CBS-MEA F/V Frosti cruise, 2-30 August 2022 Summary

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***Highlights and accomplishments***

47 SBE9 plus CTD profiles with Salinity, Temperature, Depth, Chlorophyll a fluorescence, transmissivity, dissolved oxygen concentration (membrane/electrolyte Seabird SBE43, RINKOIII and Aanderaa Optode sensors), altimeter, turbidity and subsurface and surface PAR. On 25 of these casts water samples were collected (see below).

1 RBR Concerto CTD profile with Salinity, Temperature, Depth, Chlorophyll a fluorescence, dissolved oxygen concentration (RINKOIII). This CTD was used when conditions were too rough to deploy the main CTD/Rosette.

252 water samples collected, variously sampled for DIC/TA, nutrients, O18, salinity, chlorophyll, particulate organic carbon, microbial DNA and phytoplankton taxonomy.

The procedure used by the deck crew to deploy and recover the rosette had been fine tuned this year and was much safer and more secure than in previous years. This allowed deployments in wind and wave states somewhat more severe than would have been possible before the improvements. Also, the method of hanging the conducting cable through the block using a loop through the snatch-gate rather than feeding the termination through is easier on the termination and may have contributed to its trouble-free performance this year.

***Observations***

Observations were made of physical ocean properties CTD profiles to aid delineation of pelagic fish habitat and interpretation of data from the EK80 multi-frequency bioacoustics system. At all stations, note was made of chlorophyll maximum depths. This depth varied from 5m to 56m depending on near-surface water properties and mixing due to winds and currents . Striking features in the CTD profiles were:

* Suspended particles in the water column in Franklin Bay and near Cap Bathurst reduced beam transmission levels to less than 10 percent in some cases, and were found in distinct vertical layers. This could be the result of slope-trapped jets at different depths, induced by different episodes of upwelling or downwelling.
* The surface mixed layer in Dolphin and Union Strait was the deepest observed during the cruise at between 20 and 30m depth; elsewhere mixed layer depths varied between 5 and 15m. Strong winds during sampling and earlier in the season likely caused this, especially as the western part of the study area was under ice cover until a couple of weeks before the cruise.
* A 5-profile section across Prince of Wales Strait between Cape Stewart and Cape Hays showed distinct differences between the near-shore and central part of the strait; it is not a uniform flow though this channel.

***Technical Issues***

Overall this was a trouble-free cruise. The CTD-deck unit system worked flawlessly, in stark contrast to 2021. The termination on the conducting cable used to deploy the CTD/rosette and HydroBios MPS had no issues.

A piece of stiff hose was attached to the outside of the rosette, vertically beneath the PAR sensor. This sensor is located at the top outside of the rosette and is the most vulnerable part of the rosette at risk of damage during deployments and recoveries. No damage occurred, but having the bumper in place gave the PAR sensor extra protection.

Remote display of the CTD depth, descent speed and altimeter to the winch operator worked intermittently. The current tablet is sensitive to rain, and it is not clear why the software (LetsView) stopped working 2 days before the end of the cruise. As this is a nice-to-have rather than essential, the effects of this issue were nil other than increased radio communication between the winch operator and the CTD operator.

Both the USB and Bluetooth GPS’s had issues – one of each pair failed for unknown reasons. The Bluetooth GPS would occasionally cease to communicate with the tablet used for digital event logging and needed to be power cycled and reconnected to work.

***Recommendations***

* Thorough testing of the USB and Bluetooth GPS’s and replacement if needed
* Replacement of the CTD acquisition laptop with a newer model; the one used this year and in previous years is now 10 years old. Any replacement would ideally have 3 or (better) 4 USB ports.
* Re-align the piece of hydraulic hose that guides the connector to the conducting cable down into the rosette. As it is currently located, the end of the cable runs into the CTD, meaning that guidance from below is needed to get the splice into the protection of the hose. If the hose-end led to free air, attaching the cable would be that much easier.