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The time-dependent emission of molecular iodine from Laminaria Digitata measured with incoherent broadband cavity-enhanced absorption spectroscopy

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The release of molecular iodine (I2) from the oceans into the atmosphere has been recognized to correlate strongly with ozone depletion events and aerosol formation in the Marine Boundary Layer (MBL), which affects in turn global radiative forcing. The detailed mechanisms and dominant sources leading to the observed concentrations of I2 in the marine troposphere are still under intense investigation. In a recent campaign on the Irish west coast at Mace Head Atmospheric Research Station [1], it was found that significant levels of molecular iodine correlated with times of low tide, suggesting that the emission of air-exposed macro-algae may be a prime source of molecular iodine in coastal areas [2]. To further investigate this hypothesis we tried to detect the I2 emission of the brown seaweed Laminaria digitata, one of the most efficient iodine accumulators among living systems, directly by means of highly sensitive incoherent broadband cavity-enhanced absorption spectroscopy (IBBCEAS) [3]. IBBCEAS combines a good temporal and spatial resolution with high molecule-specific detection limits [4] comparable to that of typical LP-DOAS. IBBCEAS thus complements LP-DOAS in the search for sources of tropospheric trace gases.
In this presentation the first direct observation of the time dependence of molecular iodine emission from Laminaria digitata will be shown. Plants were studied under naturally occurring stress for quasi in situ conditions for many hours. Surprisingly, the release of I2 occurs in short, strong bursts with quasi-oscillatory behaviour, bearing similarities to well known "iodine clock reactions".

References

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