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Methyl iodide production in the ocean: implications for climate change

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It is generally accepted that the marine environment is the dominant source of a range of volatile iodinated compounds to the atmosphere. These compounds rapidly dissociate into very reactive iodine radicals which then participate in a number of different catalytic cycles in the atmosphere resulting in the destruction of stratospheric and tropospheric ozone. Recent studies also suggest that iodine compounds play a part in the formation of new particles and cloud condensation nuclei. At present, however, the exact nature of the precursor compounds is unknown and there is debate on how extensive the formation processes are in global terms.

We have found very high methyl iodide concentrations, which flux into the marine boundary layer, in low latitude waters of the Atlantic and Indian Oceans. These high concentrations correlate well with the abundance of *Prochlorococcus* and we have confirmed the release of methyl iodide by this species in laboratory culture experiments. Extrapolating to the global scale we can account for a large fraction of the previously estimated global ocean flux of iodine to the marine boundary layer and the implications are far reaching. Climate prediction models suggest increases in sea surface temperature and changes in biogeographical provenance in response to global warming. Such changes will likely increase the abundance of *Prochlorococcus* and we estimate a concomitant $\sim$15% increase in the release of iodine species to the atmosphere. This could enhance tropospheric and stratospheric chemical reactions that have a net negative effect on the radiation balance and so potentially mitigate global warming.