Geophysical Research Abstracts, Vol. 9, 06154, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-06154

Multiproxy studies of methane seep: A case study from the northern Adriatic Sea

G. Panieri (1), A. Ramette (2), S. Grünke (2), L. Vigliotti (3), M. Ponti (4), G. Fonda (5)

(1) Dipartimento di Scienze della Terra e Geologico-Ambientali, Università di Bologna, Italy (panieri@geomin.unibo.it / Phone: +39-051-2094595), (2) Max Planck Institute for Marine Microbiology, Bremen, Germany, (3) ISMAR CNR, Istituto di Scienze Marine, Bologna, Italy, (4) Centro Interdipartimentale di Ricerca per le Scienze Ambientali in Ravenna, Università di Bologna, Italy, (5) Dipartimento di Scienze della Terra, Università di Trieste, Italy.

The presence of modern methane seeps in the northern Adriatic Sea provides an opportunity to study the influence of methane on the ecology and geochemistry of bacteria, living foraminifera, and ostracods in a shallow water setting. A collection of samples and cores was recovered in the northern Adriatic Sea by scuba divers from sites characterised by presence or absence of methane seepage at 25 m water depth. Seep sites exhibit distinctive seeps visually characterized by persistent, although not vigorous, gas bubbling and by white mats of giant sulphide-oxidising bacteria. Surface samples were preserved and stained to determine the d13C composition of the cytoplasm of live (stained) species and to test for living and dead benthic foraminifera. Push-cores were frozen at -20°C and sliced into 1-cm-thick layers from the surface to the end. All living species of benthic foraminifera were also found in dead assemblages. The living foraminiferal assemblages, in both seep and control areas, were dominated by the presence of Reophax, Brizalina and Bolivina, genera usually common in areas with high food supply often associated with dysoxic/anoxic conditions. The most significant difference among the surface samples is the highly variable foraminiferal density which is slightly less variable and highest within the white bacterial mats than outside. The distribution of species does not show differences among sites. Among ostracods, the more abundant species are Callistocythere adriatica, Pontocythere turbida and Krithe Compressa. Previous isotopic analyses (d13C) performed on benthic foraminifera collected from close areas revealed very negative values from the foraminiferal cytoplasm in seep samples as the likely result of grazing on microbial

mats which densely colonised the investigated site. The diversity of the large filamentous, mat-forming bacteria which thrive at the oxic/anoxic sediment interface is so far poorly understood. Based on ribosomal sequence analysis, they mostly belong to the genera Beggiatoa or Thioploca. Taxonomic identification and diversity analyses therefore contribute to a better characterization of the ecology and phylogeny of those bacteria at shallow seeps. In order to test the environmental changes related to the presence of gas we carried out rock-magnetic measurements on selected samples. Concentration-related parameters (magnetic susceptibility, x; anhysteretic remanent magnetization, ARM; and isothermal remanent magnetization, IRM) show a decrease in the magnetic content associated with the presence of gas. Interparametric ratio (SIRM/ARM) suggests a coupled increase in grain-size that could be explained by selective dissolution of ferromagnetic grains possibly related to bacterial activity. The purpose of this ongoing research is to examine the existent relationships between microorganisms and meiofauna in seep settings where high concentrations of methane and sulphide supplied to bacteria, provide the basis for this complex ecosystems.