I07N Cruise Report – Week 5 (May 21 - May 27)

Leg 2: Departed Victoria on May 19, headed to Goa (India)

In the week 4 report, we told you about the observation of a strong eastward current north of the Seychelles Bank, which we associated with the seasonal Wyrtki Jet. The strong surface eastward flow with velocities ranging from 0.4 to above 1 m/s was observed over about 7° latitudinal band (fig. 1). Because of this current, starting from station 69 (~2.75°S) we started to have twists on the forward winch cable that were causing modulo errors on the CTD. The biggest unloading of twists and caging occurred during recovery of cast 71 (~1.75°S), when the ship's ADCP recorded a strong vertical shear of the flow in the upper 200 m: there was a strong eastward flow in the upper 100 m and a strong westward flow between 100-200 m (fig. 1).

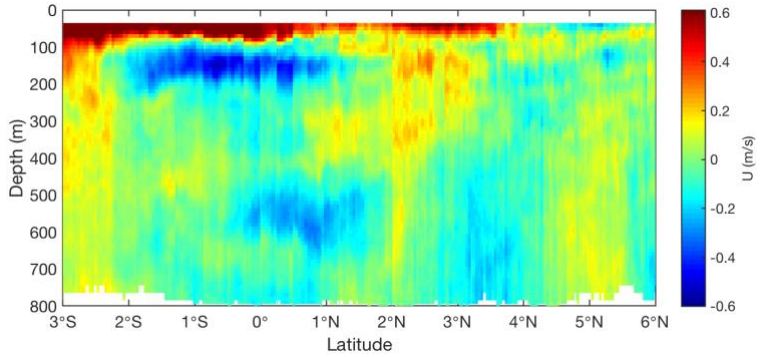

Figure 1. *Zonal velocity measured by the ship's ADCP along the I07N transect north of the Seychelles Bank.*

We had no evidence of caging after cast 72 (~1.2°S), but there was a severe twist near the mechanical termination and several static bends that warranted a re-termination of the cable. The re-termination helped, because we did not have modulo errors at station 73. But when the package was lifted onboard there was a wire twist again. This situation was causing a lot of concern, because we do not have a backup winch to use. As we mentioned in the week 1 report, the aft winch is not usable, because it makes unacceptable amount of modulo errors on the CTD, and all attempts to fix the winch had failed. A continued use of the forward winch with degrading cable would increase the chances of losing the entire package. However, the only solution we had is to keep an eye out for the cable and hope that the situation will improve once we exit the strong current. The cable was re-terminated again after station 77 and between 250-300 m of wire were cut. Fortunately, as the current was getting weaker on our way northward, the cable situation improved considerably. There are no more twists, and most of the time there are no modulo errors on the CTD. We continue to pay attention at the cable and hope that everything goes smoothly for the remainder of the cruise.

By the end of May 27th, we have completed 96 stations. During the past week, we completed 26 stations, deployed 6 Argo floats, 4 drifters, and 1 wave buoy, and did 4 net tows. We still have 32 stations ahead assuming we obtain the MSR clearance from India. If clearance is not obtained until the end of cast 111, we will change the route and follow our plan B, which will bring us as close as possible to the Indian continental slope, but still keeping us outside the Indian Exclusive Economic Zone.

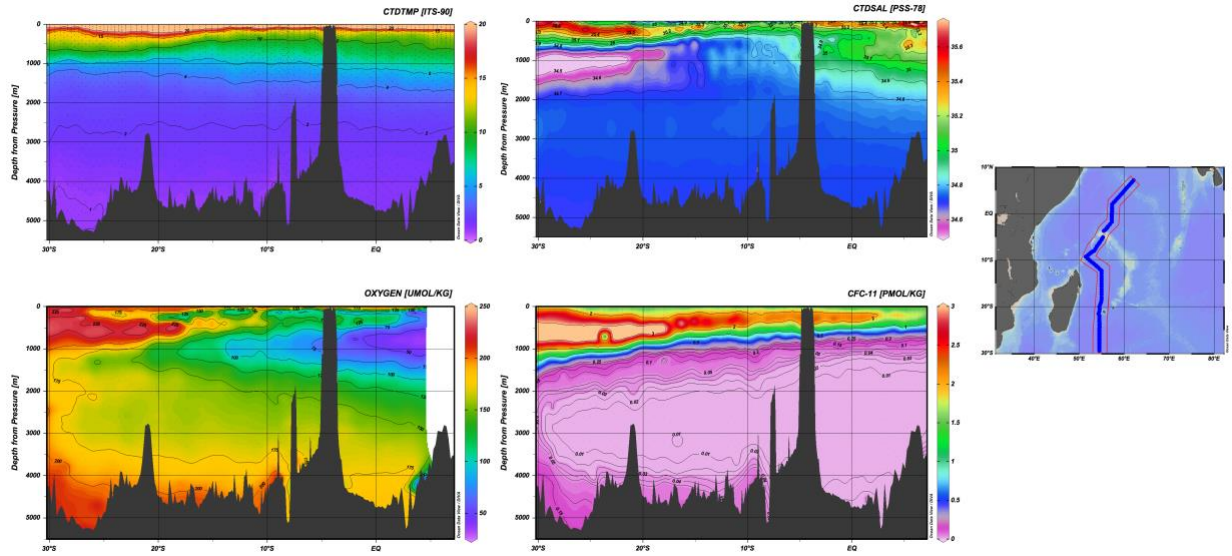

Figure 2. *Profiles of potential temperature, salinity, oxygen and CFC concentrations along the I07N transect in Apr-May 2018.*

As can be seen in Figure 2, after passing the Seychelles Bank (4-5°S) and entering the Somali Basin, we started to observe considerable increase of salinity and decrease of oxygen concentration in the upper ocean – the first signs of approaching the oxygen minimum and salinity maximum zones in the Arabian Sea. During the first leg of the cruise we reported on increased concentrations of CFCs in the Antarctic Bottom Water that were not observed during the previous occupation of the I07N section in 1995. In the Somali Basin, we observe only slightly elevated CFC concentrations near the bottom.

Although the monsoon season has started in the Arabian Sea, the weather has been very favorable to us so far. In fig. 3, you can see the weather forecast for May 27-28 with our track shown by the broken line with circles. It is amazing to see that our track lies right in the middle of the white swath of calm seas. We are tending to think that since we are a NOAA cruise, the NOAA's National Weather Service is taking a special care of us ☺.

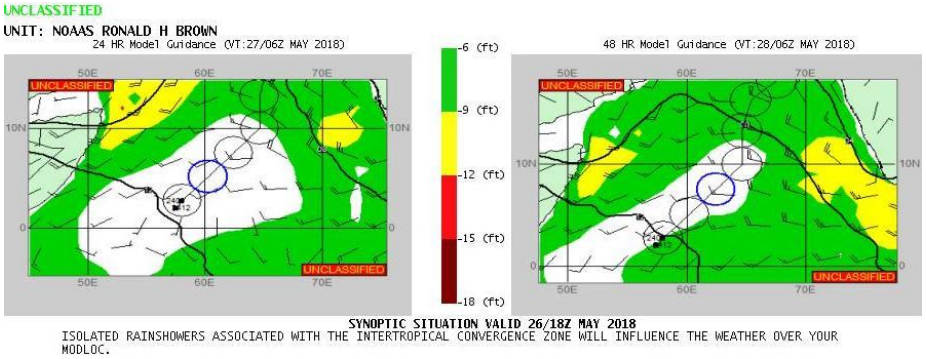

Figure 3. *Weather maps for May 27-28.*

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