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Pore Fluid Array Construction and Deployment at Mississippi Canyon Site 118, Gulf of Mexico

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Abstract

A pore-fluid array (PFA) was constructed and deployed in surficial sediments to assess hydrate stability over time at an outcropping hydrate mound, Mississippi Canyon 118, Gulf of Mexico. The PFA contains an instrument package, connector, cement weight and sea-floor probe. It is deployed from a surface ship similar to a gravity core under its own cement weight. A seafloor-mounted instrument package houses four OsmoSamplers (Jannasch et al., 2004) that continuously collect and store sedimentary pore-fluids in coils of gas-tight, small-diameter tubing (~70m long) using osmotic pumps. The samplers collect fluids at a flow rate of ~0.4mL/day at 4ºC and need no electrical power. Each sampler is connected to individually filtered ports along the 10-meter sub-seafloor probe via small diameter tubing and a custom-made, low dead-volume connector. The connector allows a remotely operated vehicle to replace the seafloor instrument package without disturbing with the sample probe. Once the instrument package is collected, the pore-fluids will be measured for chloride, sulfate, and *in situ* methane concentrations to determine temporal changes in hydrate and address processes controlling hydrate stability in the shallow subsurface. The PFA was deployed in May 2005 and will be retrieved in the summer of 2006. Data gained from this study will be coupled to geophysical measurements to correlate seismic events relating to gas hydrate formation or decomposition.

Introduction

Gas hydrates are crystallized mixtures of hydrocarbon gas (mainly methane) and water that occur in areas of high pressure and/or low temperature, as found in continental shelves and permafrost. Based upon interpretations of seismic data, gas hydrate deposits are thought to represent one of the largest carbon reservoirs on Earth, containing up to 10^{16} kg of methane carbon, about twice the amount stored in fossil fuels (Kvenvolden,