

# Greenhouse Methane Released From Ice Age Ocean

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Periods of warming temperatures during the last ice age triggered the release of methane from beneath the ocean, according to U.S. and French researchers. Once in the atmosphere, the methane would have acted as a heat-trapping greenhouse gas.

"This is a new source of methane which has not been looked at before," said Tessa Hill, now assistant professor of geology at UC Davis and at the university's Bodega Marine Laboratory.

Off the California coast -- and elsewhere around the world -- natural petroleum seeps release oil, tar and gas into the bottom of the ocean. Some methane gas finds its way to the surface, while the tar sinks back to the bottom.

Methane is also generated in marine sediments by bacteria and other organisms. Much of the biological methane remains at the sea floor in a chemically "frozen" form.

During 2002, Hill, then a graduate student at UC Santa Barbara, and colleagues sampled ocean sediments off California from a French government research vessel, the R/V Marion Dufresne.

Looking at sediments laid down during the past 30,000 years, they measured the amount of tar left behind by methane seepage and also the temperature at the ocean surface as recorded by the oxygen isotopes included in the shells of tiny sea animals.

Methane emissions peaked between 16,000 to 14,000 years ago and again 11,000 to 10,000 years ago, both periods when glaciers were melting and the ocean was warming.

"Tar deposition lines up with significant periods of warming," Hill said.

The warming climate between glaciations might have destabilized the "frozen" biological methane, causing changes in the sea floor, such as landslides, that increased seepage from below the surface, Hill said. Adding more methane to the atmosphere would have increased the warming trend.

Such natural methane seeps are present around the world, Hill said. Throughout the past several thousand years while climate has been stable, seepage has been relatively constant, but it might increase if the oceans warm significantly.

The other authors on the paper are James P. Kennett, David L. Valentine and Zuag Yang, from UCSB; Chris M. Reddy and Robert K. Nelson, Woods Hole Oceanographic Institution; Richard J. Behl, California State University Long Beach; and Christian Robert and Luc Beaufort, Centre National de la Recherche Scientifique, France.

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