Geophysical Research Abstracts, Vol. 9, 04271, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04271


# Development of a new in-situ methane sensor for deep-sea studies

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Methane is an important component of the global carbon cycle. Land and coastal sources of methane are now well documented but large uncertainties remain on the amount of methane produced by the deep ocean structures. These uncertainties are for the most part due to the difficulty of access and direct measurements.

Current *in-situ* methane sensing technology is based on methane gas partitioning across a membrane. Several studies have shown the limitations of these devices when they are used in the deep-sea environment and for long-term monitoring; the problems are mainly due to the variable permeability of the membrane in time and with pressure and temperature.

We present here a new technique for *in-situ* determination of methane concentration in seawater using a Surface Plasmon Resonance (SPR) sensor, which determines the refractive index (RI) of materials very near to a gold surface. When molecules bind to the gold surface, the measured RI changes. The SPR sensor used here is a SPREETA 2000 from Texas Instruments.

In our experiment, the gold surface is covered with a layer of cryptophane (a synthetic organic compound), which is able to selectively trap gaseous molecules, such as methane. In the experiment, we use the Cryptophane A, which is particularly adapted for methane trapping, leading to a RI change. The molecules are provided by the Organic Chemistry Laboratory of the Ecole Nationale Superieure de Lyon (France).

This presentation summarizes the first results towards the adaptation of this technique to the detection of methane in seawater and the first data from lab-based measurements.