



CDOM-mediated dimethylsulphide photolysis in the Tyne estuary, northeast England

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CDOM-mediated dimethylsulphide (DMS) photolysis was investigated in irradiation experiments carried out on samples collected from the Tyne River, the Tyne estuary and adjacent coastal North Sea waters. Rate constants of DMS photolysis and concurrent dimethylsulphoxide (DMSO) production indicated 1:1 molar conversion of DMS to DMSO, consistent with DMS photo-oxidation via CDOM derived singlet oxygen. Irradiance levels corresponding to solar noon at Newcastle upon Tyne (55 N), July, resulted in DMS photolysis rate constants ranging from 0.05 h^{-1} to 0.3 h^{-1} , with rates increasing with the CDOM absorption coefficient at 350 nm, $a(350)$. However, photolysis rate constants normalised to $a(350)$ increased towards lower CDOM absorption coefficients. These results indicate that CDOM photoreactivity with respect to DMS photolysis increases with decreasing CDOM absorbance. Preliminary estimates of photochemical DMS turnover times, based on data on the broadband wavelength dependence of DMS photolysis, estimated light attenuation, and seasonal irradiance data, are in the range of 5 -30 days. Comparison of photochemical turnover with estimates of air-sea gas exchange and microbial losses indicate that DMS photolysis is of minor importance in estuarine and near-coastal waters, chiefly due to low depth-integrated DMS photolysis in these CDOM-rich, turbid waters.