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Role of Ozone in the Production of Volatile Organoiodine Compounds in Surface Seawater

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The interaction of ozone in the atmosphere-ocean system is a topic of central importance to SOLAS science. It is known that the rate of deposition of atmospheric ozone to the sea surface is considerably enhanced by its reaction with components in seawater. We present results of laboratory experiments which show that iodide ions (I-)and organic material (OM) are involved as reactants with ambient levels of ozone, with both I- and OM of approximately equal importance in enhancing the interfacial transfer. Once taken up by seawater the ozone can lead to the formation of a variety of volatile organoiodine compounds, such as diiodomethane (CH2I2), chloroiodomethane (CH2ClI) and iodoform (CHI3), as shown in our recent experimental work (Martino et al., Geophysical Research Letters, Vol. 36, L01609, doi:10.1029/2008GL036334, 2009). These compounds are then free to transfer across the ocean-atmosphere interface and so constitute a ubiquitous source of reactive iodine-containing gases to the marine atmosphere. In the atmosphere these gases photodissociate within minutes (CH2I2), hours (CH2ClI) and days (iodomethane), producing iodine atoms, which are known to catalytically destroy tropospheric ozone to form iodine oxide (IO) radicals and, in coastal zones with seaweed beds, can play a role in new paraticle formation.