Seasonal variations of VHOC concentrations and fluxes at the ocean -atmosphere interface in a coastal area of the Western English Channel.

COCQUEMPOT B., P. MORIN, S. FORNER, P. LE CORRE

Laboratoire de Chimie Marine, Institut Universitaire Européen de la Mer, UMR CNRS and Université de Bretagne Occidentale, France.

Coastal zones are characterized by high primary productivity and constitute significant sources and sinks of numerous compounds that can influence atmospheric chemistry. Among these compounds, the volatile halogenated organic compounds with both anthropogenic and natural sources are globally emitted by the ocean and are known to influence the atmospheric ozone chemistry. Production of biogenic VHOC by macroalgae has been reported in numerous studies but the seasonal variations of production and fluxes at the ocean - atmosphere interface have been poorly studied. The Western English Channel has one of the most important macroalgal beds in the world ocean and is therefore a key area to study the production and fluxes of the biogenic VHOC by macroalgae.

Seasonal variations of different volatile halogenated organic compounds (iodinated : CH\(_3\)I, brominated : CHBr\(_3\), CHBr\(_2\)Cl and chlorinated : CHCl\(_3\)) are presented. Measurements have been realized simultaneously in surface water and air at a minimum monthly interval (sampling frequency was increased during periods of important variations in concentrations). Concentrations of VHOC in water and air showed important seasonal variations. The maximums concentrations were observed during spring and summer when the development of the macroalgae was maximal. Minimums concentrations were observed during winter. Concentrations ranged for water between 19.3 and 180.8, 1.2 and 6.8, 1.0 and 6.3, 1.3 and 6.2 ng.l\(^{-1}\) for air between 1.8 and 112.5, 18.2 and 102.6, 0 and 11.3, 21.3 and 259.1 pptv respectively for CH\(_3\)I, CHBr\(_3\), CHBr\(_2\)Cl and CHCl\(_3\).

VHOC fluxes at the ocean – atmosphere interface have been calculated following the relations of Liss and Merlivat (1986) and Nightingale et al. (2000). VHOC fluxes showed as for concentrations important seasonal variations. The Western English Channel coastal zone was a source of CH\(_3\)I, CHBr\(_3\), CHBr\(_2\)Cl for the atmosphere during the major part of the year but was a sink for CHCl\(_3\). Finally, a budget of the annual fluxes of these four VHOC taking into account the important seasonal variations is presented.

REFERENCES