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EVIDENCE FOR HISTORIC GLOBAL WARMING PUBLISHED IN SCIENCE

By analyzing a core of sediments taken from the ocean floor, scientists have discovered strong evidence linking a dramatic period of global warming, approximately 55.5 million years ago, to a massive release of methane, an event that resulted in an extensive die-off of deep sea dwelling organisms, according to this week's issue of the journal Science.

The warming, referred to as the "latest Paleocene thermal maximum" or LPTM, occurred over a 10,000 to 20,000-year interval and corresponds to the appearance of numerous mammals (including primates) and the extinction or temporary disappearance of many deep-sea species. (This period was originally discovered by James P. Kennett a University of California, Santa Barbara geology professor and his student Lowell Stott.)

Co-author Dorothy Pak, researcher in the Department of Geological Sciences and the Marine Science Institute of the University of California, Santa Barbara, explained that the new information is the "first tangible evidence for a methane dissociation event," a concept that has long been hypothesized.

According to the hypothesis, vast quantities of methane were stored as frozen gas hydrate in the upper few hundred meters of continental slope sediments before the latest Paleocene thermal maximum. "Long-term global warming during the late Paleocene pushed the ocean-atmosphere system past a critical threshold, causing

warm surface waters to sink, and intermediate to deep ocean temperatures to rise by approximately 4 to 8 degrees centigrade," according to the Science article.

The result was a chain of reactions in the global carbon cycle as the methane melted and was released in bubbles that interacted with dissolved oxygen, "adding carbon to all reservoirs of the global exogenic carbon cycle."

"Higher bottom water temperature, lower dissolved oxygen, changes in surface water productivity, and more corrosive waters killed many of the deep-sea species," according to the article. "On land, higher partial pressure of carbon dioxide and elevated temperatures quickly opened high-latitude migration routes for the widespread dispersal of mammals. Over several hundred thousand years, global carbon and oxygen cycles gradually returned to equilibrium conditions after the LPTM, although marine and terrestrial ecosystems were forever changed."

Pak explained that the sediment core, removed as part of the Ocean Drilling Program, was taken from an area known as the Blake Nose, a promontory on the continental shelf off the coast of Florida. She said that the core shows disturbed sediment, evidence of a submarine landslide layer that fits with the theory of the melting of buried methane--methane clathrates--from an ice-like solid into a gas.

The article concludes with a call for further research, "Even though our results suggest that methane was released from the Blake Nose region, during the LPTM, the mass of methane from this region alone is insufficient to explain the magnitude of global perturbations at the LPTM. Other sections deposited on the middle to lower slope during the LPTM also must exhibit features similar to those reported here."

Besides Pak, co-authors on the paper are: Miriam E. Katz and Kenneth G. Miller from Rutgers University, Piscataway, New Jersey, and Gerald R. Dickens from James Cook University, Townsville, Queensland, Australia.

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draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.