

Full details

All details held on the selected case study are shown below.

Went live on	Title	Reference
15 Apr 2010	First evidence of warming-related methane releases from the Arctic Sea.	SID0253

Synopsis

Plumes of the powerful greenhouse gas methane, spotted rising from the seafloor off Spitsbergen, may be early signs of 'positive feedback' in climate change, where warming accelerates further change.

Description

Scientists surveying the Arctic seabed, to estimate how much of the potent greenhouse gas methane might be released by climate warming, have found evidence that the process may already have started.

The team, including researchers from Birmingham University, the National Oceanography Centre, Southampton, and Royal Holloway University, London, found more than 250 plumes of methane bubbles rising from the seafloor off Spitsbergen. This is the first time scientists have found evidence suggesting such seeps are due to ocean warming.

Methane is a powerful green house gas, with a warming effect approximately 20 times stronger than carbon dioxide. At high pressures and low temperatures it can combine with water to form a solid called methane hydrate. Methane hydrate is common in the seabed of continental margins - places that are also important for human economies because they carry pipelines, communication cables and oil installations.

The team studied an area of seafloor below the West Spitsbergen current, where hydrate is expected to be widespread. The current has warmed the sea floor here by about 1 degree Celsius over recent decades. Thirty years ago, the sediment was cold enough to contain methane hydrate in water depths as shallow as 360m. Now that limit has moved down to 400m. Hydrate that was once stable appears to be breaking down, releasing methane.

The researchers spotted the plumes using a type of sonar normally used to search for fish shoals. Once detected, scientists sampled the seawater in the plumes and tested for methane at a range of depths.

At present, the implications for global change remain uncertain. Some methane release may have been going on in this area since the last ice age. And not much of the warming-related methane release is reaching the atmosphere. Most is dissolving into the seawater. But in doing so it creates a weak acid, contributing to ocean acidification - a process increasingly recognised as damaging to biodiversity and climate.

More worryingly, these warming-related seeps could be early evidence of a 'positive feedback' in climate change, where warming (in this instance of the current and hence the seafloor) triggers other changes that accelerate climate change (releasing methane).

Interviewed for a BBC news story, Graham Westbrook, professor of geophysics at the University of Birmingham, said: "If this process becomes widespread along Arctic continental margins, tens of megatonnes of methane a year - equivalent to 5-10 percent of the total amount released globally by natural sources, could be released into the ocean."

Where methane hydrate starts to dissociate, the process can also weaken the sea bed, potentially causing problems ranging from weakened oil platforms to submarine slumps that disrupt cables or even, in extreme cases, set off tsunamis.

Beginning in 2010, the team is planning collaborative research expeditions over three years to see how the plumes behave over time. Other research is investigating the amount of methane hydrate under this area of the ocean floor.

This research was carried out as part of the Artic-IPY (International Polar Year) programme.

References and links

Hyperlinks

- [BBC News - Methane seeps from Arctic sea-bed](#)
- [Planet Earth Online - Warming waters release methane plumes into Arctic Sea](#)

Impacts

Impact evidence

Scientists surveying the Arctic seabed to estimate how much climate-damaging methane might be released by future warming have found strong evidence that the process has already started. This is the first time gas seeps from methane hydrates have been clearly attributed to climate warming.

Research and funding	
Funding type	Research Programme
Date of research	April 2008 - January 2011

Researchers at Universities		
Grant reference	NE/D005728/2	
Investigator	Professor T Minshull	University of Southampton, School of Ocean and Earth Science
Co-investigator	Dr H Palike	University of Southampton, School of Ocean and Earth Science
Co-investigator	Professor EG Nisbet	Royal Holloway, Univ of London, Earth Sciences
Co-investigator	Professor EJ Rohling	University of Southampton, School of Ocean and Earth Science
Co-investigator	Professor GK Westbrook	University of Birmingham, Sch of Geography, Earth & Env Sciences

Research and Collaborative Centres	
Centre	National Oceanography Centre, Southampton

Classification	
Science themes	Climate system, Biodiversity, Natural hazards
Science areas	Atmospheric, Marine, Polar
Policy areas	Climate/environmental change and impacts, Natural processes
Keywords	Marine, Methane, Methane hydrate, Ocean acidification