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Distribution of volatile iodinated organic compounds in the Iberian upwelling system

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Volatile iodinated organic compounds (VICs) have oceanic sources and contribute to the atmospheric iodine pool. Due to their chemical instability, VICs are rapidly degraded in the troposphere by photolytic reactions into reactive iodine atoms, which in turn regulate tropospheric ozone concentration and produce iodine oxides. Therefore, by producing significant amounts of iodine oxides, the ocean is important for the formation of aerosols and cloud condensation nuclei on a global scale. Important sinks for this atmospheric iodine produced in the ocean are rainout and dry deposition. Rainout over land is an important source for terrestrial iodine; an essential micronutrient for cell metabolism and thus important for human health.
During a survey in the Iberian upwelling off Portugal, 76 CTD casts at different depths of the water column were taken during summer 2007 (August 11th to September 14th). Seawater concentrations of the three VICs, chloroiodomethane (CH2ClI), bromoiodomethane (CH2BrI), and diiodomethane (CH2I2), were determined onboard using GC-ECD.
Upwelling systems are characterized by high primary productivity, predominantly by diatoms, and thus constitute potential hotspots for the biological formation of halocarbons. During our study, the spatial distribution of VICs off Portugal revealed that open ocean concentrations of CH2ClI (mean 4.5 pmol L-1) and CH2I2 (mean 3.6 pmol L-1) were elevated compared to concentrations in the upwelling area. Open ocean concentrations were in the same range as reported values in different geographical regions. We compared VIC distribution patterns with those of bromocarbons: statistical methods (principle component analysis) revealed that VICs and bromocarbons were unequally distributed and had different sources. Correlations with biological variables and marker pigments were not significant and indicated that phytoplankton played a minor role in the biological formation of VICs. However, deep profiles from the open oceans showed that biological activity and elevated CH2ClI and CH2I2 concentrations were related. We will discuss the link between VIC distributions and biological activity.