

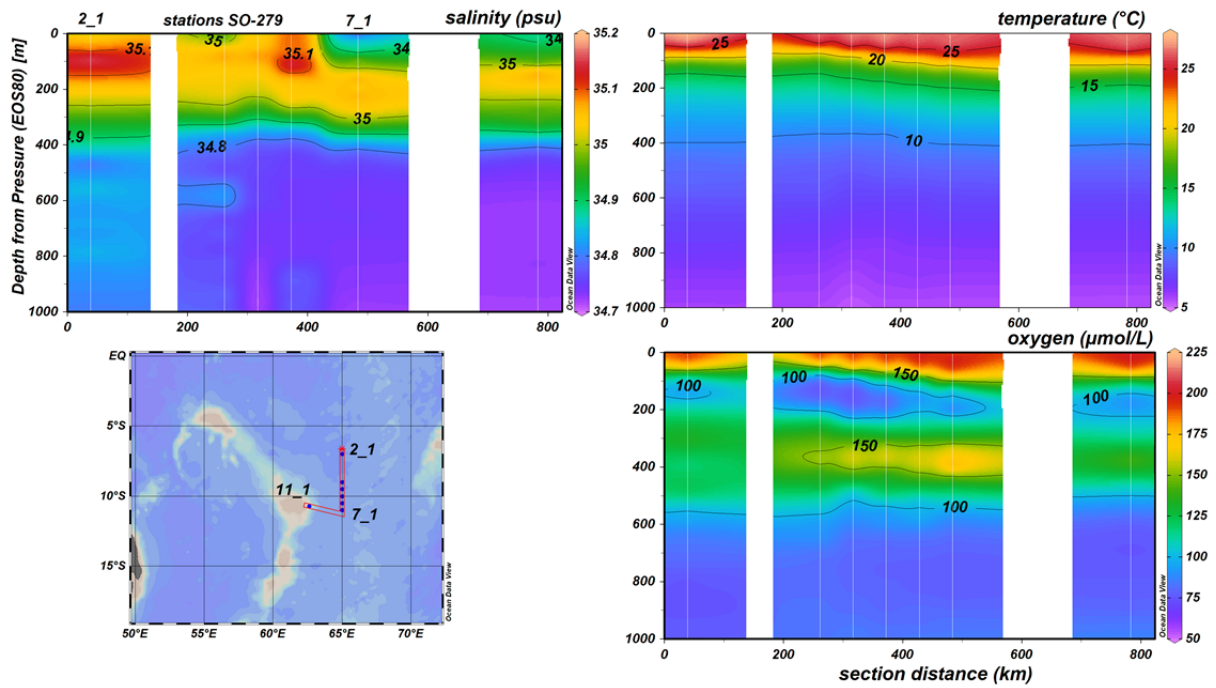
## SO270 MASCARA

### Weekly Report 4 – 22<sup>nd</sup> to 28<sup>th</sup> Sept. 2019

During this report period, we started our scientific data acquisition in the main working area, the Saya de Malha Bank, and on a north-south transect of stations along 65° east. Station work started on the morning of the 21<sup>st</sup> of September and continued until the 22<sup>nd</sup>. After 10 hours of transit towards the west, in approaching the platform, we deployed the reflection seismics. Everything worked fine, and we began a 400 nm seismic- and hydroacoustic survey that crosses the Saya de Malha platform in east-west direction. Aim of these lines is to gain insight into the large scale platform architecture, but also to provide a first overview on platform slope geometry. The survey ended on the 26<sup>th</sup> and since then, we are performing hydroacoustics and sedimentology on the eastern slope and platform top.

An important hypothesis to be tested during the expedition is whether the nature of the intermediate water masses (100-1000 m water depth) impinging on the slope and crest of the Saya de Malha platform presently precludes establishment and growth of colony-building corals on the underwater complex. The bank is situated in a mixing zone of water masses at intermediate depths, some of which are oxygen-poor and nutrient- and CO<sub>2</sub>-rich, and thus unfavourable for reef growth. We addressed this question by performing the first six of ten CTD casts along 65° from 7°S to 11°S, and in addition at a station directly near the steep eastern slope of the bank (Fig. 1). The CTD (conductivity, temperature, depth) instrument is part of a rosette water sampler with 22 bottles and registers water properties (such as temperature, salinity, oxygen concentrations) in high resolution when it is lowered (Fig. 2). Going up, water samples are taken by closing the bottles at depths representative of the different water mass types for further ship-based and shore-based analyses.

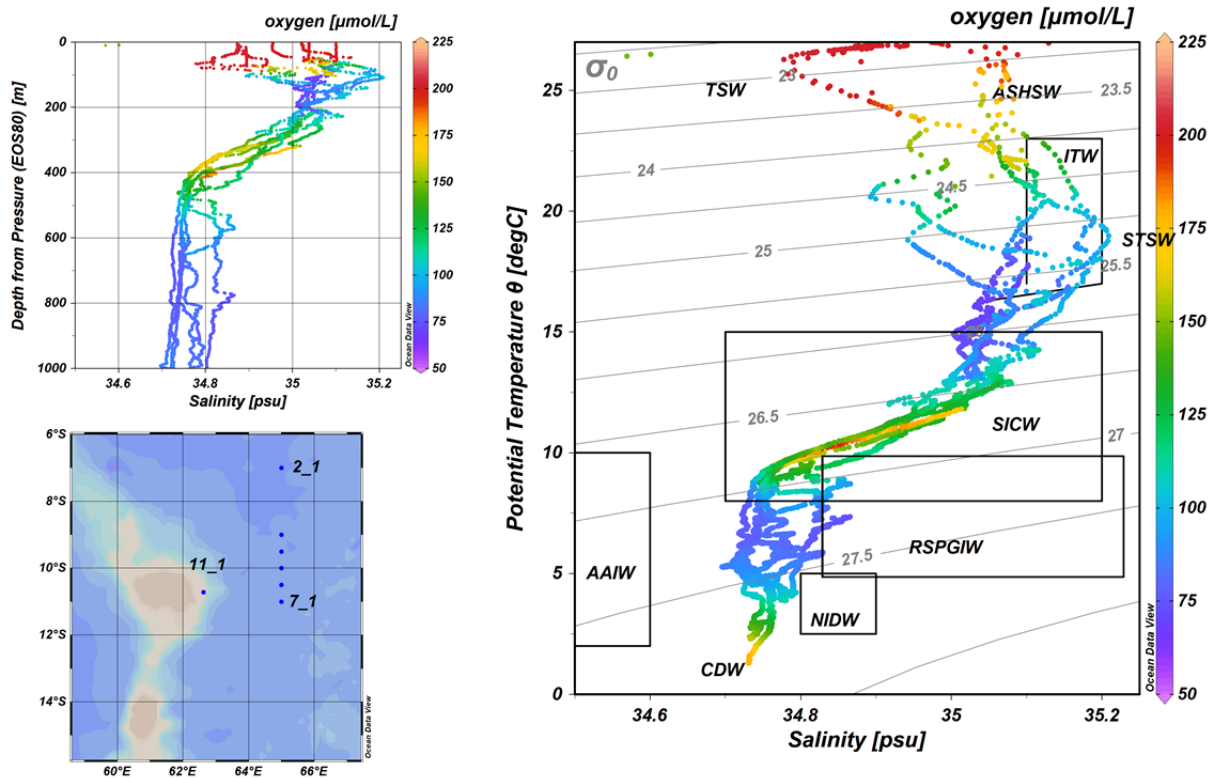
A preliminary analysis indeed shows a complex mixture of waters in the 0-1000 m water depth interval (Fig. 1). Characteristic temperature and salinity, and oxygen concentrations of the individual water masses from the literature (Fig. 3) suggest tropical surface waters of relatively low salinity (TSW) and more saline water of Arabian Sea provenance (ASHSW) near the surface. At some of the stations, salt-rich Subtropical Surface Water (STSW) and Indonesian Throughflow Water (ITW) that is relatively low in oxygen mix at around at 200 m water depth. Below that is the relatively oxygen-rich Southern Indian Central Water (300-400 m water depth), in turn underlain by oxygen-poor waters originating from the northern Indian Ocean (Red Sea/Persian Gulf Intermediate Water, RSPGIW). Importantly, the low-oxygen waters at 200m and below 500m have high dissolved CO<sub>2</sub> concentrations and are near the saturation state of calcium carbonate, which may prevent corals from precipitating aragonite. The transect of CTD sites will be continued towards 15°S when our seismic and sedimentological program on the Saya de Malha Bank is finished.



**Fig. 1:** Six CTD casts along 65° from 7°S to 11°S (Stations SO270\_2-1 to 7-1), and in addition one station (SO270\_11-1) directly near the steep eastern slope of the bank. Figure Kay Emeis.



**Fig. 2:** Deployment of CTD and rosette water sampler during SONNE cruise SO270. Photo T. Wasilewski, CEN, Uni Hamburg



**Fig. 3:** Characteristic temperature, salinity, and oxygen concentrations of the individual water masses from the literature. Comparison with our data suggest tropical surface waters of relatively low salinity (TSW) and more saline water of Arabian Sea provenance (ASHSW) near the surface. Figure Kay Emeis.

Stationwork will continue until the early morning of 29<sup>th</sup>. After that, we will deploy the seismics again and continue with a seismic survey in working areas 2 and 3, located in the south of the Saya de Malha platform. These areas are of particular interest to us as sedimentation there is supposed to be affected by internal waves.

All onboard are fine.

In the name of all cruise participants

Sebastian Lindhorst, Chief Scientist

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