

I07N Cruise Report – Week 6+ (May 28 – June 5)

Leg 2: Departed Victoria (Seychelles) on May 19, arriving in Goa (India) on June 6.

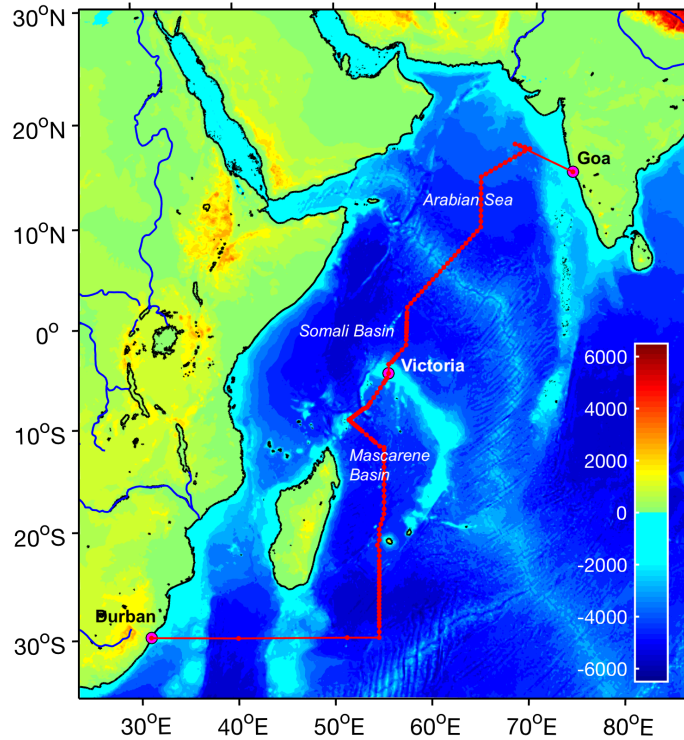


Figure 1 I07N 2018

This is our last weekly report for the GO-SHIP I07N cruise. And here, we are reporting on the last 9 days of the cruise. We just completed station 124, and we expect to arrive in Goa at 8 am on Wednesday, June 6. Overall, the cruise was a success, because we almost completely reoccupied the I07N transect for the first time since 1995. We had some issues with the winch cable (see our previous week 5 cruise report), but after taking some extra care of the cable, the problem was mitigated. During the last 9 days we were keeping a close eye on the state of the cable after each cast. We had to do one more re-termination after getting several modulo errors on the CTD. However, thanks to the extra measures we undertook, the cable situation had no impact on the quality of the data.

At the end of the previous report we left you somewhere over the Carlsberg Ridge. Upon crossing the ridge, we entered the Arabian Sea. Station 111 (~14.9N) was our decision point, from which we would either follow our initial plan A (black dots) or an alternative plan B (red dots) depending on the situation with the Indian Marine Scientific Research (MSR) clearance. Unfortunately, we did not receive the Indian MSR, neither before reaching station 111 nor later. As a result, we decided to follow plan B, which took us as close as possible to the continental slope, but still staying outside the Indian Exclusive Economic Zone (EEZ). Station 121 was the last station on the segment between the turning point at station 111 and the EEZ. Upon reaching station 121, we still had about 2 days available for doing more stations. As one of the wishes for our cruise was

to get as deep into the Oxygen Minimum Zone (OMZ) as possible, we decided to head northwestward and reach the 18N latitude – this is the northernmost latitude the ship agreed to sail to due to safety concerns.

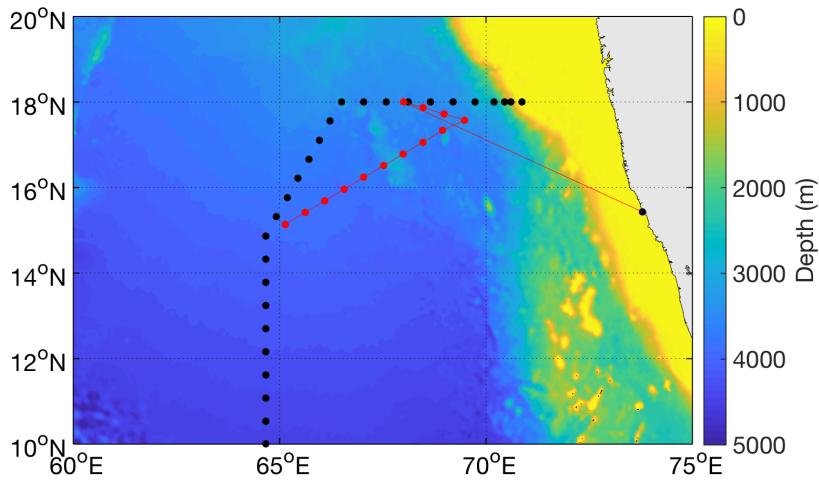


Figure 2 Plans A (black dots) and B (red dots)

Entering the OMZ was a unique experience for the CTD watchstanders and other members of the science party, observing in real-time the oxygen sharply dropping to zero (Figure 3).

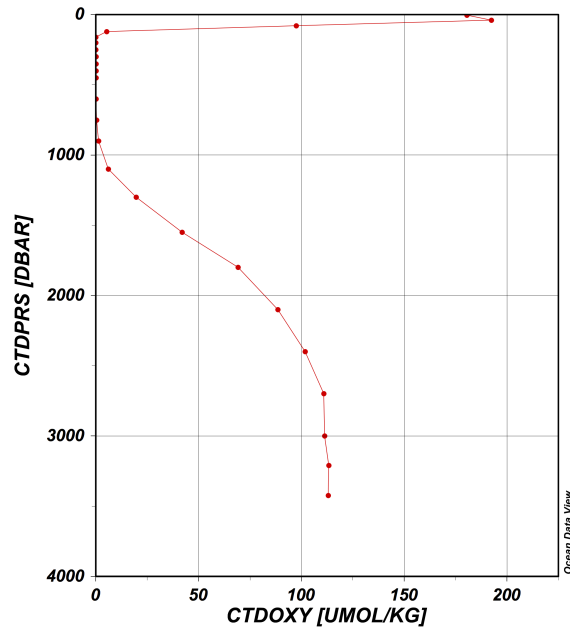


Figure 3 Oxygen Profile at station 121 (17.53° N; 64.48° E). Observe the thick layer of very low oxygen between 160 and 900 m. Red dots indicate the depths that the bottles have been fired.

To better resolve the Arabian Sea sharp features, we changed our sampling scheme at station 112, firing more bottles at the surface layer. We quickly learned that the new scheme was not optimal for all groups since several samples into the deep ocean are also needed. Thus, after only one station, we decided to go back to the previous scheme that was the best possible solution

for all of us. We found that even under the old scheme, the OMZ is well defined, occupying a thick layer between 150 and 1000 m as can be seen in Figure 4. Unfortunately, because the final segment of the I07N cruise in 2018 does not follow the same track as the I07N cruise in 1995, we cannot compare the newest data with the previous ones. In 1995, the I07N path headed to Oman in the western Arabian Sea, but due to safety concerns, we couldn't follow their footsteps.

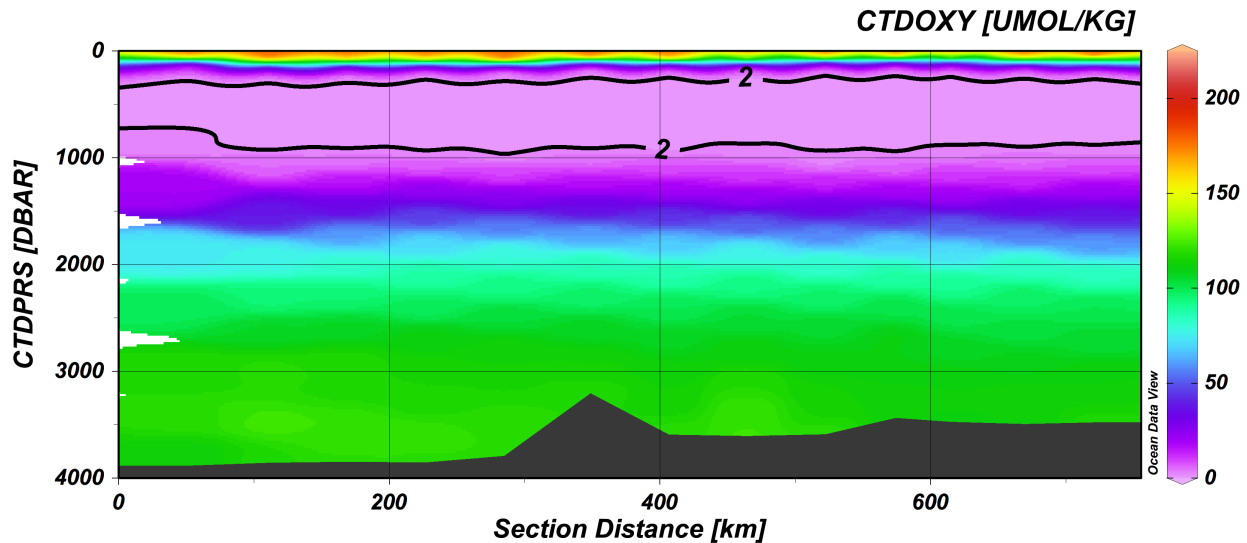


Figure 4 Oxygen concentration between stations 111 and 124 (Plan B in Figure 2)

Another feature of oxygen that caught our attention and let us intrigued was the lower oxygen near the bottom (Figure 5). This feature started around station 104, reached minimum oxygen concentration at station 111 (our inflection point to plan B in Figure 2) and persisted until station 114. A quick look at the 1995 data indicated that this feature was not prominent in that year. Several hypotheses have been discussed onboard from biological to physical mechanisms, but we couldn't decide the best ones without performing a more extensive investigation.

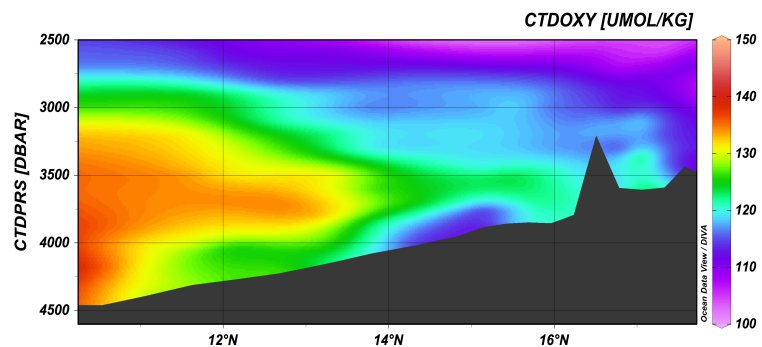


Figure 5 Oxygen below 200m between stations 102 and 122

After spending almost 40 days at sea (excluding 4 days of the port stop in Victoria), covering about 5200 nautical miles, completing 126 CTD casts (including 2 test casts at the beginning of the cruise), collecting and analyzing over 36000 liters of water from depths ranging from 5 to about 5500 m (excluding underway water intake) everybody is looking forward to return home. We have worked hard, had great and productive time onboard, met new people and made good

friends. Now it is the time to analyze the data we have collected, and we know that we have observed many interesting features that still need to be investigated in detail and explained.

Although our cruise is ending, the GO-SHIP program continues. Therefore, see you next time!

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