Geophysical Research Abstracts
Vol. 20, EGU2018-19757, 2018
EGU General Assembly 2018

Bacterial DNA markers for crude oil pollution detection in cold seawater

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Monitoring devices and methods for the fast and autonomous detection of hydrocarbons in the marine environment is becoming crucial with the growing activity from the oil and gas industry and increasing environmental concerns. Crude oil contamination at sea causes changes in marine bacterial abundance and composition, and microorganisms undetectable in a pristine environment become prevalent following. The overarching goals of this study were 1) to examine through laboratory experiments the abundance and response time of selected bacterial DNA targets detectable in the early phases of petroleum exposure to surface and sub-surface seawaters 2) to use the Environmental Sample Processor (ESP) developed by Monterey Bay Aquarium Research Institute (MBARI, CA, USA), for near-real time detection of these microbial DNA marker responses for marine monitoring and surveillance of hydrocarbon contamination in seawater.
Here we present laboratory results obtained with crude oil in the range 30ppb – 2000ppb (nominal concentration) during an 11 days exposure. Microorganisms affiliated to obligate oil- degrading bacteria (OHCB) (Oleispira, Alcanivorax, Cycloclasticus, Marinomonas) were selected as well as other possible targets within organisms often associated with crude oil degradation (Colwellia, Polaribacter and Glaciecola). The results from this work show the relationship between oil biodegradation and residual concentration and abundance of individual bacterial genus.