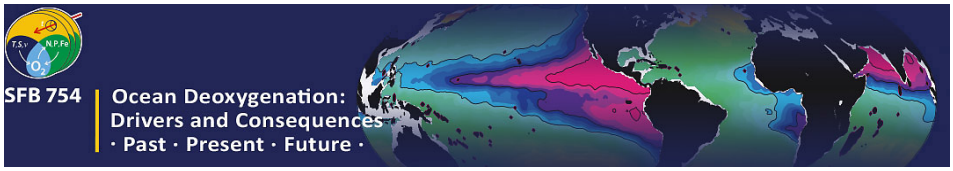

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DISSOLVED ORGANIC MATTER CYCLING IN THE COASTAL UPWELLING SYSTEM OFF CENTRAL PERU DURING AN "EL NIÑO" YEAR

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Dissolved organic matter (DOM) represents one of the largest active pools of organic carbon in the global carbon cycle. The Humboldt Current Upwelling System off Peru is among the most productive ecosystems in the world ocean, with high rates of primary production and an intense oxygen minimum zone (OMZ). One of the major perturbations of this system is associated to El Niño-Southern Oscillation, especially to its warm phase "El Niño" (EN), which reduces primary production and affects water mass distribution. We characterized the composition of solid-phase extractable DOM (SPE-DOM) in the Coastal Upwelling System off Central Peru and the processes that affect it during 2015, an "El Niño" year. Seasonal sampling (April, August and December) was carried out off Central Peru (12°S), one of the main upwelling cells characterized by high organic matter production and a well-developed OMZ. The DOM molecular composition was obtained via 15T Fourier transform ion cyclotron resonance mass spectrometry. Solid-phase extractable dissolved organic carbon (SPE-DOC) concentrations showed significant differences ($p<0.05$) between the water masses present off central Peru, they also showed significant positive correlations ($p<0.05$) with temperature ($r=0.73$), salinity (0.67) and chlorophyll-a ($r=0.43$). In order to explore if changes in SPE-DOC were behaving linearly with water mass mixing, we developed a conservative mixing model. Our model revealed a non-conservative behavior of SPE-DOC and allowed us to identify two distinct group of samples where SPE-DOC had been gained/lost respectively, and one group of samples inside the conservative mixing range. Environmental parameters as depth, dissolved oxygen and silicate concentrations showed significant differences between the groups that gained/lost SPE-DOC, showing evidence of processes associated to production and degradation of SPE-DOC. The comparison of the DOM molecular composition of the groups that gained/lost SPE-DOC with the samples in the conservative mixing range did not yield significant results when compared to a random dataset, only 7% of the total number of identified molecular formulae showed significant differences between the groups of samples. Nevertheless, these small number of molecular formulae showed hints of processes link to DOM production and degradation (i.e photodegradation). Our study suggests that 1) even in low productivity conditions like EN, there are processes that add/remove SPE-DOC, and 2) changes in the DOM molecular composition during EN conditions are minimum and not significant, and therefore do not reflect changes in bulk DOM concentrations.

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