06.01.2019 12°00‘S 077°20‘W at Isla San Lorenzo a few miles off the coast of the Peruvian capital Lima

MSM80 CUSCO

Third weekly report for the period of 30.12.2018 till 06.01.2019

During the last week, we sampled along the second section perpendicular to the Peruvian coast; this time at 9°30’S. First we steamed along the transect with the ScanFish in tow in order to assess the water mass distribution and upwelling activity. The ScanFish is a device, which measures salinity, temperature and other parameters in high spatial resolution, while being towed at a speed of six knots behind the vessel and permanently undulating between the sea surface and greater depths. Thereafter, we sampled a total of 13 stations along the transect with CTD (oceanographic sensor for temperature, salinity and depth), other hydrographic instruments and different plankton nets.

A team of researchers from the Leibniz Institute for Baltic Sea Research in Warnemünde (IOW) conducts the physical observations and measurements during our cruise. Besides the CTD, they in particular deploy gears for high-resolution measurements of hydrographic and optical parameters. In spite of the relatively short distance between the first section at 8°30’S and the second at 9°30’S, the high temporal and spatial variability is responsible for strong differences in water mass structure. Surprisingly, phytoplankton concentration was rather low close to the coast, where stronger phytoplankton growth was to be expected during periods of active upwelling. On this section, we also deployed a surface drifter for the first time during this cruise. This device is drifting with the surface currents, independent from the vessel, and provides hydrographic data on changes in the upper 50 m of the water column in high temporal resolution. The direction of the observed drift matched our expectation of wind-driven transport. However, the speed of the drift was unexpectedly high. After three days, the drifter was recovered successfully, and we are now analysing the data.

The three IOW oceanographers on board are supported by a colleague from GEOMAR Kiel, who attached an under-water camera (UVP) to the CTD frame in order to take pictures of zooplankton and other particles at different water depths and to count and measure them.

After the successful recovery of the drifter on 03.01., we headed south. We steamed to a series of stations alternating between 200 m water depth on the shelf and 1.000 m bottom depth above the continental rise in order to identify large-scale differences in the upwelling pattern along the Peruvian coastline.

Yesterday evening (05.01.) we reached 12°S, where we will sample a third transect perpendicular to the coast, since this is also one of the regular monitoring lines of our Peruvian partners from the national fisheries research institute IMARPE. At 07:20 p.m. we deployed the ScanFish again and towed it for 12 hours along the transect from a position at 2.800 m bottom depth to close to the coast in front of the Peruvian capital Lima and its port Callao. This morning, we are working now at Isla San Lorenzo a few miles off the Peruvian coast. Station work and the deployment of more gears along the 12°S section is about to start. This transect will also include a full-day 24 h-station at 12°S 78°W in order to study diel vertical migrations by zooplankton (krill and decapods) and mesopelagic fish (*i.a.* lantern fish). This sampling campaign will be by far the longest station of the entire cruise with more than 20 deployments of gears in sequence. The biologists on board will report about first results in the next weekly report.

On 10.01. we will complete the first half of this cruise. So far, the cruise was very successful, and we are very satisfied with the results achieved so far. Thanks to the excellent support by the entire crew

of R/V Maria S. Merian and due to the very calm weather conditions, the scientific work on board is highly efficient.

On the other hand, only light winds lead to low upwelling intensity in those regions, which we sampled so far. Based on satellite imagery, we hope to encounter stronger upwelling activity further south of 14°S, where we will be working during the upcoming two weeks.

On behalf of all cruise participants, we send best regards from R/V Maria S. Merian in the South Pacific,

Volker Mohrholz (for the IOW team) and Holger Auel

Fig. 1: CTD/Rosette returns to the hangar after deployment (Foto: H. Auel)

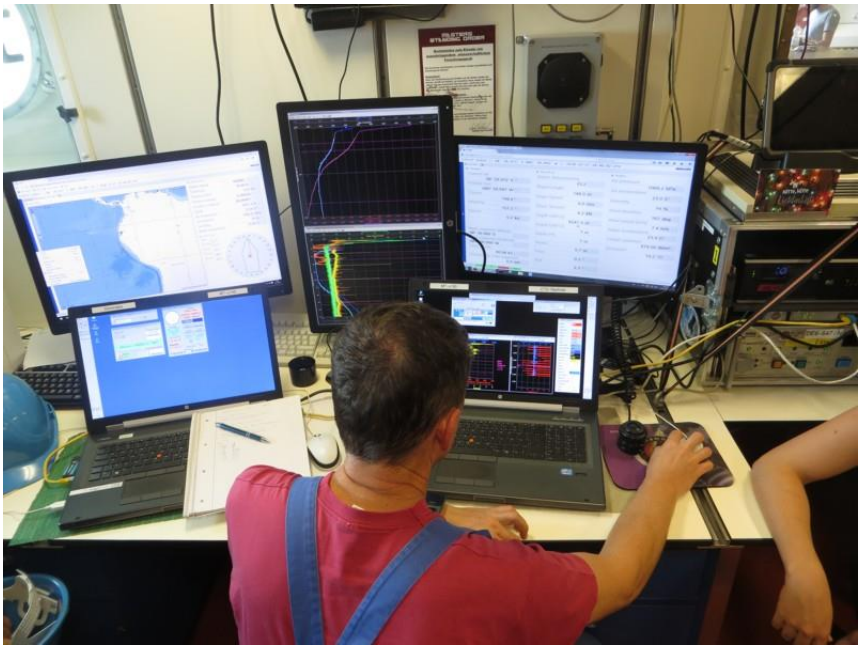

Abb. 2: CTD operation control: Physical oceanographers during data acquisition (Foto: H. Auel)

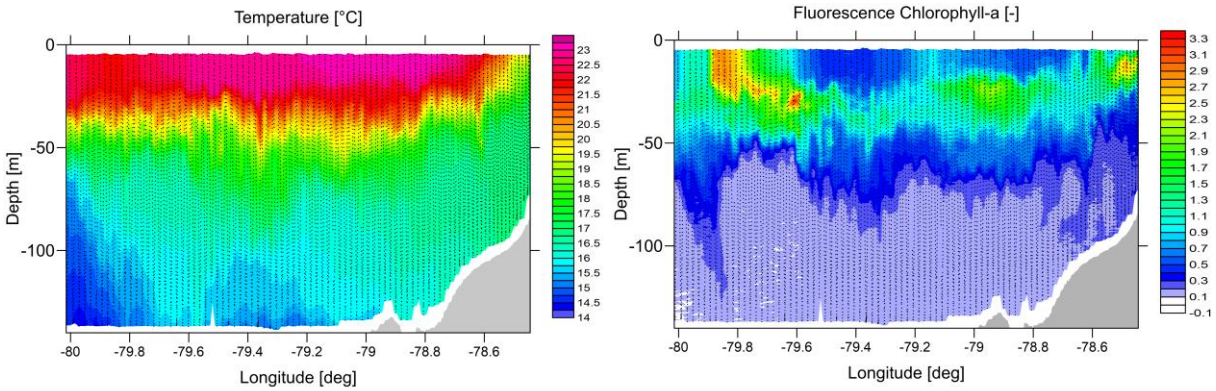

Fig. 3: Temperature and phytoplankton distribution from the open ocean (left) to the coast (right). Cold water at the coast is a typical signal of upwelling. (Graphics: V. Mohrholz)