The Microbial Methane Observatory for Seafloor Analysis (MIMOSA): Long-term coupled geochemistry and microbiology experimentation in the deep-sea

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To better understand the impact that the Gulf of Mexico *Deepwater Horizon* oil release had on deep-sea (>1,000 m water depth) benthic microbial communities, we designed and tested a novel experimental package for long-term analysis of sediment microbial ecology and biogeochemistry. Using low-cost geochemical and microbial sampling systems, temporal and spatial variations in microbial community composition, biogeochemical reactions and hydrologic activity were examined, enabling the investigation of sediment microorganism response to acute and chronic inputs of hydrocarbons. The experimental package, named MIMOSA-MIcrobial Methane Observatory for Seafloor Analysis, is designed to continuously collect fluid samples for quantifying hydrocarbon flux from the seabed, following changes in bottom water and sediment porewater geochemistry associated with hydrocarbon inputs and cycling, and observing dynamics of microbial communities involved in hydrocarbon cycling. The observatory also carries out active *in situ* experimentation by continuous injection of enrichment substrates (*i.e.* oil, labeled substrates and/or electron acceptors) into sediments. In this presentation, we will describe the concept, design, and early results of MIMOSA, highlighting deployments conducted in the Gulf of Mexico at a deep-water natural oil seep and at a non-seep site near the Macondo well-head.