

GOM Deepwater Horizon Oil Spill: A Time Series Analysis of Variations in Spilled Hydrocarbons

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An estimated amount of 210 million gallons of crude oil was released into the Gulf of Mexico (GOM) from April 20th to July 15th 2010 during the Deepwater Horizon oil rig explosion. The spill caused a tremendous financial, ecological, environmental and health impact and continues to affect the GOM today. Variations in hydrocarbons including alkanes, hopanes and poly-cyclic aromatic hydrocarbons (PAHs) can be analyzed to better understand the oil spill and assist in oil source identification. Twenty-one sediment samples*, two tar ball samples and one surface water oil sample were obtained from distinct locations in the GOM and within varying time frames from May to December 2010. Each sample was extracted through the ASE 200 solvent extractor, concentrated down under nitrogen gas, purified through an alumina column, concentrated down again with nitrogen gas and analyzed via GC X GC-TOF MS. Forty-one different hydrocarbons were quantified in each sample. Various hydrocarbon “fingerprints,” such as parental :alkylate PAH ratios, high molecular weight PAHs: low molecular weight alkane ratios, and carbon preference index were calculated. The initial objective of this project was to identify the relative hydrocarbon contributions of petrogenic sources and combustion sources. Based on the calculated ratios, it is evident that the sediment core taken in October of 2010 was greatly affected by combustion sources. Following the first month of the spill, oil in the gulf was burned in attempts to contain the spill. Combustion related sources have quicker sedimentation rates, and hydrocarbons from a combustion source essentially move into deeper depths quicker than those from a petrogenic source, as was observed in analyses of the October 2010 sediment.

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*Of the twenty-one sediment samples prepared, nine were quantified for this project.