Geophysical Research Abstracts
Vol. 13, EGU2011-11516-1, 2011
EGU General Assembly 2011

First in situ respiratory measurement of vesicomyid bivalves at a cold-seep site (REGAB pockmark off Congo)

Carole Decker (1), Christian Le Gall (1), Antje Boetius (2,3), and Karine Olu-Le Roy (1)

(1) IFREMER Centre de Brest, Département Etude des Ecosystèmes Profonds, Plouzané, France (carole.decker@ifremer.fr), (2) Max-Planck-Insitute for Marine Microbiology, Germany, (3) Alfred Wegener Institute for Polar and Marine Research, Germany

Vesicomyid bivalves are one of the most abundant members of the chemosynthetic fauna inhabiting deep-sea reducing ecosystems. Their metabolic rates are not well known. Indeed, the bulk of studies on oxygen consumption rates have been assessed from ex situ measurements. Only one in situ oxygen uptake on vesicomyid bivalves was obtained with a benthic chamber deployment from the surface (Sommer et al. 2006); however without bivalve biomass estimation required for respiratory rate assessments. The giant pockmark REGAB located at 3160 m water depth along the Congo-Angola margin (Ondréas et al. 2005) is dominated by dense assemblages of vesicomyids, mytilids and escarpids. These symbiont-bearing species were observed along a NE-SW axis, with a decrease of methane concentration from the centre to the periphery of the pockmark. Two species of vesicomyid "Calyptogena" regab and Laubiericoncha chuni are distributed over the pockmark with high dominance of C. regab. During the GUINECO cruise (RV Meteor, 2008) two sites were studied along NE-SW axis (1-at the Centre and 2-at the South-West) characterised by dense aggregates of vesicomyids. To assess in situ respiratory rates of the bivalves and methane fluxes, the benthic chamber CALMAR (Caprais et al. 2010) has been deployed on one aggregate at each site. Total oxygen uptake and methane flux were obtained by both analysis of sequential water samples and oxygen probe deployment. Photos were taken and bivalves were sampled by blade cores to estimate density and biomass. Total oxygen uptake was respectively 332 mmol.m-2.d-1 and on the centre site and 492 mmol.m-2.d-1 on the SW one. Nevertheless, considering vesicomyid densities and biomass, oxygen consumption rate was the highest at the centre site (1.5-3.4 μmol.g total dry mass-1.h-1 vs 1.8-2.4 μmol.g total dry mass-1.h-1). These results are consistent with higher condition index for bivalves at this site. The differences observed in the bivalve metabolism could be explained by a higher methane flux (14.6 mmol.m-2.d-1 vs 0.3 mmol.m-2.d-1) and sulphide concentration in sediment in the centre than in the periphery of the pockmark.

Caprais, J.C., N. Lanteri, P. Crassous, P. Noël, L. Bignon, P. Rousseaux, P. Pignet, A. Khripounoff (2010) A new CALMAR benthic chamber operating by submersible: First application in the cold-seep environment of Napoli mud volcano (Mediterranean Sea) Limnology and Oceanography, 8, 304-312.
Ondréas, H., K. Olu, Y. Fouquet, J. Charlou, A. Gay, B. Dennielou, J. Donval, A. Fifis, T. Nadalig, P. Cochonat, E. Cauquil, J. Bourillet, M. Moigne, M. Sibuet (2005) ROV study of a giant pockmark on the Gabon continental margin. Geo-Marine Letters, 25(5), 281.
Sommer, S., O. Pfannkuche, P. Linke, R. Luff, J. Greinert, M. Drews, S. Gubsch, M. Pieper, M. Poser, T. Viergutz (2006) Efficiency of the benthic filter: Biological ontrom of the emission of dissolved methane from sediments containing shallow gas hydrates at Hydrate Ridge. Global Biogeochemical Cycles, 20, 1-14.