Cruise: PC1609
Ship: R/V Pisces
Expo Code: 334B20161018
Dates: 10/18/2016 – 11/11 2016
Chief Scientist: Jerry Prezioso
Equipment: CTD Rosette
Total number of stations: 3
Location: US Mid-Atlantic coastal region (ECOMON cruise)

The samples were run for Dr. Chris Melrose of the NEFSC as part of our coastal ocean acidification monitoring project.

Sample Collection

The discrete samples were collected from Niskin bottles attached to a 24 bottle configured rosette onboard the R/V Pisces by Christopher Taylor. The date and time listed in the data file are UTC when each sample bottle was collected.

DIC:
3 locations, 9 samples each 500-ml, 0 duplicate samples.
Sample_ID#: 90101, etc.; Station, cast number and Niskin bottle number
PI: Dr. Rik Wanninkhof
Analyzed by: Charles Featherstone

pH:
3 locations, 9 samples each 500-ml, 0 duplicate samples.
Sample_ID#: 90101, etc.; Station, cast number and Niskin bottle number
PI: Dr. Rik Wanninkhof
Analyzed by: Charles Featherstone

TAlk:
3 locations, 9 samples each 500-ml, 0 duplicate samples.
Sample_ID#: 90101, etc.; Station, cast number and Niskin bottle number
PI: Dr. Rik Wanninkhof
Analyzed by: Charles Featherstone

Sample Analysis
DIC:

Instrument ID	Date	Certified CRM (µmol/kg)	CRM Value (µmol/kg)	CRM Offset (µmol/kg)	Blank (Counts)	Avg. Sample Analysis Time
AOML 4	11/22/2016	2022.04	2028.65	6.61	28.0, 37.0	15.0

Analysis date: 11/22/2016
Coulometer used: DICE –CM5015- AOML 4
Blanks: 28.0 and 37.0 counts/min
CRM # 682 was used and with an assigned value of (includes both DIC and salinity):
Batch 123, c: 2022.04 µmol/kg, S: 33.357
CRM values measured: AOML 4: offset 6.61 µmol/kg (2028.65 µmol/kg).
Average run time, minimum run time, maximum run time: 15, 11 and 20 min.

Reproducibility: (# samples and average difference): No duplicate samples

CRM, salinity and HgCl2 correction applied: Salinity correction was applied using TSG salinity.

Remarks

The volume correction was applied due to added $HgCl_2$ (Measured DIC*1.00037).
The first CRM of each cell was used for a CRM correction.

The DIC instruments were stable: the gas loop and CRM values did not change significantly throughout the life span of each cell.

The samples were analyzed using the DICE (AOML 3 and 4) and a new coulometer from UIC, Inc. CM5015 with CM5011 emulation software.

The blank on AOML 4 (11/22/2016) was raised from 28.0 to 37.0 after running the first two samples. The same CRM was run again before continuing analysis.

pH:

Analysis date: 11/22/2016
Spectrophotometer used: HP Agilent 8453

A CRM from Batch 123 was analyzed for pH before analyzing samples. CRM #741 had a pH value 7.9283. The pH is not certified but assumed to have a value of 8.000.

Reproducibility: (# samples and average difference): No duplicate samples.

Temperature measurements made during pH analysis

Sample ID	Sample BTL #	BTL Temp (^{0}C)	Start Cell (^{0}C)	End Cell (^{0}C)	Differ Start to End Cell (^{0}C)
CRM 741	741	19.98	20.322	20.341	0.019
30101	1	19.831	20.050	20.181	0.131
30105	2	19.780	20.466	20.989	0.523
30111	3	19.827	20.865	21.292	0.427
60201	4	19.812	20.517	20.940	0.423

60204	5	19.815	20.405	20.775	0.370
60211	6	19.777	20.642	21.575	0.933
70301	9	19.79	20.996	21.961	0.965
70302	8	19.934	20.788	21.874	1.086
70311	7	19.846	20.868	21.704	0.836
Average		19.839	20.592	21.163	0.571

Remarks

The equations of Liu et al, 2011 formulated using the purified m-cresol purple indicator was used to determine pH of the samples. pH samples were analyzed at 20^0C at Full Scale (pH 0-14).

Temperature for each sample was measured before analysis using a Hart Scientific Fluke 1523 reference thermometer.

Approximately 80 mL of sample was extracted from each DIC sample bottle by syringe before DIC analysis to determine the pH.

TAlk:

Analysis date: 11/29/2016
Titration system used: Open cell
CRM Batch 123, Salinity = 33.384, cert. TA = 2225.21 µmol/kg.

On 11/29/2017 one CRM was analyzed before the samples and the same CRM was run at the end of analysis each day for each system.
The TA for the water samples was corrected using the daily averaged ratios between the certified and measured values of the CRMs run on each cell. The following table shows the CRM measurements for each day and cell.

Cell System	Date	Time	Bottle #	TA	|ΔCRM|
2	11/29/2016	10:09:39	216	2230.29	1.14
2	11/29/2016	15:26:49	216	2231.43	

Reproducibility: (# samples and average difference): No duplicate samples.

Remarks

The CRM measurement for each day was used to correct the data for that day only. Both

systems worked well.

Comments

Cruise terminated due to mechanical ship failure with only 3 stations sampled.

The latitude, longitude, date, and time reported with the DIC, pH and TAlk measurements were taken from the sample field log. The field log values are provided for reference; no post-cruise assurance of accuracy has been done to this data. The Niskin bottles are approximately one half meter above the CTD sensors on the rosette. Therefore, Temp and Sal are bin-averaged CTD values representing the next shallower depth from that recorded by the CTD (CTD Depth) at the time the Niskin bottles were fired with the exception of the surface values, which are the same as the CTD Depth values (as per the log sheet).

The Sample ID is the sample station, cast number and Niskin bottle number for the discrete samples.

This carbon dataset has been merged with nutrient data from the same cruise, provided by Dr. Chris Melrose's group. Where samples for carbon parameters and nutrients were drawn from different Niskin bottles, merging has been done based on sample depth, assuming all Niskin bottles tripped at the same depth would have the same nutrient values.

The following columns have been imported from the nutrients file:

Date_UTC, Depth_station, Depth_sampling, CTDPRS, CTDOXY, CTDOXYMOL, SILCAT, NITRIT+NITRAT, AMMONIA, PHSPHT

An additional column named Niskin_nuts has been added to reflect the niskin that nutrient samples were drawn from (which sometimes is different from the niskin used for carbon samples).

UPDATE:
Between March and June of 2021, all of the data for the discrete samples was put into a uniform format. The supporting information was checked for accuracy, especially the expocode, date, time, and positions.
Additionally, pH results were recalculated to 20 and 25 degrees Celsius.