NOC_Pride_of_Bilbao_2005-2010

# Discrete measurements (TCO2, TALK, pCO2, and pH) metadata form

Investigator:

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Dataset Info:
Dataset ID:**NOC_Pride_of_Bilbao_2005-2010**
Submission Dates:
Initial Submission: **2012/10/02**
Revised Submission:

Cruise Info:
Experiment:
Experiment Name:
**NOC_Pride_of_Bilbao**
Cruise:
Cruise ID: (Expocode)
Section: (Leg)
Geographical Coverage: **Northeast Atlantic**
Geographical Region: **POB route covers a suite of different oceanographic regions from shallow English Channel to deep oceanic Bay of Biscay**

Bounds:
Westernmost Longitude: **-6**
Easternmost Longitude: **-1**
Northernmost Latitude**: +51**
Southernmost Latitude: **+43**

Temporal Coverage:
Start Date: **2005/9/26**

End Date: **2010/9/16**
Ports of Call: (One per line) *???*
Vessel:
Vessel Name: **MV Pride of Bilbao**
Vessel ID:  **IMO: 8414582**
Country: **UK**
Vessel Owner: **P&O Ferries**

Variables Info:
Variable:
Variable Name: **ShipID**
Description of Variable: (units)
**The ID of the ship used for collecting the DIC/TA samples**
Variable Name: **Longitude**
Description of Variable: (units)
**Longitude in decimal degrees; recording GPS position of ship at time sample was taken**
Variable Name: **Latitude**
Description of Variable: (units)
**Latitude in decimal degrees; recording GPS position of ship at time sample was taken**
Variable Name: **SamplingTime**
Description of Variable: (units) **Sampling time, yyyy/mm/dd HH:MM**
Variable Name: **Year**
Description of Variable: (units) **Sampling year**
Variable Name: **Month**
Description of Variable: (units) **Sampling month**
Variable Name: **Depth**
Description of Variable: (units) **Sampling depth (m)**
Variable Name: **Temperature**
Description of Variable: (units)
**In situ temperature (degree C); measured by a MINIpack system from Chelsea Technologies Group (Hydes et al., 2003)**
Variable Name: **Salinity**
Description of Variable: (units)
**Salinity calculated from temperature and conductivity measured by a MINIpack system from Chelsea Technologies Group (Hydes et al., 2003), and calibrated by daily discrete samples which were analysed by a salinometer (8400 B Autosal, Guildline, Canada).**
Variable Name: **DIC(TCO2)_µmol/kg**
Description of Variable: (units)
**Dissolved inorganic carbon (µmol kg-1), measured by VINDTA 3C (Marianda, Germany).**
Variable Name: **DIC_flag: 1 = Sample for this measurement was drawn from water bottle but analysis not received; 2 = Acceptable measurement; 3 = Questionable measurement; 4 = Bad measurement; 5 = Not reported; 6 = Mean of replicate measurements; 7 = Manual chromatographic peak measurement; 8 = Irregular digital chromatographic peak integration; 9 = Sample not drawn for this measurement from this bottle.**
Variable Name: **TA_µmol/kg**

Description of Variable: (units)

**Total alkalinity (µmol kg-1), measured by VINDTA 3C (Marianda, Germany).**

Variable Name: **TA_flag**

Description of Variable: (units)

**TA quality flag: 1 = Sample for this measurement was drawn from water bottle but analysis not received; 2 = Acceptable measurement; 3 = Questionable measurement; 4 = Bad measurement; 5 = Not reported; 6 = Mean of replicate measurements; 7 = Manual chromatographic peak measurement; 8 = Irregular digital chromatographic peak integration; 9 = Sample not drawn for this measurement from this bottle.**

Variable Name: **Oxygen_µmol/kg**

Description of Variable: (units)

**Dissolved oxygen (µmol kg-1); measured by a MINIpack system from Chelsea Technologies Group (Hydes et al., 2003), calibrated by the onboard Winkler titration**

Variable Name: **DIN_µmol/kg**

Description of Variable: (units)

**Nitrate plus nitrite (µmol kg-1); measured by a MINIpack system from Chelsea Technologies Group, calibrated by the onboard Winkler titration**

Variable Name: **Phosphate_µmol/kg**

Description of Variable: (units)

**µmol kg-1; measured by an auto-analyser using standard methods (Grasshoff 1983).**

Variable Name: Silicate_µmol/kg

Description of Variable: (units)

**µmol kg-1; measured by an auto-analyser using standard methods (Grasshoff 1983).**


Total Variables in the Data Set: **17**

Method Description:

DIC Analysis Method:

Total C02 Data:

TCO2 Analysis Method:

**The analysis of DIC was undertaken in National Oceanography Centre, Southampton using VINDTA 3C (Marianda, Germany，unit 11 and unit 24). By reaction with phosphoric acid, dissolve inorganic carbon of the sample was converted to CO2. The CO2 gas was carried by N2 into the coulometer cell and reacts with monoethanolamine to form a titratable acid which causes the fading of the blue indicator. Responding to the colour change, a current flow generates base to remove the acid and restore the indicator to the original colour. The amount of CO2 can be estimated from the required coulombs of the current required (corrected for blank), and DIC concentration can then be calculated given the known sample volume.**

Standardization Technique:

Technique Description:

**In order to standardize the results, Certified Reference Materials (CRM) from A.G. Dickson, Scripps Institution of Oceanography were analysed as standards to calibrate the instrument at the beginning and end of each day of analysis.  A**

**daily correction factor was applied to all measured values according to Millero et al. (1998).**
Sample Volume: (mL) **19.1681**

CRM Info:
Correction Magnitude: **the averaged correction factor is 0.9937**
Batch Number: (One Used Batch Number per Line)
**81**
**90**
**91**
**93**
**97**
**98**
**99**
**105**

CRM Analysis Info: (e.g., Refer to plots for CRMs):

Field Replicate Info:
**Repeated measurements on the same batch of seawater (n>=3) in the lab gave consistent results (precision for the whole dataset estimated as 2.0±0.7 μmol kg-1).**
Poisoning Info:
Poisoning Correction Description: (e.g., Refer to plots for CRMs)
**Saturated HgCl2 (0.05 mL) is added to the collected sample to prevent the sample from biological modification. Since we use a large sampling volume (250 mL), the dilution effect of adding HgCl2 is neglectable (0.02%).**

Poison Volume: (mL) **0.05**
Accuracy Info: (Estimate overall precision and accuracy, and why)
**Repeated measurements on the same batch of seawater (n>=3) were undertaken every day prior to sample analysis in order to assess the precision of the method. The precision was estimated for the whole dataset to be 2.0±0.7 μmol kg-1 for DIC and 1.2±0.5 μmol kg-1 for TA. The accuracy of the measurement is assured by the standardization using the CRM from A.G. Dickson, Scripps Institution of Oceanography on daily basis.**
Method References: (Publication(s) describing method)
**Dickson, A. G., C. L. Sabine, and J. R. Christian. 2007. Guide to best practices for ocean CO2 measurements. PICES Special Publication 3. 191 pp.**
**Dumousseaud, C., E. P. Achterberg, T. Tyrrell, A. Charalampopoulou, U. Schuster, M. Hartman, and D. J. Hydes. 2010. Contrasting effects of temperature and winter mixing on the seasonal and inter-annual variability of the carbonate system in the Northeast Atlantic Ocean. Biogeosciences 7: 1481-1492.**
**Millero, F. J., Dickson, A. G., Eischeid, G., Goyet, C., Guenther, P., Johnson, K. M., Key, R. M., Lee, K., Purkenson, D., Sabine, C. L., Schottle, R. G., Wallace, D. W. R., Lewis, E., and Winn, C. D.: Assessment of the quality of the shipboard measurements of total alkalinity on the WOCE Hydrographic Program Indian Ocean CO2 survey cruises 1994–1996, Mar. Chem., 63, 9–20, 1998**

Alkalinity:

Curve Fitting Method: **non-linear curve fitting (least-squares) approach (Dickson et al., 2007)**

Type of Titration:

**Titration with HCl (~0.10 mol/L) uses a closed cell procedure with an open cell, with a pH half cell electrode (glass bodied Orion 8101SC, Ross, USA) and an Ag/AgCl reference electrode (model 6.0729.100, Metrohm, Switzerland).**

Description of Other Titration: (If other, please describe)

Cell Type: **open cell**

CRM Scale: *???*

Sample Volume: (mL) **97.409**

Magnitude of Blank Correction: *???*

Accuracy Info: (Estimate overall precision and accuracy, and why)

**Repeated measurements on the same batch of seawater (n>=3) were undertaken every day prior to sample analysis in order to assess the precision of the method. The precision was estimated for the whole dataset to be 2.0±0.7 µmol kg-1 for DIC and 1.2±0.5 µmol kg-1 for TA. The accuracy of the measurement is assured by the standardization using the CRM from A.G. Dickson, Scripps Institution of Oceanography on daily basis.**

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**Grasshoff, K.: Determination of nutrients, in: Methods of Seawater Analysis, second edition, edited by: Grasshoff, K., Ehrhardt, M., and Kremling, K., Verlag Chemie GmbH, Basel, pp. 125–188, 419 pp., 1983.**

**Hydes, D.J. et al. Use of a Ferry-Box system to look at shelf sea and ocean margin processes. In: Dahlin H., Flemming N.C., Nittis K., Petersson S.E. (Eds.), Building of the European Capacity in Operational Oceanography. Elsevier Oceanography Series 69, 2**

**Hydes, D. J., Yool, A., Campbell, J. M., Crisp, N. A., Dodgson, J., Dupee, B., Edwards, M., Hartman, S. E., Kelly-Gerreyn, B. A., Lavin, A. M., Gonz´alez-Pola, C. M. and Miller, P.: Use of a Ferry-Box system to look at shelf sea and ocean margin processes, edited by: Dahlin, H., Flemming, N. C., Nittis, K., Petersson, S. E., Building of the European Capacity in Operational Oceanography, Elsevier Oceanography Series, 69, 297–303, 2003.**

**Millero, F. J., Dickson, A. G., Eischeid, G., Goyet, C., Guenther, P., Johnson, K. M., Key, R. M., Lee, K., Purkenson, D., Sabine, C. L., Schottle, R. G., Wallace, D. W. R., Lewis, E., and Winn, C. D.: Assessment of the quality of the shipboard measurements of total alkalinity on the WOCE Hydrographic Program Indian Ocean CO2 survey cruises 1994–1996, Mar. Chem., 63, 9–20, 1998**

Additional information:

Data Set References: (Publication(s) describing data set)

**Dumousseaud, C., E. P. Achterberg, T. Tyrrell, A. Charalampopoulou, U. Schuster, M. Hartman, and D. J. Hydes. 2010. Contrasting effects of temperature**

**and winter mixing on the seasonal and inter-annual variability of the carbonate system in the Northeast Atlantic Ocean. Biogeosciences 7: 1481-1492.**


Citation: (How to cite this data set)

Data Set Link:
URL: http://www.noc.soton.ac.uk/ops/ferrybox_index.php
Label:
Link Note: (Optional instructions or remarks)