

SONNE 243 Weekly Report I

Today is Sunday 12. October 2015 and the first week of the SO243 cruise is almost over. This week has seen a variety of activity, something very typical for a biogeochemical research cruise. We are in the eastern tropical South Pacific Ocean, studying the effects of oxygen minimum zones on biogeochemical cycling in the surface ocean and air-sea gas exchange. On board are chemical, biological, and physical oceanographers, atmospheric chemists, and atmospheric physicists studying a variety of trace gases in the ocean and atmosphere and the biological, chemical and physical processes that influence their production, loss, and air-sea exchange.

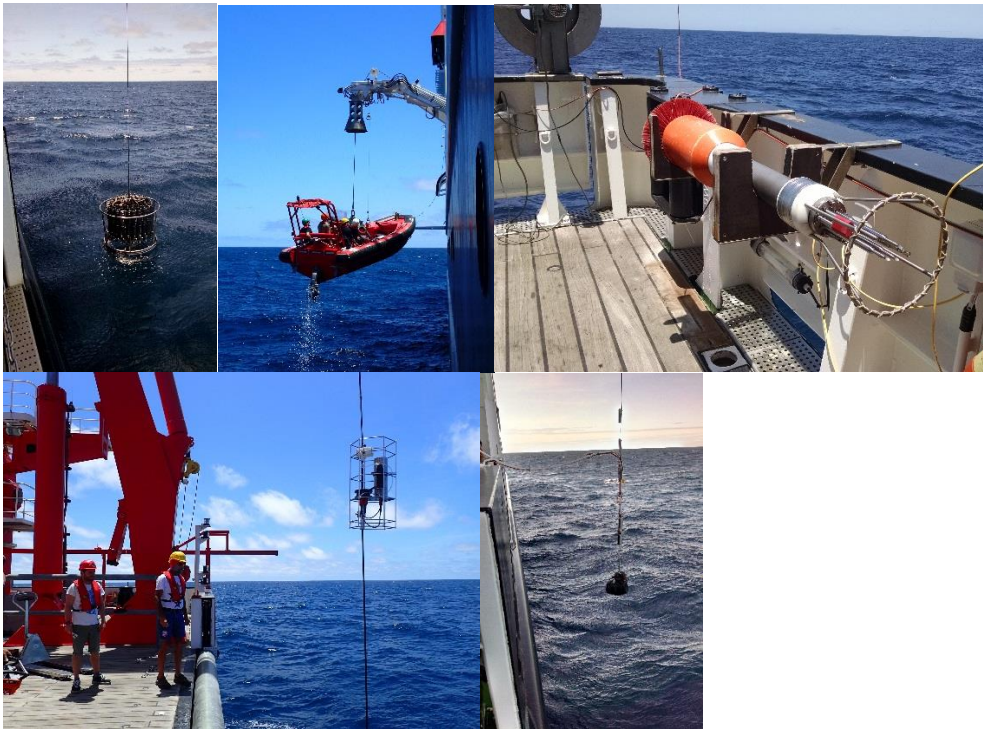


Figure 1. Top row from left: CTD rosette, Zodiac, microstructure sonde; bottom row from left: particle pump, continuous profile pump (C. Marandino, I. Rapp)

In the first week we had 7 stations involving multiple CTD casts, RAMSES deployments, Zodiac sampling, microstructure sonde deployments, Go-flo casts, particle pumps, and a continuous profile pump (Figure 1). The stations have been a bit energetic; with 37 people on board during a 17 day cruise, it is a challenge to meet their water sampling needs while trying to save time to make it to Antofagasta. But between Damian G., Toste T., Rudi L., Lothar S., and Tim F. we have a crack CTD team. Most deployments have been successful and the preliminary data is already being produced (Figure 2).

One highlight of the week was our eddy hunt. Eddies are rotating mesoscale structures in the ocean that contain different water properties than their surroundings. Recently, eddies have been identified as low oxygen natural laboratories, in which we can investigate how the biogeochemistry is different from the surrounding waters. The eddy we found was a 10°S, 82°W and was a normal anticyclonic eddy (Figure 2). The oxycline was found at 20m and the levels went down to approximately 50 $\mu\text{mol/l}$. The effect of the lower oxygen concentrations can be seen in both the nitrous oxide (N_2O) profile and the carbonyl sulphide (OCS) profile in the right panel in Figure 2.

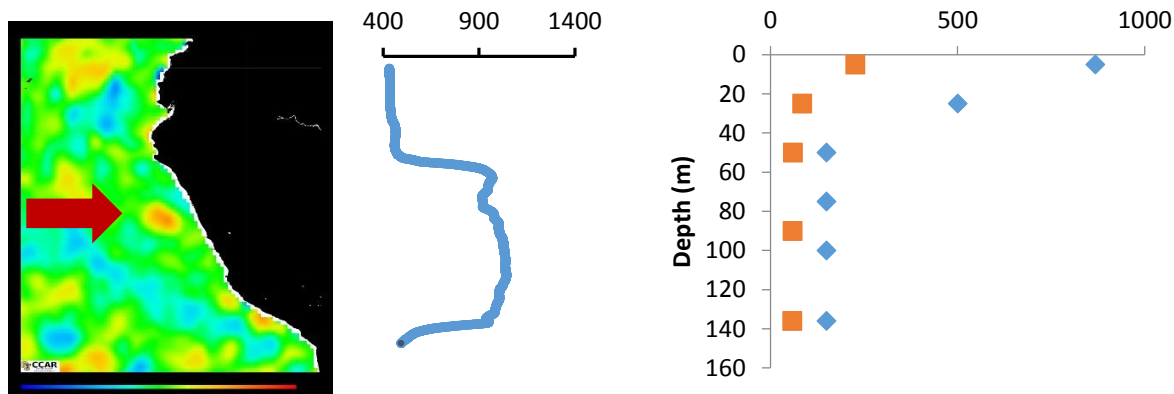


Figure 2. Left) location of sampled anti-cyclonic eddy; middle) N_2O seawater values (ppb equilibrated air) vs. depth in eddy; right) O_2 ($\mu\text{mol/L}$, orange), OCS (ppt equilibrated air, blue) vs. depth in eddy.

In addition to the station program, we are performing a variety of underway measurements from the moon pool pumping system, a trace metal clean tow fish, and in the atmosphere. These include discrete sampling for chemical and biological parameters, as well as continuous equilibrator based chemical measurements, radio- and ozonesondes, air canister sampling, and direct flux measurements using the eddy covariance technique (Figure 3).

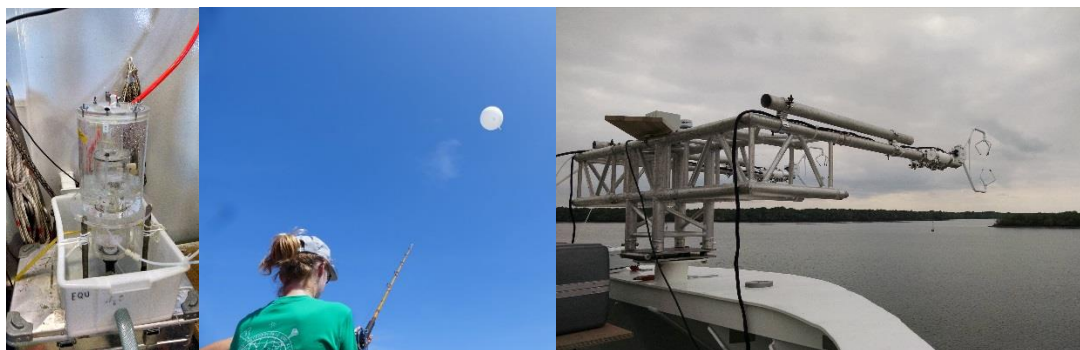


Figure 3. From left) continuous underway seawater equilibrator, radiosonding with a fishing pole, eddy covariance mast. (C. Marandino, T. Tanhua)

Despite the flurry of activities, we have still managed some time for amusement: after the first 3 stations, we had a little ice breaker; and the crew was kind enough to show us around the massive engine rooms of the new R/V Sonne (Figure 4).



Figure 4. Left) ice breaker; right) engine tour. (C. Marandino, S. Endres)

Thanks to the hard work of all the scientists, and especially the captain and crew, the first week ended well!

Greetings from the Pacific, Christa Marandino and Damian Grundle