



Understanding Hotspots of Iodine Chemistry: Comparison of Spatially-averaged and Point Measurements of Iodine Monoxide

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The iodine monoxide (IO) radical plays an important role in marine boundary layer chemistry. IO catalytically destroys ozone, affects HO_x and NO_x partitioning and has been implicated as a precursor to new particle formation. IO is formed by the reaction of ozone with iodine atoms generated by the photolysis of molecular iodine and photolabile iodocarbons.

Measurements of IO were made at the Mace Head Atmospheric Research Station (MHARS) in August 2007 using two different methods. Point measurements of IO were made using a portable laser-induced fluorescence (LIF) instrument. The measurement point was located 50 m from a narrow intertidal region, with macroalgae exposed only at some low tides. A long-path differential optical absorption spectroscopy (LP-DOAS) instrument measured IO concentrations over a large spatial scale from the point measurement site (14 km total path length), including measurements across intertidal regions containing macro-algae.

High time-resolution (10 s) data from the LIF instrument shows significant variability in IO mixing ratios at low tide (± 20 pptv over 1 minute). LIF point measurements of IO peaked at 33.8 pptv (10 s integration time) at daytime low tide (the highest mixing ratios of IO measured worldwide), while DOAS spatially-averaged measurements of IO peaked at 4.4 pptv (10 minute integration time) over the same period. Data from the two instruments are compared with tidal variations and the relationship between point and spatially-averaged measurements is analysed.