

Metadata Information for SOCAT data Submission for UW fCO<sub>2</sub> data of RV Simon Stevin (VLIZ - Belgium).

Vessel Name: Simon Stevin (NODC code: 11SS)

PI: Gkritzalis, T.

Vessel type: Ship

#### System Information:

System design: System is using a showerhead packed equilibrator using the design proposed by Frankignoulle (Frankignoulle et al. 2001). Seawater temperature is measured at the intake of the UW system (ship's bow) using a SBE38 inline temperature sensor. Temperature is also measure before the equilibrator using a SBE21 thermosalinograph and at the equilibrator using a Fluke 45 multimeter and a Pt100 temperature probe. Information of calibration for all sensors is presented below. The system is using a Licor LI7000 NDIR analyser. The sample is partially dried using a Nafion column (Perma Pure MD-070-48S-4). The seawater flow rate is approx. 2 lpm and the gas flow rate to the NDIR is approx. 1.8 nlpm. The equilibrator is vented to the atmosphere using a 6m long ¼" OD x 1/8" ID Bev-a-line tubing.

The atmospheric pressure is retrieved by the vessels meteo system and the pressure of the equilibrator is measured using a VAISALA PTB210 pressure sensor.

Nr of standard calibration gases: 4 (0 ppm included)

Concentrations of cal gases: 0 – 250 – 400 – 800 ppm

Provider: Air Liquide Belgium

Additional information: Cal gases actual concentration was measured in University of Liege (Dprt of physics) validating the cal gases against NOAA calibration gases, which are WMO traceable.

#### Calibration information of sensors<sup>1</sup>:

SBE38 Temp sensor (S/N:0267): The SBE38 Temp sensor was calibrated by Sea-bird GmbH on 24/11/2016. The sensor was delivered with  $\pm 0.0001^{\circ}\text{C}$  residual (Residual = Sensor reading – Cal Bath reading). When delivered by Seabird for calibration the residual from the previous calibration (approx. 1 year ago) was found to be -0.28 mdegC.

SBE21 Thermosalinograph (S/N: 3885): The SBE 21 was calibrated on 8/12/2016. The system was delivered with a  $\pm 0.0001^{\circ}\text{C}$  residual for temperature and with a  $\pm 0.00005$  S/m residual for conductivity.

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<sup>1</sup> Additional information for the calibration of sensors from the suppliers can be provided if necessary

When delivered by Seabird for calibration the residual from the previous calibration (approx. 1 year ago) was found to be -0.52 mdegC.

Fluke 45 + Pt100: The system was “calibrated” against a SBE38 in the lab using a Julabo FK30-SL calibration bath. The offset between the 2 sensors was max. 0.02 degC.

Vaisala PTB210 pressure sensor (S/N: H2750004): Multipoint calibration by Vaisala on 12/10/2016. The max “As found” offset was -0.3 hPa. The calibrated sensor was delivered with a  $\pm 0.01$  hPa offset.

Licor LI7000 NDIR: The sensor was calibrated by the manufacturer on 19/10/2016.

Data processing and calculation of fCO<sub>2</sub>.

Initial QC is based on erroneous salinity (Sal > 30 PSU) readings and  $\Delta T$  between the equilibrator temperature measurements (Fluke45 + Pt100) and seawater intake temperature sensor (SBE38) ( $\Delta T < 1^\circ\text{C}$ ).

Further data processing, including xCO<sub>2</sub> corrections based on piecewise interpolation of calibration gases, fCO<sub>2</sub> calculations, etc., is following SOCAT documented procedures (Pfeil & Olsen 2011).

Frankignoulle, M., Borges, A. & Biondo, R., 2001. A NEW DESIGN OF EQUILIBRATOR TO MONITOR CARBON DIOXIDE IN HIGHLY DYNAMIC AND TURBID ENVIRONMENTS. *Water Resources Management*, 35(5), pp.1344–1347.

Pfeil, B. & Olsen, A., 2011. Uniform format surface fCO<sub>2</sub> database. Available at: 10013/epic.38006.d001.