Cruise: GU1506
EXPO Code: 33GG20151002
Ship: R/V Gordon Gunter
Dates: October 2nd, 2015 – October 25th, 2015
Chief Scientist: Jerry Prezioso
Equipment: CTD Rosette
Total number of stations: 23
Location: Northeast Coast and Gulf of Maine

Sample Collection

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

DIC:
23 locations, 65 samples each 500-ml, No duplicate samples.
Sample_ID#: 90101, etc.; Station, cast number and Niskin bottle number
PI: Dr. Rik Wanninkhof
Analyzed by: Charles Featherstone

pH:
23 locations, 65 samples each 500-ml, No duplicate samples.
Sample_ID#: 90101, etc.; Station, cast number and Niskin bottle number
PI: Dr. Rik Wanninkhof
Analyzed by: Charles Featherstone

TAlk:
23 locations, 65 samples each 500-ml, No duplicate samples.
Sample_ID#:   90101, etc.; Station, cast number and Niskin bottle number
PI: Dr. Rik Wanninkhof
Analyzed by: Charles Featherstone and Dr. Leticia Barbero

Sample Analysis

Instrument ID	Date	Certified CRM (µmol/kg)	CRM Value (µmol/kg)	CRM Offset (µmol/kg)	Blank (Counts)	Avg. Sample Analysis Time
AOML 2	11/19/15	2031.53	2026.10	5.43	30.0	11
AOML 2	12/07/15	2031.53	2032.60	1.07	35.5	10
AOML 2	12/08/15	2031.53	2031.60	0.07	35.0	10

DIC:
Analysis date: 11/19/2015
Coulometer used: SOMMA - AOML 2
Blanks: 30.0 counts/min
CRM # 0912 was used and with an assigned value of (includes both DIC and salinity):
Batch 144, c: 2031.53 µmol/kg, S: 33.571
CRM values measured: AOML 2: offset 5.43 µmol/kg (2026.1 µmol/kg).
Average run time, minimum run time, maximum run time: 17, 11 and 20 min.

Analysis date: 12/07/2019
Coulometer used: SOMMA - AOML 2
Blanks: 35.5 counts/min
CRM # 0653 was used and with an assigned value of (includes both DIC and salinity):
Batch 129, c: 2031.53 µmol/kg, S: 33.571
CRM value measured: AOML 2: offset 1.07 µmol/kg (2032.6 µmol/kg).
Average run time, minimum run time, maximum run time: 14, 10 and 20 min.

Analysis date: 12/08/2015
Coulometer used: SOMMA - AOML 2
Blanks: 35.0 counts/min
CRM # 0849 was used and with an assigned value of (includes both DIC and salinity):
Batch 129, c: 2031.53 µmol/kg, S: 33.571
CRM value measured: AOML 2: offset 0.07 µmol/kg (2031.6 µmol/kg).
Average run time, minimum run time, maximum run time: 14, 10 and 20 min.

Reproducibility: No duplicate samples were collected

<u>Remarks</u>

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

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

pH:

Analysis date: November 19th, December 7th, and December 8th, 2014
Spectrophotometer used: HP Agilent 8453

Reproducibility: No duplicate samples 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. pH samples were analyzed at 20^0C at Full Scale.

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

TAlk:

The results posted are duplicate analyses from the same sample bottles used for DIC.
Analysis dates: 12/14/2015 – 12/17/2015
Titration system used: Open cell
CRM batch: 129, S = 33.361, certified TA = 2237.32 µmol/kg

2 CRM samples were run daily on each cell, before and after the seawater samples. The TA for the water samples was corrected using the daily averaged ratios between the certified and measured values of the 2 CRMs run on each cell. The following table shows the CRM measurements for each day and cell.

Cell System	Date	Time	Bottle #	TA	$|\Delta CRM|$
1	12/14/15	11:04:35	977	2239.91	
1	12/14/15	18:55:01	639	2239.14	0.77
1	12/16/15	09:21:22	1030	2236.72	
1	12/16/15	17:40:55	1094	2236.32	0.40
1	12/17/15	09:20:33	530	2236.95	
1	12/17/15	13:52:30	222	2238.51	1.56

2	12/16/15	09:15:06	1030	2212.65	
2	12/16/15	17:43:46	1094	2211.2	1.45
2	12/17/15	09:28:00	530	2208.66	
2	12/17/15	13:47:25	222	2199.23	9.43
				Average	2.72
				Std. Dev.	3.78

Reproducibility: No duplicate samples were collected.

Remarks

The two systems behaved well in general during the analyses. On December 17th, the value for the second CRM used on system 2 was considered suspicious based on the normal values obtained for CRMs from batch 129 on this system and was therefore not used for the correction of samples run on system 2 on that day.

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

The DIC instrument was stable: CRM values did not change significantly throughout the life span of each cell.

The blank (AOML 2) on 11-19-2015 the blank was lowered from 39.2 to 30.0 before running the CRM.

The blank (AOML 2) on 12-08-2015 was raised from 30.4 to 35.0 before running the CRM.

The glass stopper for bottle #10 broke while trying to open it, sample tube was held in the sample bottle during analysis by hand. A black rubber stopper was used to cap the bottle for later alkalinity analysis.

Niskin bottle 9 was leaking (Surface sample) for both stations 52 and 60. They were marked as 3 or 4 in the data file for DIC, pH and TA.

Replaced Scotty CO2 standard gas on 11-20-2015.

Replaced valve 10 and 11 on 12-04-2015.

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

The carbon data has been merged with nutrient data from the same cruise, provided by Dr. Jon Hare'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 (or close enough) nutrient values.

The following nutrient columns have been added :

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