

Dataset Expocode 08D820230521

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Initial Submission (yyyymmdd): 20230105
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Campaign/Cruise **Expocode:** 08D820230521
Campaign/Cruise Name: VA202306
Campaign/Cruise Info: INIDEP
Platform Type:
CO2 Instrument Type: Equilibrator-IR or CRDS or GC
Survey Type: Research Cruise
Vessel Name: Víctor Angelescu
Vessel Owner: Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP)-Argentina
Vessel Code: 08D8

Coverage **Start Date (yyyymmdd):** 20230521
End Date (yyyymmdd): 20230603
Westernmost Longitude: 57.4 W
Easternmost Longitude: 52.8 W
Northernmost Latitude: 35.5 S
Southernmost Latitude: 38.2 S
Port of Call: Mar del Plata

Variable **Name:** xCO2_EQU_ppm
Unit: ppm
Description: Mole fraction of CO2 in the equilibrator headspace (dry) at equilibrator temperature (ppm)

Variable **Name:** xCO2_ATM_ppm
Unit: ppm
Description: Mole fraction of CO2 measured in dry outside air (ppm)

Variable **Name:** xCO2_ATM_interpolated_ppm
Unit: ppm

Description: Mole fraction of CO₂ in outside air associated with each water analysis. These values are interpolated between the bracketing averaged good xCO₂_ATM analyses (ppm)

Variable	Name: PRES_EQU_hPa Unit: hPa Description: Barometric pressure in the equilibrator headspace (hPa)
Variable	Name: PRES_ATM@SSP_hPa Unit: hPa Description: Barometric pressure measured outside, corrected to sea level (hPa)
Variable	Name: TEMP_EQU_C Unit: Degree C Description: Water temperature in equilibrator (°C)
Variable	Name: SST_C Unit: Degree C Description: Sea surface temperature (°C)
Variable	Name: SAL_permil Unit: ppt Description: Sea surface salinity on Practical Salinity Scale (o/oo)
Variable	Name: fCO ₂ _SW@SST_uatm Unit: µatm Description: Fugacity of CO ₂ in sea water at SST and 100% humidity (µatm)
Variable	Name: fCO ₂ _ATM_interpolated_uatm Unit: µatm Description: Fugacity of CO ₂ in air corresponding to the interpolated xCO ₂ at SST and 100% humidity (µatm)
Variable	Name: dfCO ₂ _uatm Unit: µatm Description: Sea water fCO ₂ minus interpolated air fCO ₂ (µatm)
Variable	Name: WOCE_QC_FLAG Unit: None Description: Quality control flag for fCO ₂ values (2=good, 3=questionable)
Variable	Name: QC_SUBFLAG Unit: None Description: Quality control subflag for fCO ₂ values, provides explanation when QC flag=3
Sea Surface Temperature	Location: Sea water enters the vessel through a ship's hull via a 3-inch pipe located in the machine room. Approximately 1.5 meters after the intake, there is a main sluice and a diversion towards the SBE38 temperature sensor. The SW pump, is situated in the main pipe, 2 meters after the SBE38. Manufacturer: Seabird, Inc. Model: SBE 38 Accuracy: 0.001 (°C if units not given) Precision: 0.0003 (°C if units not given) Calibration: Factory calibration Comments: Manufacturer's Resolution is taken as Precision.
Sea Surface Salinity	Location: Near the pCO ₂ System. Manufacturer: Seabird

Model: SBE 45
Accuracy: ± 0.005 o/oo
Precision: 0.0002 o/oo
Calibration: Factory calibration
Comments: Manufacturer's Resolution is taken as Precision.

Atmospheric Pressure

Location: It is located on the bridge visor, on the bow
Normalized to Sea Level: Yes
Manufacturer: Vaisala
Model: PTB210A1A1B
Accuracy: 0.25 (hPa if units not given)
Precision: 0.01 (hPa if units not given)
Calibration: march 2017
Comments: Located in the Deck box inside a room connected to the pressure port by a flexible tube

Atmospheric CO2

Measured/Frequency: Yes
Intake Location: lighth mast at the bow on the starboard side
Drying Method: Gas stream passes through a thermoelectric condenser ($\sim 5^\circ\text{C}$) and then through a Perma Pure (Nafion) dryer before reaching the analyzer (90% dry).
Atmospheric CO2 Accuracy: ± 0.5 μatm in fCO₂_ATM
Atmospheric CO2 Precision: ± 0.01 μatm in fCO₂_ATM

Aqueous CO2 Equilibrator Design

System Manufacturer:
Intake Depth: 5 meters
Intake Location: Bow
Equilibration Type: Spray head above dynamic pool
Equilibrator Volume (L): 0.95 L (0.4 L water, 0.55 L headspace)
Headspace Gas Flow Rate (ml/min): 70 - 130 ml/min
Equilibrator Water Flow Rate (L/min): 2.0 - 2.6 L/min
Equilibrator Vented: Yes
Equilibration Comments: Primary equilibrator is vented through a secondary equilibrator.
Drying Method: Gas stream passes through a thermoelectric condenser ($\sim 5^\circ\text{C}$) and then through a Perma Pure (Nafion) dryer before reaching the analyzer (90% dry).

Aqueous CO2 Sensor Details

Measurement Method: IR
Method details: details of CO₂ sensing (not required)
Manufacturer: LI-COR
Model: 7000
Measured CO2 Values: xCO₂(dry)
Measurement Frequency: Every 140 seconds, except during calibration
Aqueous CO2 Accuracy: ± 2 μatm in fCO₂_SW
Aqueous CO2 Precision: ± 0.01 μatm in fCO₂_SW
Sensor Calibrations:
Calibration of Calibration Gases: The analyzer is calibrated every 5 hours with field standards that in turn were calibrated with primary standards that are directly traceable to the WMO X2007 scale. The zero gas is Nitrogen 5.0.
Number Non-Zero Gas Standards: 3
Calibration Gases:

Std 1: A180631, 0.00 ppm, owned by INIDEP_Linde, used every ~ 5.0 hours.

Std 2: CC751999, 194.10 ppm, owned by INIDEP_ApelRiemer, used every ~5.0 hours.

Std 3: CC751998, 391.70 ppm, owned by INIDEP_ApelRiemer, used every ~5.0 hours.

Std 4: CC751984, 597.90 ppm, owned by INIDEP_ApelRiemer, used every ~5.0 hours.

Comparison to Other CO2 Analyses:

Comments:

Method Reference:

Pierrot, D., C. Neil, K. Sullivan, R. Castle, R. Wanninkhof, H. Lueger, T. Johannessen, A. Olsen, R. A. Feely, and C. E. Cosca (2009), Recommendations for autonomous underway pCO₂ measuring systems and data reduction routines, Deep-Sea Res II, 56, 512-522.

Equilibrator Temperature Sensor

Location: Inserted into equilibrator ~5 cm below water level

Manufacturer: Hart

Model: 1523

Accuracy: 0.015 (°C if units not given)

Precision: 0.001 (°C if units not given)

Calibration: Factory calibration

Comments: Resolution is taken as Precision.

Equilibrator Pressure Sensor

Location: Attached to equilibrator headspace. The differential pressure reading from Setra 239, which is attached to the equilibrator headspace, is added to the pressure reading from the LICOR analyzer, which is measured by an external Setra 270 connected to the exit of the analyzer.

Manufacturer: Setra

Model: 270

Accuracy: 0.15 (hPa if units not given)

Precision: 0.015 (hPa if units not given)

Calibration: Factory calibration

Comments: Manufacturer's Resolution is taken as Precision.

Additional Information

Suggested QC flag from Data Provider: NA

Additional Comments: The expedition 'Identification of spawning and nursery areas for Argentine hake between 35°S and 39°S' focused on assessing the northern stock hake reproductive status the spawning grounds and egg, larvae and juvenile distribution. The sampling design involved transects perpendicular to the bathymetry, covering the area between 35°S and 39°S, at depths ranging from 50 to 300 meters, where bottom trawling fishing operations, multinet deployments and CTD stations were conducted. The analytical system performed well overall, with a calculated time offset of 2.85 minutes between the intake and equ temperature, which was used for data processing. The temperature differences between the SBE38 and the equilibrator were between 0.5 and 1 degC (this offset was different to previous cruises due to the inadequate functioning of the air conditioning on board the vessel, particularly during yday 150 to 152). From 23/5/23 (yday 143.0027) to 24/5/23 (yday 144.649), there are no data because the ship returned to port (due to fishing gear repair). Water Flow was maintain between 2.6 and 2.8 L/min. There was quite low water flow (2.0 L/min) on 27/05/23 (around yday 147.67 and 148.0) which did not affect the xCO₂sw values; insufficient water flow reaching the pCO₂, due to cleaning of the SW pump filter without pausing acquisition occurred on 1/6/23 (yday 152.54-152.64). The equilibrator pressure during 29/05/23 (around yday 149.49, 149.63 and 149) spiked and went high; it corresponded to when the equilibrator gas (LiCOR) flow slowed down and then

went high. It might be caused by a blockage (sw) in the equilibrator return tubing that went away after cleaning the equ return. Instances of equilibrator pressure spikes were flagged as 3. Atmospheric pressures weren't the best... Consequently, data inference was performed based on LiCOR press readings at some instances (e.g., yday 142.8, 146, 147.0, 148.6-149.1, 150-150.5, 150.8-151.2, 151.28-151.33, 151.8-152.4, 152.76-152.94 and 153.9-154). All were flagged as 3 for ATM as questionable/interpolated p. The salinity data obtained from the SBE-45 was reliable; fresher water intrusions from the Río de La Plata occurred during yday 145.37-146.03, 146.5-146.9 and 147.36-147.4. STDs gas flow was 85-100 ml/min. STDs covaried nicely, but STD2 and STD3 were 6 and 8 ppm off, respectively. The ATM maintained a flow of 120-130 ml/min. Bad ATM measurements at yday 150.6 were flagged as 4. The data was reduced with the 'pCO₂ Data Reduction' Matlab software (version 1.30), written by D. Pierrot, that follows the recommendations of Pierrot et al. (2009). Full unprocessed data files from the analytical instrument, encompassing flow information and TSG data at the time of sampling, are available upon request to INIDEP. This dataset contributes to the Joint Technical Commission of the Maritime Front (Comisión Técnica Mixta del Frente Marítimo, CTMFM; <http://www.ctmfm.org/>) which is the intergovernmental Argentinean-Uruguayan body responsible for conducting studies and adopting and coordinating plans and measures for the conservation, preservation and rational exploitation of living resources and the protection of the marine environment of the Argentinean-Uruguayan Common Fishing Zone (ZCPAU). In addition, it contributes to the LAOCA network.

Citation for this Dataset:

Other References for this Dataset: