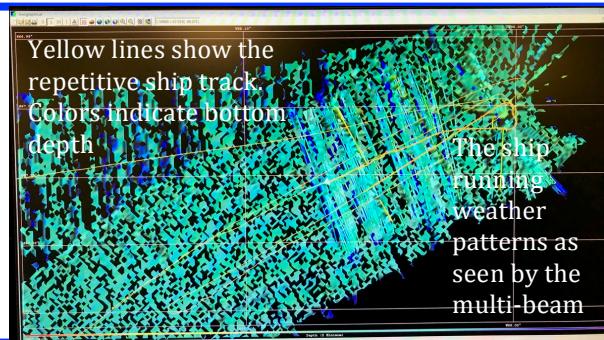


Week 8: From the Amundsen Sea to the Bellinghausen Sea



Doing Weather Patterns waiting on
Station 114 at 67.0°S, 88°W
Winds: from WSW 30-40 kts, gusting to 45kts
Seas: confused /w pitch, roll & heave all
greater and more erratic than we would like
Outside Temp: -8.8°C, 16.2°F
Wind Chill: -33°C, -27.4°F



We can hardly believe it is week 8 at sea (9 since we arrived in port). We have come up the 103°W line (north-south aligned red crosses on last week's report, now black circles above) chomping our way through ice to eventually head east again (more black circles to right of 103°W). Although we have not had the opportunity, as they did in 2011, to get ourselves into thick enough ice and off the Palmer, it has been enough to just be moving through the ice and see penguins again. We looked forward to the 103°W line, and with weather systems constantly threatening, there was quite a bit of angst amongst the science party that we would have to cut it from the cruise plan. But in the end, it made sense to head south out of the storm track, rather than to sit on a station that it might take days to get a chance to measure.

J. Brower

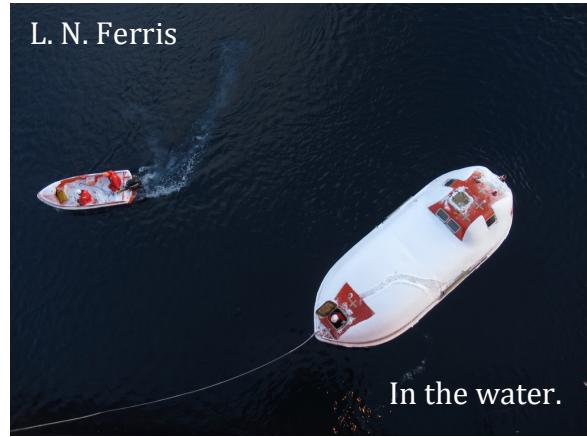


M. O. G. Villanueva





Getting ready.



In the water.

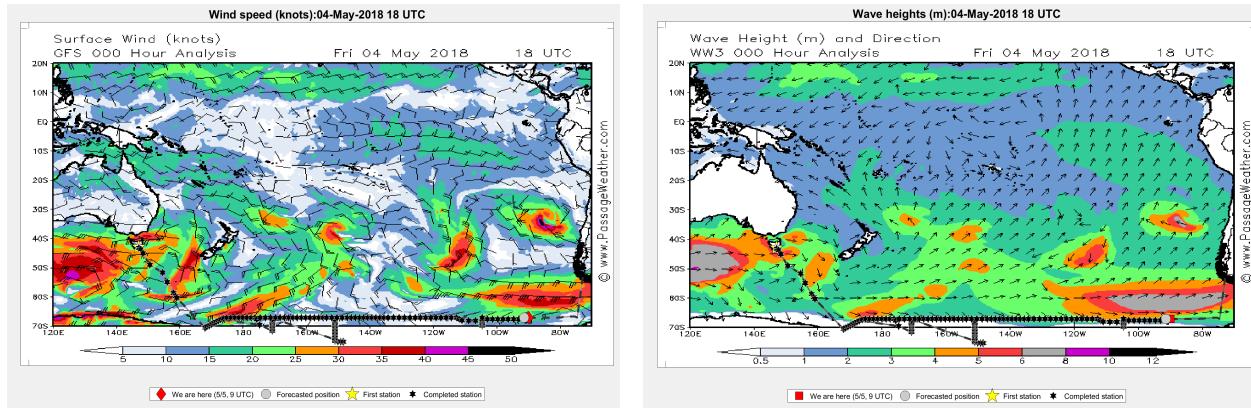
Not only were we able to work uninterrupted while in the calmer waters surrounded by ice, but the Captain and crew were able to do their mandatory lifeboat deployment exercise (above). The timing was such that most of us were able to use this as an excuse to get outside and watch the activities (below).



Last week Ellen and I made a conscious decision not to have her summary of the week's happenings revolve around the weather, but this week that seems hardly possible. You remember that she mentioned our diverting southeastward to duck a storm stalled to the north and take advantage of the calmer waters closer to the ice so we could continue sampling as long as possible. That turned out to be a good choice at the time as we were able to keep going and ended up only losing about 8 hours to weather. We stretched out the stations on the short segment at 68°S and were able to keep 30 nm spacing coming up the 103°W line; sampling at the same locations as the recent P18 cruise.

However, these storms, which are of course persistently rolling eastward through the Southern Ocean (see below), appear from our perspective to be gathering strength as they cross the Ross Sea, just so they can sweep down at the most inconvenient moment and hang to the north of us. The result is that although our local conditions might be workable, there is a tendency for us also to see a strong, longer frequency signal coming from a

distance (likely from where the ocean is being pounded by gale force winds). This signal when it combines with local conditions in just the right way produces high amplitude heave, which when the rosette is in the water results in large tension swings on the wire. We have not had any tension spikes large enough to cause the concern that the wire might break or compromise the wire's electrical signal, but negative tensions that can create kinks in the wire have occurred. So the MTs, MPC and the CTD watch have all spent many hours staring at the heave and tension readouts, printing and comparing winch reports, and checking the wire. So far so good... for the wire – not so good on the loss of science due to weather.



Passage Weather wind speed (on left in knots) and wave heights (on right in meters) with our track in black symbols close to the bottom of both panels (courtesy of B. Luo and T. Sohail). For May 4th 18 UTC – a good day when we were able to successfully and continuously send the rosette down and bring it out. Intended to illustrate the continuous pattern of storms that pass through the Southern Ocean.

When we get the rosette in, we are all working quickly and efficiently. After two months at sea and many long discussions about sea conditions, wire and speed, we find the MTs and the CTD watch are working well together to get the rosette in safely when it is possible and get it out, when it is not. But this past week the fates have not been kind to us. A few days ago after having had to abort the station at 67°S, 103°W due to a storm that had stalled just to north of this position, we ducked south again and the station spacing between 103°W and 88°W was subsequently stretched to ~40 nm.

Now we are at 88°W. A storm that we thought would only touch us in passing is not letting up and has already eaten up most of the time the stretched spacing allowed us. There will be a lull, so this station will happen. However, there is another, stronger system sweeping in right behind it. As we approach the end of the S04P line our choices for dealing with delays are becoming more limited. Our next tactic will be to run – that is, we will go to ~50 nm spacing to allow ourselves some more time by occupying fewer stations and head east as quickly as we can. If we are lucky, we will be afforded enough time to still make a well-resolved crossing of the boundary current on the slope west of Adelaide Island.

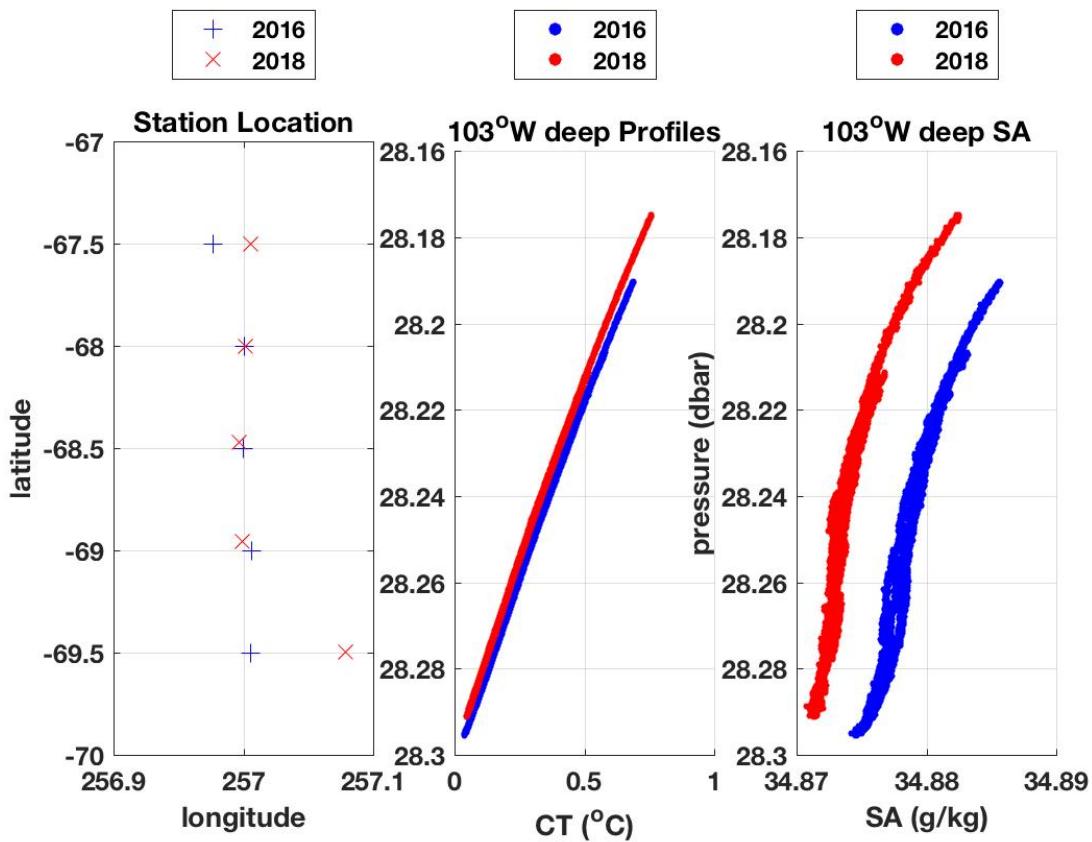
But enough about the weather - what significant events have occurred in the past week? Well, May Day prompted a May Pole dance in the dry lab; there is a photo contest; the

cribbage tournament has worked its way to the semifinal stage; the last apple is gone, but occasionally chocolate still appears out of corners and pockets; some serious thought is being given to documentation – some sections are further along than others; we are coordinating packing; and plans are afoot for various outings once we are ashore. Shipping news: plans are well underway. Our MPC and DAMCO personnel are working hard to assure that there is a smooth transition from ship to shore and out of Chile. As I have been writing, the winds and seas have come down and after a long slow descent through the first 1000 m, we are now at 2600 m and heading smoothly to the bottom.

For now we leave you with a quick comparison of the 2018 S04P and 2016 P18 occupation of the southern end of 103°W line, and some more images of our last moment in the ice.

Seeking East -
Until next time,
Best regards,

Alison Macdonald (Chief Scientist) and Ellen Briggs (Co-chief Scientist)



A comparison below 2500 m of the 2018 S04P (red) 103°W conservative temperature (CT) and absolute salinity (SA) to the same from the 2016 P18 (blue) stations that fall within 5 nm of the S04P station locations. Station locations (left: S04P as red x's and P18 as blue crosses +); CT versus neutral density (center); SA versus neutral density (right).

Keeping in mind that these results are preliminary and that no effort has been made to apply batch or ad hoc offsets, the above plot suggests measurable differences in the temperature, salinity and density characteristics within the deep water column over a span of two years. Below 2500 m, fresher, lighter waters appear in 2018. Although the 2018 observations are generally cooler at any particular density, both their maximum and minimum temperatures are visibly warmer than in 2016 values. It is not often that one has multiple "crossover" stations available for comparison nor do we (GO-SHIP/CLIVAR/WOCE) often get a group of stations measured only two years apart. It will be interesting to see if these differences hold up with a more careful analysis as well as to comparison to earlier occupations.



M. O. G. Villanueva



A. Barna



A. Macdonald



M. O. G. Villanueva



M. O. G. Villanueva

A. Barna

**Four strong winds that blow lonely,
Seven seas that run high,**

All those things that don't change come what may.

If the good times are all gone then I'm bound for moving on.

I'll look for you if I'm ever back this way.

(by Ian Tyson)