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First application of an online method for quantification of maritime molecular iodine and hypoiodic acid in maritime aerosol during PEGASO cruise

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The atmospheric chemistry of iodine is important in multiple ways. The focus lies on the ability to influence the oxidizing capacity of the atmosphere, i.e. by destruction of ozone, and the formation of iodine oxide particles (IOP), i.e. the influence on condensation nuclei (CCN). Using a variation of techniques, like differential optical absorption spectroscopy (DOAS), laser-induced fluorescence (LIF), inductively coupled plasma mass spectrometry (ICP-MS) and atmospheric pressure chemical ionization with tandem mass spectrometry (APCI-MS/MS), the reactive iodine species of atomic iodine (I), molecular iodine (I2), iodine monoxide (IO) and iodine dioxide (OIO) have all been detected in the atmosphere from Antarctica to the equatorial marine boundary layer (MBL). In the past few years there have been active research on IO, especially after revealing significant levels in open ocean measurements, and higher iodine oxides. In addition to atmospheric measurements, significant developments in laboratory kinetics, photochemistry and heterogeneous chemistry of iodine species have been accomplished. [1]

Here we introduce the first field application of an online-method for detecting gaseous molecular iodine and HOI, which is a further development of a technique [2] based on selective photolytic dissociation, followed by oxidization and particle formation of iodine compounds. The particles are than size-segregated and detected by a scanning mobility particle sizer (SMPS) system. Initial IOP forming is performed in a reaction chamber providing specific wavelengths according to corresponding bond dissociation thresholds. Additionally offline sampling of iodine and iodine containing interhalogenes with coated diffusion denuders [3] were carried out throughout the cruise to compare both methods after analysis with GC/MS. Furthermore filter samples were taken to perform non-target analysis of organic compounds by UHPLC/ESI(+/-)-HR-MS. Preliminary results of iodine related analysis from the PEGASO cruise (plankton-derived emissions of trace gases and aerosols in the southern ocean) will be shown.

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