Cruise: GU1302 , EcoMon
Ship: R/V Gordon Gunter
Expocode: 33GG20130609
Dates: June 9th, 2013 to June 24th, 2013
Chief Scientist: Chris Melrose and Dave Richardson
Equipment: Ship's Flow-through system and CTD Rosette
Total number of stations: 27

Sample Collection

Locations: Latitude 35.990 N to 44.485 N and 67.225 W to 75.535 W

The discrete samples were collected from Niskin bottles attached to a 24 bottle configured rosette and the flow thru system onboard the ship by Christopher Taylor of the NE Fisheries science center. The date and time listed in the data file are UTC when each sample bottle was collected.

DIC:
27 locations, 92 samples each 500-ml, No duplicate samples.
Sample_ID#: 90101, etc.; Station, cast number and Niskin bottle number
PI: Dr. Rik Wanninkhof
Analyzed by: Dr. Leticia Barbero, Dr. Denis Pierrot and Bob Castle

pH:
27 locations, 92 samples each 500-ml, No duplicate samples.
Sample_ID#: 90101, etc.; Station, cast number and Niskin bottle number
PI: Dr. Rik Wanninkhof
Analyzed by: Dr. Leticia Barbero, Dr. Denis Pierrot and Charles Featherstone

TAlk:
27 locations, 92 samples each 500-ml, No duplicate samples.
Sample_ID#:
PI: Dr. Rik Wanninkhof
Analyzed by: Dr. Leticia Barbero

Sample Analysis

DIC:

All CRMs are from batch 112: cert.S= 33.305 and cert. DIC = 2011.09 µmol/kg.

Date	System	Blanks (cnts/min)	CRM batch	CRM #	meas DIC (µmol/kg)	Offset	Run Times (min.) Avg	Min.	Max.
7/2/13	AOML4	24	112	291	2011.72	0.63	16	16	16
7/3/13	AOML3	40, 45	112	265	2009.31	-1.78	14	10	20
7/3/13	AOML4	26.1	112	822	2012.58	1.49	19	14	20
7/5/13	AOML3	17.9, 25	112	537	2009.83	-1.26	12	12	12
7/5/13	AOML4	29	112	780	2011.92	0.83	20	20	20
7/6/13	AOML3	20.7, 28	112	1084	2011.71	0.62	12	11	13
7/6/13	AOML4	24.9, 30	112	198	2010.69	-0.4	17	13	20
7/7/13	AOML3	20.8, 27	112	473	2010.78	-0.31	11	10	13
7/7/13	AOML4	29.7, 40	112	736	2011.27	0.18	11	10	13
7/8/13	AOML3	18, 28	112	149	2011.25	0.16	14	10	20
7/8/13	AOML4	14.7, 25	112	417	2010.83	-0.26	12	10	16
7/9/13	AOML3	15.3, 34	112	956	2012.28	1.19	13	10	17
7/9/13	AOML4	20.4, 36, 44	112	690	2010.02	-1.07	13	9	20

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

AOML 3 Blanks

The blank (AOML 3) on 07-03-2013 was raised from 40.0 to 45.0 before running the second gas loop.

The blank (AOML 3) on 07-05-2013 was raised from 17.9 to 25.0 before running the second gas loop.

The blank (AOML 3) on 07-06-2013 was raised from 20.7 to 28.0 before running CRM #1084.

The blank (AOML 3) on 07-07-2013 was raised from 20.3 to 27.0 before running CRM #0473.

The blank (AOML 3) on 07-08-2013 was raised from 18.0 to 28.0 before running CRM

#0149. Re-ran the CRM using a blank of 34.0.

The blank (AOML 3) on 07-09-2013 was raised from 15.3 to 34.0 before running CRM #0956.

AOML 4 Blanks

The blank (AOML 4) on 07-06-2013 was raised from 24.9 to 30.0 before running CRM #0198.

The blank (AOML 4) on 07-07-2013 was raised from 29.7 to 40.0 before running CRM #0736.

The blank (AOML 4) on 07-08-2013 was raised from 14.7 to 25.0 before running CRM #0417.

The blank (AOML 4) on 07-09-2013 was raised from 20.4 to 36.0 before running CRM #0690. The blank was raised again to 44.0 after the analysis of bottle #157.

On July 8th, 2013 after experiencing high counts and the nitrogen gas hovering around 500 PSI the nitrogen was changed to a new tank. New CRM's were ran on both instruments (DICE) before the analysis of samples. AOML 4 had a gas cal factor to high for the 2nd run, so the 1st gas cal was entered manually and used for the analysis of samples.

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

Reproducibility: (# samples and average difference): No duplicates were collected.

Remarks

CRM and $HgCl_2$ correction applied.
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 (additive).

pH:

Analysis date: July 2nd, 5th, 6th, 7th, 8th and 9th, 2013
Spectrophotometer used: HP Agilent 8453

Reproducibility: (# samples and average difference): No duplicates were collected

Remarks

The equations of Liu et al, 2011 formulated using the purified m-cresol purple indicator was used to determine pH of the samples. The temperature of the pH cell was recorded before and after the absorbance measurements using a Hart Scientific Fluke 1523 reference thermometer. The pH was calculated using the average of the 2 temperatures. The average difference in temperature before and after was 0.9 ºC. Samples were analyzed between 21 ºC and 22 ºC. They were calculated at 20 ºC using CO2Sys and the DIC measurements. The average correction made is 0.023 in pH. They are reported at 20 ºC on the Total Scale.

TAlk:

The results posted are analyses from the same sample bottles used for DIC.
Analysis date: 10/30/2013 – 11/05/2013
Titration system used: Open cell
CRM analysis (values in µmol/kg):
Each day, a CRM was analyzed before (CRM-1) and after (CRM-2) the samples.
CRM analyzed:

Batch 85, Salinity = 33.326, cert. TA = 2184.03 µmol/kg.
Batch 108, Salinity = 33.224, cert. TA = 2218.00 µmol/kg.
Batch 112, Salinity = 33.305, cert. TA = 2223.26 µmol/kg.
Batch 123, Salinity = 33.384, cert. TA = 2225.21 µmol/kg.

				SYSTEM 1			SYSTEM 2		
CRM	Date	Batch	Bottle #	meas. TA	meas.-cert. TA	Diff. in Offsets	meas.-cert. TA	meas.-cert. TA	Diff. in Offsets
1	10/30/13	123	230	2219.75	-5.46	1.14	2219.96	-5.25	0.1
2	10/30/13	112	363	2218.94	-4.32		2218.11	-5.15	
1	10/31/13	112	306	2219.77	-3.49	0.66	2220.6	-2.66	0.16
2	10/31/13	108	452	2215.17	-2.83		2215.18	-2.82	
1	11/1/13	85	258	2178.45	-5.58	2.85	2182.64	-1.39	2.6
2	11/1/13	108	217	2215.27	-2.73		2214.01	-3.99	
1	11/4/13	112	80	2217.39	-5.87	0.16	2216.94	-6.32	3.73
2	11/4/13	112	1069	2217.55	-5.71		2213.21	-10.05	
1	11/5/13	112	513	2217.02	-6.24	0.04			
2	11/5/13	112	514	2217.06	-6.2				

Reproducibility: No duplicates were collected.

Remarks-

For most of the samples, the first CRM was used to correct the data. The second CRM served to verify that no major drift had occurred to the system.
For the samples with bottle # 129, 131, 133, 135 ,137, 139, 140, 142, 144, 146, 148, and 150, the second CRM was used to correct the data. The first measured CRM was old and considered unreliable based on the measured value.
The CRM measurement for each day was used to correct the data for that day only.

Comments

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 salinity and temperature values from the pCO_2 raw data collected during the cruise was used for the flow-thru (FT) samples.

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

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

UPDATE JULY 2015

This datafile has been merged with nutrient data from the same cruise, provided by Dr. Jon Hare's group. Carbon and nutrient samples were drawn from different Niskins so merging has been done based on sample depth, assuming all Niskin bottles tripped at the same depth would have the same (or close enough) nutrient values. We have kept the salinity and temperature values used for the carbon parameter calculations. Comparison with calibrated and corrected salinity values provided by Hare's group indicate that the average salinity difference (absolute difference) between preliminary and corrected

salinity values was 0.03 ± 0.05.
The following columns have been added:

Depth_station, Depth_sampling, CTDPRS, Date_UTC, Sigma-Theta, CTDOXY, CTDOXYMOL, SILCAT, NITRIT+NITRAT, AMMONIA , PHSPHT, and BTLNBR_nuts.

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.