



Multiyear increases in dissolved organic matter inventories at Station ALOHA in the North Pacific Subtropical Gyre

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Limnol. Oceanogr., 47(1), 2002, 1-10 | DOI: 10.4319/lo.2002.47.1.0001

ABSTRACT: The inventories and dynamics of dissolved organic matter (DOM) in the surface water at Station ALOHA were analyzed from the Hawaii Ocean Time-series (HOT) data set for the period 1989-1999. Euphotic zone, depthintegrated (0-175 m) concentrations of dissolved organic carbon (DOC), nitrogen (DON), and phosphorus (DOP) were temporally variable. In particular, during the period 1993-1999, concentrations of DOC and DON increased while inventories of DOP remained unchanged. DOC inventories increased by $303 \text{ mmol C m}^{-2} \text{ yr}^{-1}$, a value equivalent to approximately 2% of measured primary production (^{14}C method) at this site. DON increased at $11 \text{ mmol N m}^{-2} \text{ yr}^{-1}$, resulting in a mean molar DOC:DON ratio of 27.5 for the accumulated DOM. Accumulation of DOC and DON without corresponding accumulation of DOP resulted in changes to the bulk organic C:N:P stoichiometry; bulk DOC:DOP ratios increased 16% and DON:DOP ratios increased by 17%. These results indicate that a small fraction of the annually produced organic matter escaped biological utilization on time scales of months to years. More importantly, the accumulated DOM inventories grew progressively enriched in C and N relative to P. Fundamental changes in the North Pacific Subtropical Gyre (NPSG) habitat appear to have altered microbial processes that regulate organic matter fluxes. Considered together, the long-term increases in DOC and DON inventories are consistent with previous observations, indicating that a recent reorganization of plankton community dynamics may have altered organic matter cycling in this ecosystem.

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