Geophysical Research Abstracts
Vol. 15, EGU2013-3579, 2013
EGU General Assembly 2013

Sulfate reduction in a pockmark field on the Chatham Rise, New Zealand

Paula Rose (1), Richard Coffin (2), Lewis Millholland (3), Ingo Klaucke (4), Joerg Bialas (4), Ingo Pecher (5), and Andrew Gorman (6)

(1) NRC Postdoctoral Research Associate, US Naval Research Laboratory, Washington, DC, United States (paula.rose.ctr@nrl.navy.mil), (2) US Naval Research Laboratory, Washington, DC, United States , (3) SAIC, US Naval Research Laboratory, Washington, DC, United States , (4) GEOMAR - Helmholtz Centre for Ocean Research, Kiel, Germany, (5) University of Auckland, Auckland, New Zealand, (6) University of Otago, Dunedin, New Zealand

Seismic studies have identified an extensive field ($>$20,000 km^2) of seafloor depressions, or pockmarks, on the southwestern flank of the Chatham Rise, New Zealand. It has been suggested that these pockmarks result from gas hydrate dissociation linked to sea-level changes during glacial-interglacial cycles. Gas hydrates are predominately composed of methane (CH_4), a potent greenhouse gas. The upward flux of CH_4 in sediments is often quantified using pore water sulfate (SO_4^{2-}) profiles, assuming steady-state consumption of SO_4^{2-} and CH_4 by anaerobic oxidation of methane (AOM): $CH_4 + SO_4^{2-} \rightarrow HCO_3^- + HS^- + H_2O$. This reaction is one of the primary controls on CH_4 distributions in sediments.

Surface sediment cores ($\sim$ 8 m) will be collected from the pockmark field on the Chatham Rise during a research cruise in February 2013 to evaluate the association of the features with CH_4 releases. A suite of geochemical parameters will be determined in both solid phase sediment and pore water. This work will present pore water SO_4^{2-}, sulfide (HS^-) and chloride (Cl^-) depth profiles in sediments collected from the pockmark field. Theoretical SO_4^{2-} distributions in the absence of AOM will be compared to observed SO_4^{2-}profiles as a preliminary assessment of the influence of CH_4 on sediment geochemistry in and around the seafloor depressions. Chloride and HS^- distributions will further elucidate the role of gas hydrate dissociation at these sites and its possible role in the formation of the pockmarks on the Chatham Rise. These data will provide the foundation for interpreting CH_4 profiles in the same sediments and will generally lead to a better understanding of sediment CH_4geochemistry.