

Dataset Expocode	08D820230227
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Dataset	Funding Info: Programa Dinámica del Plancton Marino y Cambio Climático (DiPlaMCC)-INIDEP; National Program for Research and Productive Innovation in Argentine Maritime Spaces (Programa Nacional de Investigación e Innovación Productiva en Espacios Marítimos Argentinos, PROMAR) Initial Submission (yyyymmdd): 20230109 Revised Submission (yyyymmdd):
Campaign/Cruise	Expocode: 08D820230227 Campaign/Cruise Name: VA202302 Campaign/Cruise Info: INIDEP Platform Type: CO2 Instrument Type: Equilibrator-IR or CRDS or GC Survey Type: Research Cruise Vessel Name: Victor Angelescu Vessel Owner: Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP)-Argentina Vessel Code: 08D8
Coverage	Start Date (yyyymmdd): 20230227 End Date (yyyymmdd): 20230403 Westernmost Longitude: 64.3 W Easternmost Longitude: 35 W Northernmost Latitude: 38.2 S Southernmost Latitude: 55.5 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 (~5 °C) and then through a Perma Pure (Nafion) dryer before reaching the analyzer (90% dry).
Atmospheric CO2 Accuracy: ± 0.5 μ atm in fCO₂_ATM
Atmospheric CO2 Precision: ± 0.01 μ atm 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): 80 - 100 ml/min
Equilibrator Water Flow Rate (L/min): 2.3 - 2.9 L/min
Equilibrator Vented: Yes
Equilibration Comments: Primary equilibrator is vented through a secondary equilibrator.
Drying Method: Gas stream passes through a thermoelectric condenser (~5 °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 μ atm in fCO₂_SW
Aqueous CO2 Precision: ± 0.01 μ atm 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 'Assessment of the abundance of juvenile Patagonian toothfish (*Dissostichus eleginoides*) and other demersal species on the shelves of Georgias del Sur Islands, Cormoran and Negra Rocks' focused on gathering information on the status of Patagonian toothfish juveniles in the CCAMLR statistical subarea 48.3 and involved bottom trawling fishing operations, multinet deployments and CTD stations. The analytical system performed well overall, with a calculated time offset of 2.40 minutes between the intake and equilibrator temperature, which was used for data processing. The temperature differences between the SBE38 and the equilibrator were between -0.5 and 1 degC. Water flow was maintain between 2.3 and 2.9 L/min. Cleaning of the SW pump filter or to perform maintenance on the GO 8050 pCO₂ at: 28/2 (yday 63) 12:35-12:50 hrs; 1/3 (yday 64) 17:10 hrs; 4/3 (yday 65) 11:30 hrs; 6/3 (yday 67) 14:43 hrs; 7/3 (yday 68) 15:15 and 20:58 hrs; 10/3 (yday 69) 03:20 hrs; 11/3 (yday 70) 05:58 hrs; 12/3 (yday 71) 15:51 hrs ; 13/3 (yday 72) 03:32 hrs; 15/3 (yday 74) 23:45 hrs; 19/3 (yday 78) 12:30 hrs; 23/3 (yday 82) 03:22 hrs; 25/3 (yday 84) 04:08 hrs; 26/3 (yday 85) 11:25 hrs; 28/3 (yday 87) 19:20 hrs; 31/3 (yday 90) 10:25 hrs filter cleaning and at 20:41 hrs acquisition interrupted due to a search for a missing vessel near to the coast in Golfo San Matías. 1/4 (yday 91), acquisition resumed at approximately 22:00 hrs. Data acquisition was stopped to clean the gas return to the equilibrator on 17/3. Issues with the equilibrator pump that made

the LiCOR flow to spike from 13/3 (yday 72) to 18/3 (yday 77), yet it did not affect the equilibrator pressure. This was fixed on 18/3 (14:52 hrs) by replacing the equilibrator pump. The equilibrator pump configuration was changed to a fixed speed at 23:22 hrs. The atmospheric pressure readings were consistent. Data inference was performed based on LiCOR press readings at some instances (e.g. yday 79.5-80.3, 83.3-84.24 and 92.8-93.4). All were flagged as 3 for ATM as questionable/interpolated p. The salinity data obtained from the SBE-45 was reliable (the average correction was 0.073). Lower salinities occurred on 10/3 (Yday 69) 09:30 hrs until 12/3 10:30 hrs due to navigating through icebergs. STDs gas flow was 75-100 ml/min. STDs covaried nicely, but STD2 and STD3 were 6 and 8 ppm off, respectively. Bad STDs measurements occurred on 23/3 (yday 58.7) and 16/3 (yday 75.85). The ATM maintained a flow of 115-130 ml/min. Bad ATM measurements 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. The expedition took place within the framework of the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR), through the Pampa Azul Initiative, which coordinates scientific research, technological development, and innovation actions to provide scientific bases for national oceanic policies. This dataset contributes to the CCAMLR and the Pampa Azul Initiative. In addition, it contributes to the LAOCA network.

Citation for this Dataset:

Other References for this Dataset: