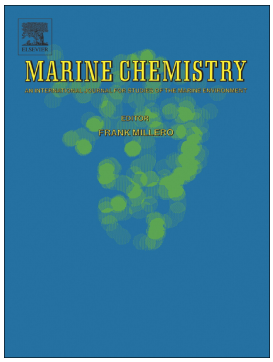

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Spectral Absorption by marine chromophoric dissolved organic matter: Laboratory determination and piecewise regression modeling

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Abstract

Chromophoric dissolved organic matter (CDOM) is an important light-absorbing component of seawater. Yet spectrophotometric determinations of CDOM absorption from existing laboratory methods differ substantially. Since CDOM absorption in the visible usually remains below the detection limit of traditional spectrophotometers, its spectral shape has been modeled from the ultra-violet, by applying a single exponential model (SEM) from which a unique parameter, the spectral slope *S*, is derived. The usefulness of SEM and *S* is controversial, due to the lack of agreement on the fitting procedures and the poor ability of the SEM to fit equally well all CDOM absorption spectra. In view of this, empirical factors affecting the measurement of CDOM absorption coefficient by spectrophotometry were tested. No differences in CDOM spectra obtained by filtration through 0.2 µm membrane or 0.7 µm GFF filters were found for either high (Case II) or low (Case I) CDOM content situations. Two spectral shape groups were distinguished after applying a multivariate approach to 145 spectra from the South Atlantic, Strait of Magallanes, and South Pacific. The two groups were associated mainly with coastal and oceanic waters. A segmented regression model (SRM) with two free breakpoints better represented the CDOM absorption spectra than a SEM. The SRM fitted both CDOM spectral shape groups with accuracy. This concatenated exponential model is useful for understanding CDOM dynamics and developing improved satellite ocean-color algorithms.