TIME-DEPENDENT EMISSION OF MOLECULAR IODINE FROM BROWN SEAWEED: AN APPLICATION OF INCOHERENT BROADBAND CAVITY-ENHANCED ABSORPTION SPECTROSCOPY

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A large variety of gases enters the atmosphere from seawater and is the driving force of local and global atmospheric processes. Since knowing the composition of gases evolving from the sea and the total fluxes involved is a precondition for the development of quantitative atmospheric models, sea-to-air exchange mechanisms are subject of intense investigation. The release of volatile organic iodine compounds and of molecular iodine (I_2) into the marine boundary layer is recognized to be of fundamental importance for (subsequent) ozone depletion events and marine aerosol formation, which in turn affects global radiative forcing. Although biogenic emission (iodo-volatilization) of I_2 by phytoplankton in open waters and via macrophytic algae in coastal areas, has been suggested to be one of the most important processes leading to the observed iodine concentrations in the marine troposphere, the dominant sources of molecular iodine and in particular the mechanisms of I_2 release are still being debated.

We used incoherent broadband cavity-enhanced absorption spectroscopy (IBBCEAS) for the first quasi in situ detection of molecular iodine after emission from the brown macroalgae, *Laminaria digitata*, under naturally occurring stress. Since IBBCEAS combines a high spatial and temporal resolution with high molecule-specific detection sensitivity it is ideally suited to study point sources of atmospheric trace constituents. In this context IBBCEAS complements long-path DOAS setups in the search for trace gas emission sources. In this presentation we will show that the release of I_2 occurs in short, regularly occurring, strong bursts. The new data suggest that the control of I_2 release by the plant may be based on a nonlinear reaction scheme involving the release of H_2O_2 on the plants surface, leading to quasi-oscillatory emission behaviour. Preliminary measurement of flux estimates of I_2 release per kg of dry weight of the plant will be discussed.

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