NEWS

Warming waters release methane plumes into Arctic sea

24 August 2009, by Tom Marshall

Scientists have found more than 250 plumes of methane gas rising from the seabed near Svalbard in the Arctic Circle.

A paper in *Geophysical Research Letters* details the findings, made on an expedition in Autumn 2008 in the British research ship RRS James Clark Ross.

A sample of methane hydrate from a core of the sub-seabed sediment, taken from the methane plumes, where the higher pressure in deeper water keeps the hydrate stable.

The team of scientists from Birmingham University, the National Oceanography Centre, Southampton and Royal Holloway University think the gas is being released from methane hydrate beneath the seabed, which is melting because of warming waters above.

Similar gas plumes have been found elsewhere in places like the Black Sea and the Gulf of Mexico, but this is the first time scientists have found them in where the conditions for their occurrence can be clearly attributed to climate warming.

'Various people have predicted this for several years, and methane from hydrate beneath the sea bed has been strongly appealed to by scientists looking to explain past climate shifts,' says Professor Graham Westbrook, a geophysicist at Birmingham University. 'But this is first time anyone's discovered a situation where it actually seems to be happening now as a result of rising water temperatures,' he adds.

Water bottle rosette with 24 bottles at the side of the RRS James Clark Ross. The bottles are opened at pre-selected depths, as the rosette is lowered through the water, to take samples of the water near the gas bubbles.

The gas plumes rise from the seabed between 150m and 400m deep, and can reach 50m from the surface before petering out. The team found them with a sonar system designed to track shoals of fish, and subsequently took water samples and measurements of temperature and salinity at different depths.

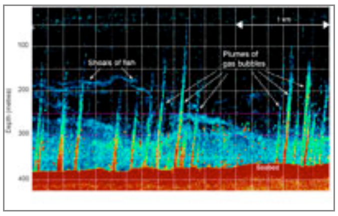
Methane hydrate is a solid material composed of water and methane. It forms at high pressures and low temperatures. 'Hydrate looks just like ice, but when you get it to the surface it begins to fizz - once you remove it from the stability zone it immediately starts breaking down to methane gas and water,' says Westbrook. 'You can even set light to it - you end up with what looks like a piece of ice in your hand, with flames coming from it.'

Normally hydrate exists only in what scientists call the gas hydrate stability zone, or GHSZ. This zone begins at the seabed and stretches down several hundred metres until the Earth's heat becomes too great for hydrate to form.

The West Spitsbergen current, which flows northward through the area, has warmed by 1°C over the last 30 years. Westbrook believes this has caused the top of the GHSZ to move deeper - it used to start around 360m beneath the seabed, and now it starts around 400m. Hydrate that was once in its upper reaches is now outside the GHSZ and hence has broken down, releasing methane.

If this happened across the Arctic, large amounts of methane could be released - Westbrook estimates that tens of teragrammes could escape every year.

If this methane reached the atmosphere, it could potentially contribute to climate change, leading to a vicious circle of more methane leading to higher temperatures, in turn melting more methane hydrates.



Sonar image of plumes of bubbles emanating from the seabed. Click on image to enlarge

Methane is a potent greenhouse gas, trapping heat in the Earth's atmosphere more than 20 times more effectively than carbon dioxide. Indeed, some scientists have suggested increased release of methane from the seafloor could have been partly responsible for rapid changes in the ancient climate.

But Westbrook remains cautious about the methane's potential impact on the climate. Few of the gas bubbles even reach the surface, and in those that do much of the original methane has dissolved into the surrounding waters on the way up, to be replaced by nitrogen.

Concerns remain, though. Dissolved methane makes sea water more acidic, and this could add to the growing problem of ocean acidification, which has so far largely on image to enlarge.

been due to dissolved CO_2. Scientists are concerned that more acid oceans could threaten plankton and other marine organisms by dissolving their chalky shells.

It's also possible that the rate of gas seeping from the seabed might fluctuate, with periods of more violent activity during which more methane could reach the atmosphere.

'What we know from experience in other places is that the level of activity of these plumes isn't always constant - you can have short periods when the rate of outflow becomes orders of magnitude greater,' Westbrook explains. 'When that happens the water can't absorb all the methane and some can be released.' At present, measurements of methane concentration in the atmosphere and in the near-surface water in the area of the plumes show that a small amount of methane is being transferred to the atmosphere.

If the methane in the hydrate deposits did ever make it into the atmosphere, the effects would be profound. 'There have been estimates that there's more carbon in methane hydrate under the oceans than in all the rest of the world's carbon stores put together, although recently these estimates have been revised downward,' explains Westbrook. 'Certainly, they are at least equal to the carbon in all the natural sources of petroleum and gas,' he adds.

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"their occurrence can be clearly attributed to climate warming"
There is no facts for this, these plumes were found by mistake in the Aurtum of 2008. Not knowing how long these have been in existence can not be put down to climate warming.

Nemo

Jon Nemo, Llanelli
Wednesday, 26 August 2009 - 19:31
