

## Changes in The Chemical Compositions of Porewater Dissolved Organic Matter Across The Sulfate Methane Transition Region

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Organic matter oxidation in marine sediments often occurs in two distinct depth zones: reactive surface sediments, and “hot spots” in the sub-surface, commonly located at the depth interval where sulfate ( $\text{SO}_4^{2-}$ ) is exhausted and methane ( $\text{CH}_4$ ) begins to increase (the sulfate-methane transition, or SMT). Several lines of evidences support the suggestion of enhanced production of dissolved organic matter (DOM) in the methanogenic zone followed by its oxidation in the sulfate reducing zone. However some of the DOM produced in the deep sub-surface (methanogenic) sediments likely resists oxidation in the sediments, and therefore contributes to a net DOM flux out of the sediments into the water column. Here we present results that examine changes in the chemical composition of dissolved organic matter across the sulfate-methane transition zone in Santa Barbara Basin sediments by using proton nuclear magnetic resonance ( $^1\text{H-NMR}$ ) and Fourier transform ion cyclotron resonance mass spectrometry (FTICR-MS). The coupling of these two spectroscopic techniques provides a more complementary picture of porewater DOM because it traces changes in both the major chemical functional groups and in individual molecular level composition. To further highlight the chemical composition of labile and recalcitrant porewater DOM fractions across the SMT a two-dimensional spectroscopy correlation analysis (2D-correlation) of these results will be used. The biogeochemical implications of all of these observations will be discussed.