

Temporal Salt Marsh Sediment Response to the Deep Water Horizon BP Oil Spill at Marsh Point, MS

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Abstract

Salt marshes may experience adverse effects due to long-term exposure to oil contamination. As a result of increased carbon loading from spilled hydrocarbons, porewater oxygen is rapidly depleted, causing an increase in porewater sulfide (H_2S) concentrations. Elevated H_2S concentrations, due to increased microbial activity, make sediments more toxic and inhospitable to marsh vegetation. Careful monitoring of porewater sulfide allows for an assessment of oil spill impact on salt marshes over time.

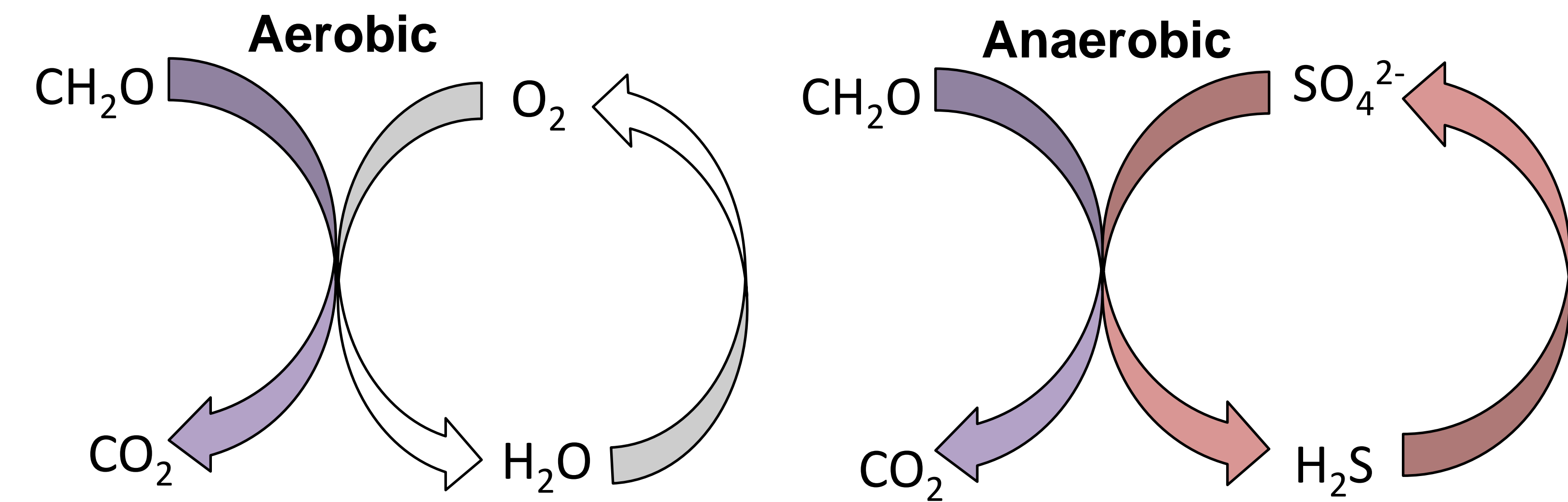


Figure 1. Under anaerobic conditions, microbes may use sulfate as a TEA and produce sulfide.

Research Questions

1. Are there differences in the sediment biogeochemistry in areas that have been identified as contaminated and areas that are not?
2. What is the temporal response to oil contamination?



Figure 2. Sediment cores collected from Marsh Point in Ocean Springs, MS during the Fall of 2010, 2011, and 2012.

Contaminated vs Non-Contaminated

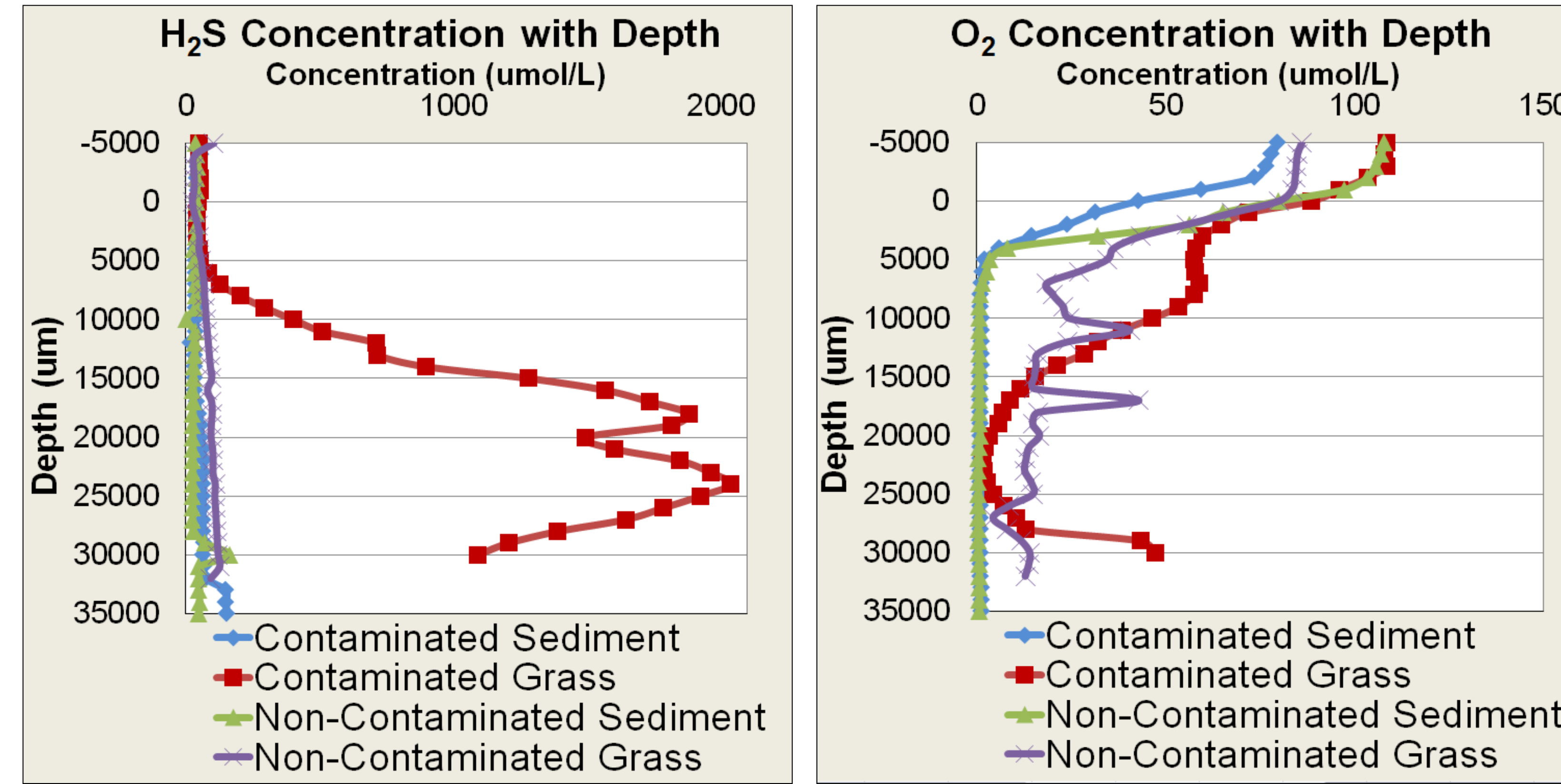


Figure 3. Comparison of H_2S & O_2 concentrations at contaminated and non-contaminated sites in 2010.

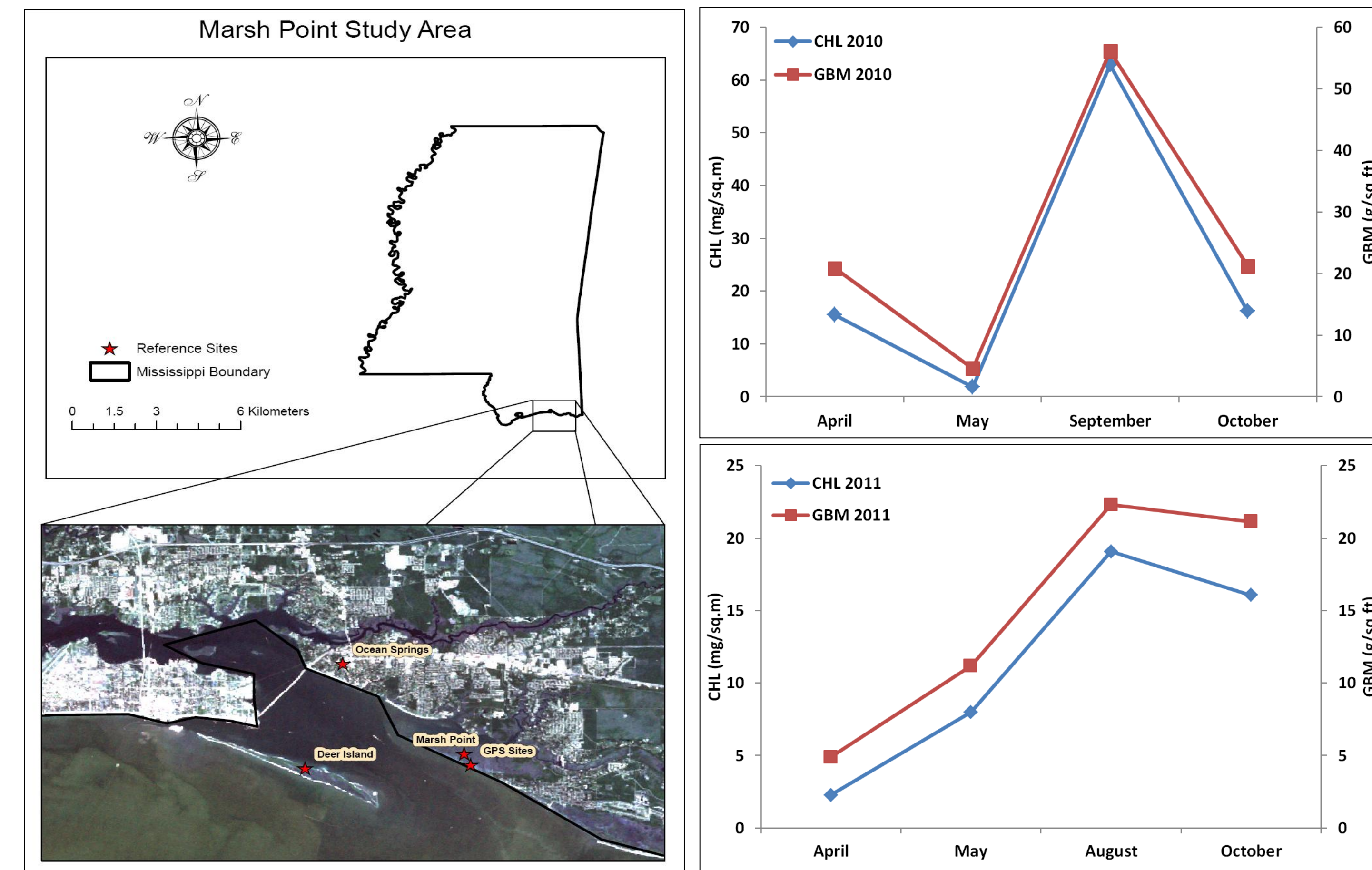


Figure 4. Marsh Point, MS vegetation abundance as indicated by chlorophyll (CHL) and green biomass (GBM) for 2010 & 2011.

Summary

2010 cores indicated significantly more active sulfate reducing bacteria in contaminated sediments producing sulfide concentrations 20x higher than non-contaminated sediments (Figure 3).

Microbial anaerobic communities were significantly more active in 2011 when sulfide concentrations were highest (Figure 5 & 6).

Remote sensing data and H_2S concentrations indicate that effects of hydrocarbon contamination were prominent in 2010 and growth was even lower in 2011 (Figure 4).

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2010, 2011, 2012 Comparison

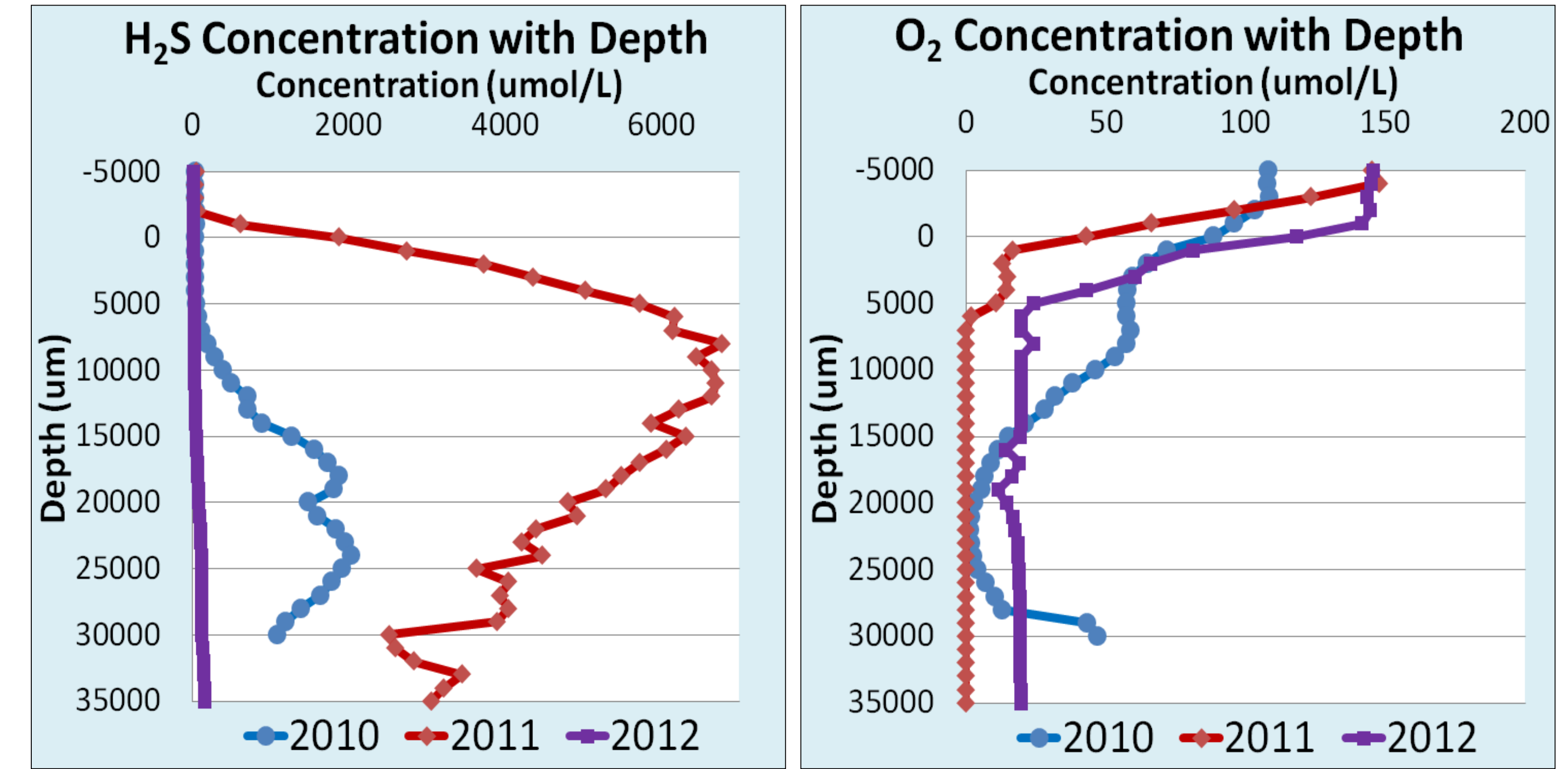


Figure 5. Comparison of H_2S & O_2 concentrations for 2010, 2011, and 2012.

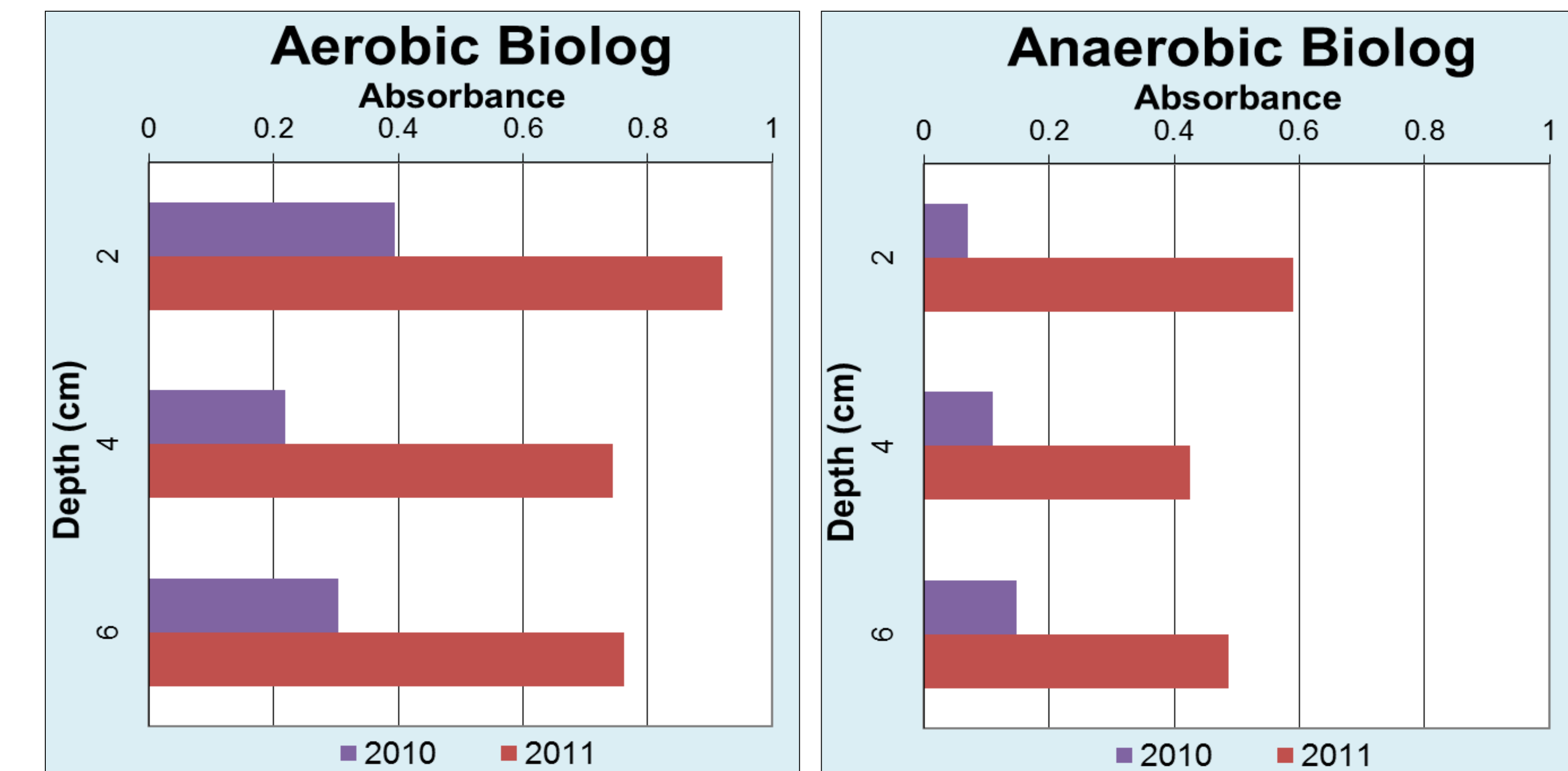


Figure 6. Comparison of biological communities for 2010 and 2011. Higher absorbance indicates more community abundance.



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