast of Guinea, West Africa. The team believes the asteroid that created the newly discovered Nadir crater could have formed by breakup of a parent asteroid or by a swarm of asteroids in that time period. If confirmed, the crater will be one of less than 20 confirmed marine impact craters found on Earth.

**What impact would the asteroid have had?**

Bray used computer simulations to determine what kind of collision took place and what the effects might have been. The simulations suggest the crater was caused by the collision of a 1,300 foot-wide asteroid in 1,600 to 2,600 feet of water.

"This would have generated a tsunami over 3,000 feet high, as well as an earthquake of more than magnitude 6.5," Bray said. "Although it is a lot smaller than the global cataclysm of the Chicxulub impact, Nadir will have contributed significantly to the local devastation. And if we have found one 'sibling' to Chicxulub, it opens the question: Are there others?"

The estimated size of the asteroid would put it roughly on par with asteroid Bennu, the target of the UAizona-led NASA asteroid sample return mission OSIRIS-REx. According to Bray's calculations, the energy released from the impact that caused the Nadir crater would have been around 1,000 times greater than the tsunami caused by the underwater eruption of the Hunga Tonga-Hunga Ha'apai volcano in the Polynesian country of Tonga on Jan. 15.

"These are preliminary simulations and need to be refined when we get more data," Bray said, "but they provide important new insights into the possible ocean depths in this area at the time of impact."

**What does the crater look like?**

Uisdean Nicholson, a geologist at Heriot-Watt University in Edinburgh, discovered the crater somewhat by accident, while examining seismic reflection data from the seabed during a research project dedicated to seafloor spreading, the geologic process that caused the African and American continents to drift apart, thereby opening the Atlantic Ocean.
"I've interpreted lots of seismic data in my time, but had never seen anything like this. Instead of the flat sedimentary sequences I was expecting on the plateau, I found an 8.5-kilometer depression under the seabed, with very unusual characteristics," Nicholson said. "It has particular features that point to a meteor impact crater. It has a raised rim and a very prominent central uplift, which is consistent for large impact craters.

"It also has what looks like ejecta outside the crater, with very chaotic sedimentary deposits extending for tens of kilometers outside of the crater," he added. "The characteristics are just not consistent with other crater-forming processes like salt withdrawal or the collapse of a volcano."

The asteroid crashed around same time as the dinosaur killer

"The Nadir Crater is an incredibly exciting discovery of a second impact close in time to the Cretaceous–Paleogene extinction," said study co-author Sean Gulick, an impact expert at the University of Texas at Austin. "While much smaller than the extinction causing Chicxulub impactor, its very existence requires us to investigate the possibility of an impact cluster in the latest Cretaceous."

While the seismic data indicate that the sediments impacted by the asteroid correspond with the Cretaceous-Paleogene boundary – a sedimentary layer demarcating the end of the Cretaceous period and last known occurrence of dinosaurs – there is some uncertainty about the precise time of impact, limited by the resolution of the data.

"Despite 4 billion years of impactors hitting Earth, only 200 have been discovered," Gulick said. "It is thus exciting news whenever a new potential impact is discovered, especially in the hard-to-explore marine environment."

Nicholson has applied for funding to drill into the seabed to confirm that it's an asteroid impact crater and test its precise age.

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