



## **In situ measurements of IO and reactive iodine aboard the RV Sonne during SHIVA**

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Halogenated very short-lived substances (VSLS) are emitted from the oceans by marine species such as macroalgae and phytoplankton and contribute to halogen loading in the troposphere and lower stratosphere. The SHIVA (Stratospheric Ozone: Halogen Impacts in a Varying Atmosphere) project combined ship-borne, aircraft-based and ground-based measurements in and over the South China Sea and the Sulu Sea, and around the coast of Malaysian Borneo. In this paper we present measurements of IO radicals in coastal and open ocean regions made onboard the German research vessel RV Sonne in November 2011 between Singapore and Manila, via the northern coast of Malaysian Borneo (South China Sea) and the Sulu Sea. In situ measurements of IO were made on 12 days by the University of Leeds laser-induced fluorescence (LIF) instrument, with a detection limit of 0.3 pptv for a 30 minute averaging period. The cruise average IO concentration was found to be 1.2 pptv, with a maximum concentration of 2.4 pptv in the middle of the Sulu Sea, an area known for high biological activity. Only a weak diurnal profile was observed, with IO detected above the detection limit on 10 out of the 11 nights when the LIF instrument was operational. Measurements of IO at night in the open ocean have not previously been reported and indicate the presence of gas phase or heterogeneous mechanisms that recycle iodine species without requiring light. There was reasonable agreement for IO concentrations measured by the University of Leeds LIF and the University of Bremen MAX-DOAS instruments, for which a comparison will be presented. I<sub>2</sub>, IC<sub>1</sub> and HOI were measured by the University of Mainz using a coupled diffusion denuder system followed by analysis using gas chromatography coupled with ion trap mass spectroscopy, with a detection of 0.17 pptv for 30 mins (I<sub>2</sub>). The cruise average I<sub>2</sub> concentration was found to be 2.0 pptv, with a maximum concentration observed during one night of 12.7 pptv on the northern coast of Borneo near Kuching. IO and CH<sub>3</sub>I concentrations were both elevated during the second half of the cruise in the Sulu Sea.