

Radiocarbon Signatures of Dissolved Organic Carbon in Anoxic Sediments of the Santa Barbara Basin

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We determined pore water profiles of dissolved organic carbon (DOC) and its carbon isotopic composition in the Santa Barbara Basin to constrain the reactivity and sources of DOC that accumulate in these anoxic sediments. DOC concentration increased steadily with depth from bottom-water values to ~5 mM at 4.4 m, the deepest depth horizon sampled. The profile was slightly concave-down from the core-top to ~2.0 m depth, indicating net production of DOC in this depth zone. An inflection point was observed in the DOC profile at ~2.0 m, below which the concentration gradient decreased, and was linear. The DOC profile below ~2.0 m therefore appears to be shaped largely by upward diffusive transport of DOC from deeper sediments.

$\Delta^{14}\text{C}$ values of DOC decreased from -235‰ at 8.5 m to -485‰ at 4.4 m. An isotope mixing plot constructed from these data shows that the DOC diffusing into the base of this core is largely devoid of ^{14}C . Based on the $\Delta^{14}\text{C}$ values of particulate organic carbon (POC), and the sedimentation rate reported for a nearby site [1], we expect POC at this site to contain above-background levels of ^{14}C to about 50 m depth. A significant component of the DOC diffusing into the base of this core therefore appears to originate from the deep subsurface. These findings suggest that $\Delta^{14}\text{C}$ values of pore water DOC might provide unique insight into the time and depth scales of organic matter remineraliation.

[1] Ingram & Kennett (1995), *Proc. ODP Sci. Results* **146**, 19-27