2021-03-11

This info will be added into the CTD Processing Notes file so all info will exist in one place.

This will also be added to the header of the IOS archived chemistry file (\*.CHE)

***Addition to CTD processing Notes***

Bottle Casts Kug2 (Station 16 casts 31 to 44)

At Kug2 there was initially a full depth cast (3 times) followed by bottle casts to 6, 12 and 36m m. The bottle casts were shallow enough that icing became a problem due to the CTD being close to the surface’s fresh water and the CTD being colder than the freezing temperature. Although pressure appears good, salinity is too low during the short profiles due to icing. The pressure values from bottle casts were used to determine bottle depth but the CTD data are from the initial full depth casts.

The near-surface bottle is at 2.2m however this is just in the huge transition zone from the lens of freshwater down to salt water. The CTD data used may not match the water in the bottle. Ideally the salinity bottle’s value will help determine actual depth of water inside Niskin.

***Bottle data:***

The station KUG2 was revisited 2 days after the first survey and water samples were taken at 3 depths: 2, 10 and 35dbar where the full depth was around 50dbar.

Samples were taken for Nutrients (Nitrate+Nitrate (NO3), Silicate(SiO4), Phosphate (PO4)), Total Alkalinity, Dissolved Organic Carbon, Major Ions, Oxygen Isotope (δ18O), and Salinity.

A single 1.7L Niskin was attached to the line above the RBR CTD with the bottle center 1.2m above the pressure sensor. The CTD was lowered to the desired depth, a “messenger” was attached to the line and released, closing the Niskin. The line was pulled up and the Niskin removed and sampled before being put back on the line for the next sample. . Bottle depth was determined to be the depth of the bottle stop, observed from the data, minus 1.2 m to account for the distance between Niskin and CTD sensors. The CTD data corresponding to the bottle depth was recorded in a spreadsheet along with the water sample chemistry.

Needed: Sample method (bottle type, rinses), storage method, analysis method (include where and when)

Nutrients:

Nutrient samples were collected, filtered using a 20um Swinex filter into a 20mL vial.

in new 15 mL polystyrene tubes after rinsing 3 times with sample water and then frozen until analysis. Samples thawed for 2 hours at ~28C and let equilibrate to room temperature before analysis 14 May 2019 (5 week after collection). Analysis was performed on a Seal Analytical AA3 with corrections made for salt effects and to the certified reference material (CRM). CRM used was Kanso Lot CA and CD. All samples were taken in duplicate however one tube cracked (sample #5) and was not used. Samples had a precision, calculated as the Standard Pool, of:

NO3: 0.18 µM (n = 6, min = 5.34 µM, max = 8.65 µM)

SiO4: 0.37 µM (n = 6, min = 11.82µM, max = 18.81 µM)

PO4: 0.023 µM (n = 6, min = 1.093 µM, max =1.307 µM)

Salinity:

Salinity samples were collected into 200 mL type II glass bottles with screw caps and

 disposable plastic inserts after rinsing 3 times with sample water. Samples were kept unfrozen and brought back to IOS for analysis. Samples were analyzed May 15, 2019 (5 weeks after collection) in a temperature-controlled lab on the Guildline AutoSalinometer Model 8400B (SN: 69086), which was standardized with IAPSO standard seawater, Batch #162, exp 20 May 2022. No replicates as second set of salinities may be run for a separate analysis. Removing 1 outlier, comparison with ctd (n=6): mean -0.002 PSU, standard deviation 0.004 PSU.

O18

Oxygen Isotopes Samples were collected into 30 ml glass vials after rinsing 3 times with sample water. Once at room temperature, the caps were retightened and kept unfrozen until analysis. Samples were analyzed at Oregon State University using the Thermo DeltaPlusXL mass spectrometer connected to a H2O-CO2 equilibration unit. Samples were analyzed June to July 2010 (10 to 11 months after collection).

Alkalinity

DIC and Alkalinity were analysed out of the same sample. A glass 330ml (beer) bottle was rinsed three times and filled, head space given, poisoned with about 70ug powdered mercuric chloride and sealed with a metal crimp cap. Samples were kept cool (4C) until analysis at the Institute of Ocean Sciences. DIC was analysed using the VINDTA 84, a coulometer system. Dickson CRM batch 178 standard water was used. Alkalinity samples were analyzed using an automated potentiometric titration system with an open cell type and non-linear least squares endpoint determination for the total alkalinity measurement. Dickson CRM batch 173 standard water was used. Samples were analysed May 2, 2019, less than 4 weeks after collection. All samples had been collected in replicate.

Standard deviation of replicates after removing questionable sample #6:

 DIC: 1.05umol/kg, n=6

 Alkalinity: 1.60 umol/kg, n=6