Methane and the clathrate gun hypothesis of fast climate change

Enormous amounts of CH_4 are sitting on the ocean floor in the form of methane hydrates (also called clathrates). Clathrates are cages formed by water molecules where gas molecules are trapped in the hollow space inside the cage. This symbiotic structure is stable at low temperature/ high pressure. The clathrate gun hypothesis speculates that a spontaneous release of methane from clathrates increases the atmospheric methane composition to the degree where the boosted greenhouse effect triggers climate change.

So far we have not found any sign of such catastrophic events occurring. However, it is speculated that less dramatic release from clathrates might happen during times of rapid climate change. Such events are hard to catch due to the short lifetime of CH_4 in the atmosphere. Atmospheric CH_4 originating from clathrates has a distinct isotopic composition of hydrogen. So far we are able to measure the carbon isotopic composition.

The master thesis project involves extending our measurement capacities to isotopes of hydrogen, testing the new system, and performing first measurements over a climatologically interesting time period. This is a 12 month project.

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