



## **Real-time measurement of carbon monoxide (CO) in seawater: Refinement of a continuous extractor system and application in the Southern Atlantic Ocean**

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A continuous-flow equilibration device has been developed for real-time measurement of dissolved gas in seawater, following the system reported by Xie et al. (2001). It has been used for CO monitoring, in the frame of the European project OOMPH (Organics over the Ocean Modifying Particles in both Hemispheres) which aims to better identify and quantify organic compounds emitted by the ocean. Basically, this system consists in a glass coil where seawater and zero air (without CO) are introduced at the bottom and equilibrate along the pathway; the partially equilibrated gas is then introduced into a gas chromatograph (GC) for the detection and quantification of CO. Refinements of the initial prototype developed by Xie et al. (2001) include a temperature-controlled box at 30°C for a better regulation of the gas-water equilibrium in the coil, an overflowing debubbler for mixing of the extracted sampled air and a specific injection system using two electric 10-port & 4-port valves (Valco, Vicci metronics) allowing the injection every 3 minutes of a gas sample into the GC.

The extraction efficiency of the system has been carefully measured in the laboratory with aqueous standards solutions. For an air/water flowrate of 0.25, about 60% of the CO was extracted, in good agreement with the theoretical value. The detection limit has been evaluated as 0.1 nmol/L (CO).

This system has been deployed in the field for the first time along the two oceanographic cruises of the OOMPH program onboard the R.V. Marion-Dufresne in the southern Atlantic ocean (January-March 2007). Preliminary results from the second

cruise (Punta Arenas, Chile, 53°S - Reunion Island, 21°S) are presented and discussed here. Dissolved CO continuously monitored during this leg showed seawater concentrations in the order of 1 nmol/L. The fast time response of the system allows the observation of fine structures of dissolved CO which can be examined along with fluorescence, and solar irradiance at the sea surface measured in parallel.