



# SO264 SONNE-EMPEROR

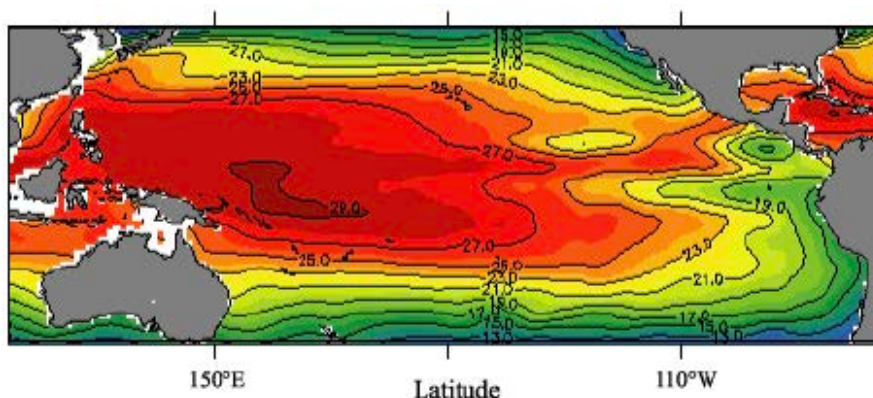
Weekly Report No. 2

(2.7.-8.7.2018)

FS SONNE has begun its ~3000 nautical miles journey to the remote study area of the Emperor Seamount Chain in the North Pacific. The storm from southeasterly directions, already announced the day before, blew us towards the first planned water station at ~11°S and ~179°E. This area belongs to the territory of Tuvalu, for which a research permission has been requested and granted previously. Upon arrival on the morning of July 2, 2018 at 6:00 am, we unfortunately had to cancel station work. A huge wave and winds up to 9 Bft. prevented the safe deployment of the CTD, the multi-net would have been torn by the gusty wind. In order to keep our schedule, we continued to sail to the 2<sup>nd</sup> planned station. In the afternoon, wind and waves became less, and long-missed faces emerged again from the chambers. Seasickness is unfortunately an everlasting annoying companion.

Since departure, group sessions are held regularly every two days for mutual information and coordination. In addition, the smaller group of team leaders meets daily to discuss the upcoming work. In the morning of July 3, 2018 at 5:00 am we reached the next "water station" at ~7°S and 179°50'E, which became a nice success. The calm weather allowed further unpacking of the containers and setting up of the laboratories.

It remains amazing how RV SONNE manages very long distances at moderate speeds, which are more like those of a cyclist. We are currently in the area of the so-called West Pacific Warmpool, a vast ocean region characterized by extremely high water temperatures of up to 29.5°C (with air temperatures commonly 1-2°C cooler!). This oceanic heat capacity is an important driver for the global climate and controls the heat transfer to high latitudes to a decisive extent. Already during middle Miocene times, i.e. ~7 million years ago, the Pacific proto-warmpool formed due to plate tectonic reorganizations in the Indonesian seaway. With significantly improving weather conditions during the following days, all cruise participants started to realize the gigantic proportions of this oceanic heat storage.



*The West Pacific Warmpool with sea surface temperatures >27°C*

A highlight of this week was the crossing of the equator at an exact latitude of 0° and longitude of 180°. We suspect that only few people have ever reached this unique position. The awarding of a "Crossing the Line" certificate signed by the god of the sea, Neptun, and the receipt of a bottle of schnapps filled with equatorial water rounded off a happy get-together celebrated by the crew and scientists on the work deck.



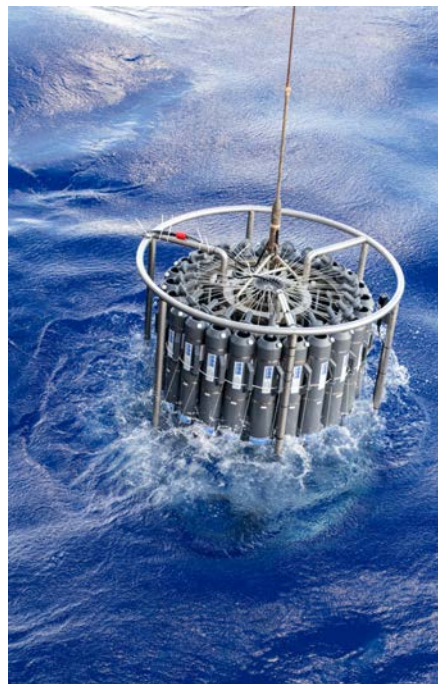
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During the following days at sea, another 4 water stations between 2°N and 10°N were carried out, thereby crossing the complex area of the equatorial current system. Two westward wind-driven equatorial currents are separated by the eastward north-equatorial countercurrent. Routinely starting with a multinet down to 100 m, insights into the near-surface distribution of planktonic assemblages became possible. Water mass properties such as temperature, salinity, fluorescence, and oxygen content were measured with the subsequent CTD/water rosette equipment, and water samples were collected from depths of up to 5300 m. Subsequent water analyses will focus on stable oxygen and carbon isotopes, silicon and neodymium isotopes, radiocarbon, trace elements, carbonate chemistry, and biomarkers. A multi-net to depths of 600 m terminating the station work documents the deeper vertical distribution of the plankton. The net catches clearly indicate that the plankton communities, especially those of the foraminifera, are influenced by the oceanographically predefined nutrient conditions. The suspended organic material filtered off by continuous pumping "on transit" also points to distinct lateral gradients. All of this work within the water column is necessary to calibrate the proxy parameters used in paleoceanography.



*RV SONNE at 8-9 Bft in the tropical W Pacific*



*Deployment of CTD/water rosette-unit*

After crossing the equatorial zone, we slowly but steadily reach the area of the subtropical gyre that circulates in a clockwise direction. The deep blue water reveals that it is a nutrient-poor, oligotrophic ocean area. Accordingly, we will significantly increase the distances between the water stations in the following days, also to be able to meet our strict schedule.

According to the current planning we will arrive next Friday in our study area of the Emperor Seamounts and will start the geology program. The geological devices have now been set up, and the corresponding laboratories are prepared. The sampling of the deep-sea sediments will be done using traditional devices such as TV-Multicorer, large box corer,



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gravity, piston, and Kasten corers. The international team of technicians, hydrographers, geophysicists, sedimentologists, biologists and tephrostratigraphers, micropalaeontologists, paleoceanographers, and geochemists will guarantee the recovery and processing of these important climate archives.

We learned during the past week that the tropical Pacific can be quite rough, stormy and rainy. Apart from the heat, the weather could be easily compared to the northern German november weather. Even the dreamy South Seas islands hid behind the horizon. A floating plastic canister at 10°03.4'N and 178°26.9'E, ~400 nautical miles away from human settlements closest to us, reminded us that not everything that is found in the ocean belongs there. The spirit on board RV SONNE still remains very good, and we look forward to the coming weeks. All participants are well and send warm greetings from 14° N 178° E to those who stayed at home.

On behalf of all cruise participants

Dirk Nürnberg