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Overview of a research cruise aimed at linking ancient and modern chemosynthesis-based ecosystems

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This session, "The Evolution of Chemosynthesis-based Ecosystems", was started in 2007. As a result of discussions over the past 3 years of continuous sessions, we have recognized that there is a need to form a link between past and present chemosynthesis-based ecosystems using comprehensive techniques within a framework of research that involves paleontologists, biologists (including microbiologists) and geochemists working together.

In order to realize the formation of a link between past and present chemosynthesis-based ecosystems, we submitted a proposal for a cruise to carry out research on chemosynthesis-based ecosystems using ROV. The proposal was accepted and our dive will take place in the area around Suruga and Sagami Bay in October, 2010. This presentation will give a brief outline of the planned research.

As a result of previous research on ancient chemosynthesis-based ecosystems, especially on cold-seep dependent ecosystems, it has been revealed that among bivalves found in the area of cold seep deposits, infaunal bivalves, which lived within sediment, are much more commonly found than epifaunal bivalves, which lived on the sea floor. Such infauna are thought to have lived in a low-hydrogen sulfide flux area, e.g. on the periphery of cold seeps. Furthermore, the distribution of such organisms as well as that of biomarkers, and of authigenic minerals related to microbial activities, varied in terms of both horizontal planes and vertical sections. Thus, to understand the overall context of a cold-seep ecosystem, it is necessary to study a cold-seep with special emphasis placed on its marginal area.

Our proposed cruise will focus on a relatively shallow cold-seep (ca. 300 m in depth) off Suruga Bay, e.g. Kanesu-no-se Bank. We are planning to excavate slices of geological sections ranging from the center to the periphery of the cold-seep, excavating both epifaunal and infaunal benthic animals. The slices will be subjected to analyses from the perspective of pore water geochemistry, microbial diversity and biomarkers, and with a view to observing sedimentary structures so as to reveal the overall context of a cold-seep. Such information will be useful in the reconstruction of ancient cold-seep ecosystems.

Keywords: cold seep, hydrocarbon seep, methane seep, chemosynthesis-based ecosystem, community structure, Kanesu-no-se