

I07N Cruise Report – Week 2 (Apr 30 - May 6)

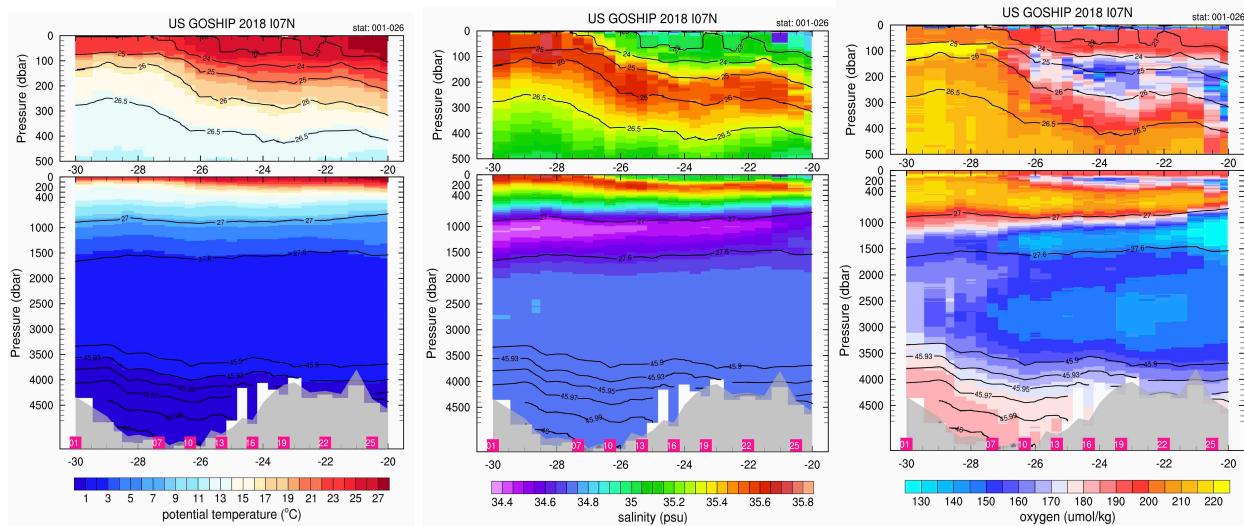


On the second week of the cruise the science team is very well adjusted to the daily routine: shifts, CTD casts, sampling, data and sample analysis, meals, sleep, etc.. The beginning of the week was rather dense, because the distance between the stations was ~20 nm, but at the end of the week the distance increased to ~30 nm, which took off some stress and let us return on schedule by steaming faster during transits. The weather has been relatively good. Occasionally we have some wind and swell, but nothing major yet that would impact operations. Hopefully, we will have the same weather all the way to Goa. As we go north, when the sky is clear, which is almost every day, we enjoy watching the sunset on the port side of the ship followed by a spectacular moonrise on the starboard (as shown by photographs above).

By the afternoon of May 6, we have completed 33 stations (25 stations last week), so exactly a quarter of all planned stations on the I07N line. We deployed a drifter and 3 Argo floats. Everything worked well, and we experienced no major issues. On station #24, close to the Reunion Island, we had to deviate a little from our route, because the French were conducting military exercises offshore the island, and our station was in the “no sail” area. Because of this, we decided to move station #24 10 nm westward, but still keeping it on the same latitude. As we were approaching the Exclusive Economic Zone (EEZ) of Tromelin Island, which is a disputed territory between France and Mauritius, we were getting more and more anxious about not having the Marine Scientific Research clearance from Mauritius. We finally received it when we were only a day away from entering the Tromelin EEZ. That was a big relief! Now we are still waiting for clearances from the Seychelles and India...

As a quarter of the I07N stations is already behind the stern, we are starting to look at the data we have collected. Displayed in the left figure below is the potential temperature for the first 26 stations if I07N obtained by CTD (this is raw data without corrections). Stations 1-26 run along the 54.5 E meridian. The top panel shows the upper layer and bottom panel the whole water column. Black curves in the top panels are sigma-0 density; in the bottom panels they are sigma-0 (above 200 m) and sigma-4 (below 3000 m) densities. The volume between 27 and 27.6 is occupied by the AAIW (Antarctic Intermediate Water). Below 3000 m, the cold waters (< 3°C)

represent the AABW (Antarctic Bottom Water). The AAIW, trapped in the 27-27.6 density layer, is clearly seen in the middle plot that shows the salinity profile. Near the surface at ~28S, there is a signature of the subduction of the saltier subtropical water. The vertical profile of oxygen (the right plot) shows an increased oxygen concentration near the bottom, indicating recent ventilation, which is a clear AABW signature.



Our biologists have been busy too. By the end of the second week of the cruise, they have completed 3 net tows. One of the reasons for towing the net is to collect samples for studying whether the skeletons of pteropods are gradually dissolving because of the increase in acidity of the oceans due to increasing CO₂. Victoria Coles and Hannah Morrissette caught a bunch of them on their filters the other night (see photo on the left). Pteropod's shells are aragonite and are sensitive to the pH of the ocean. Just like a soda, adding CO₂ to the ocean makes it more acid.

We are making 12 knots towards our next station #34, which should be completed by the end of May 6. Next week we will be crossing the Mascarene Basin, and we will attempt to find and (if found) to recover a PMEL mooring, the communication with which was lost 5 years ago. Stay tuned!

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