Synchrotron Infrared Spectromicroscopy and the Gulf of Mexico Deep-Sea Oil Plume

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ABSTRACT

The Deepwater Horizon blowout in the Gulf of Mexico on April 20, 2010 is the largest oil spill in the history of the United States. Their biological effects and expected fate are unknown due partly to the extreme depth and magnitude of this event, and partly to the primary initial mitigation strategy that injected unprecedented quantity of oil dispersant COREXIT 9500 directly at the wellhead (1,544 m below the sea surface). An additional mitigation strategy is to utilize the deep sea microorganisms that could degrade the oil; but this strategy depended on how native microorganisms would respond to an increased concentration of hydrocarbons and/or dispersant in situ. Now, a collaboration led by Berkeley Lab researchers has reported that the dispersed hydrocarbon plume stimulated deep-sea psychrophilic □-proteobacteria. In this presentation, we will describe how synchrotron infrared-based molecular measurements can help us give insights into the in-situ microbial processes by revealing how intrinsic microbes — as seemingly insignificant as an mitigation agent at low temperature and high pressure — can lead to significant molecular changes in hydrocarbon composition with distance from the source at 5°C in the deep-water column of the oil plume in the Gulf of Mexico (1).

REFERENCE

1. T.C. Hazen et al. "Deep-sea oil plume enriches psychrophilic oil-degrading bacteria", Science, 330(6001), 204-208, 2010.