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THE Current

May 13, 2004
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Evidence of Meteor Impact Near Australia Linked to Largest Extinction in Earth's History

An impact crater, believed to be associated with the "Great Dying," the largest extinction event in the history of life on Earth––much earlier than the extinction of the dinosaurs––appears to be buried off the coast of Australia, according to new findings of a major research project headed by a scientist at the University of California, Santa Barbara. A scientific paper describing the crater was published on the Internet by Science Express, the electronic publication of the journal Science, on May 13.

Most scientists agree that a meteor impact called Chicxulub, in the area of Mexico's Yucatan Peninsula, accompanied the extinction of the dinosaurs 65 million years ago. But until now the time of the Great Dying––when 90 percent of marine life and 80 percent of life on land became extinct 250 million years ago––lacked evidence and a location for a similar impact event.

The study's first author, Luann Becker, research scientist at UCSB, and her team, have now found extensive evidence for a 125-mile-wide crater called "Bedout" off the northwestern coast of Australia. They found that the clues match up with the Great Dying, the time period known as the end-Permian when the Earth was configured as one primary land mass called Pangea, and a super ocean called Panthalassa.

During recent research in Antarctica, Becker and her team found meteoric fragments in a thin claystone "breccia" layer, pointing to an end-Permian event. The breccia contains the impact debris that resettled in a layer of sediment at end-Permian time. They also found "shocked quartz" in this area and in Australia. "Few earthly circumstances have the power to disfigure quartz, even high temperatures and pressures deep inside the Earth's crust," said Becker. Quartz can be fractured by extreme volcanic activity, but only in one direction. Shocked quartz is fractured in several directions and is therefore believed to be a good tracer for the impact of a meteor.

Becker discovered that oil companies in the early 70's and 80's had drilled two cores into the Bedout structure in search of hydrocarbons. She and co-author Robert Poreda, of the University of Rochester, went to Australia to examine these cores held by the Geological Survey for Australia in Canberra. "The moment we saw the cores we thought it looked like an impact breccia," said Becker. In the cores Becker's team found evidence for a melt layer formed by an impact. A date obtained by co-author Mark Harrison, from the Australian National University in Canberra, on material obtained from one of the cores indicate an age that is close to the end-Permian era. While in Australia on a field trip and workshop about Bedout, funded by the National Science Foundation, co-author Kevin Pope found large shocked quartz grains in end-Permian sediments that he thinks formed as a result of the Bedout impact.

Seismic and gravity data on Bedout are also consistent with an impact crater.

In the Science paper, Becker has documented how the Chicxulub cores are very similar to the Bedout cores. She explained that when the Australian cores were drilled, scientists did not know exactly what to look for in terms of evidence of impact craters. The cores sat, untouched, for decades.

The Bedout impact crater is also associated in time with extreme volcanism and the break-up of Pangea. "We think that mass extinctions may be defined by catastrophes like impact and volcanism occurring synchronously in time," said Becker. "This is what happened 65 million years ago at Chicxulub but was largely dismissed by scientists as merely a coincidence. With the discovery of Bedout I don't think we can call such catastrophes occurring together a coincidence anymore."

NASA, a major funder of the research, held a press conference on May 13 to announce the findings.

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Professor Becker's Bedout Web Site

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