

## Chemistry World

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## Frozen fuel find rewrites rule book

23 August 2006

Earth scientists are revising their ideas about natural gas hydrates after discovering that large deposits of the water and methane mixture can form at surprisingly shallow depths below the sea floor.

Gas hydrates form as an icy mass at low temperatures and high pressures, and are usually found in the porous sediments at the bottom of deep oceans. They are potentially a vast source of fuel, and may also act as a source of atmospheric methane, a powerful greenhouse gas.



A chunk of gas hydrate recovered from just six metres below the sea floor at the Cascadia Margin

© William Crawford, Integrated Ocean Drilling Program

So when Michael Riedel of McGill University, Montreal, Canada, found a 20-metre-thick layer rich in hydrate at about 70 metres below the sea floor with nothing beneath it, he was amazed. 'We were stunned, and rubbing our eyes saying, "what's going on?"' he remembers.

The discovery came during an expedition, sponsored by the Integrated Ocean Drilling Program (IODP), to drill rock cores from the Northern Cascadia Margin off the west coast of Canada, nearly 1000 metres below sea level. Riedel's team found several deposits at 50 to 120 metres beneath the seabed, and even discovered some hydrate just nine metres below the seafloor. The findings are published in *Eos*, the journal of the American Geophysical Union.

Although small amounts of exposed hydrates have been found lying on the seabed itself in the Gulf of Mexico, these have been formed in areas of extreme methane flux such as vents. Riedel's results prove that much larger deposits of hydrates in other parts of the world could be created much closer to the surface than was previously thought, potentially making it easier to extract the gas.

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Drilling companies are hoping to tap hydrates by boring into them with devices that either heat the deposits or lower the pressure until they release methane. Since Riedel's hydrates were in relatively coarse, permeable sediments, this should also make the gas more accessible. Proposals to use the structures as storage sinks for carbon dioxide may also benefit.

The find should help to revise exactly how the hydrates form in the first place. Riedel's results are 'the best confirmation so far' that the existing model was a 'gross simplification', said Ingo Pecher of the Centre for Gas Hydrate Research at Herriott-Watt University, Edinburgh, UK.

Riedel suggests that the shallow deposits may be caused by methane gas rising quickly through fissures before seeping horizontally through the upper layers of the seabed sediments. 'We will now have to refine the old model so that faults and fractures are included,' he said.

*Tom Westgate*

## References

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M Riedel *et al*, *Eos*, 2006, **87**, 325

### Establishing the structure of hydrates

Researchers develop novel diffraction techniques for structure determination.

#### [Gas hydrates](#)

US geological survey

#### [Centre for gas hydrate research](#)

Heriot Watt University, Edinburgh, UK

#### [IODP expedition](#)

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