RVIB N. B. Palmer, NBP17-06/P06 Leg 1: Weekly Scientific Report 05

32.50°S, 159.72°W
8:45pm, Monday, 07 August 2017 (local time and day)
air: 14.2°C, water: 17.1°C, winds: 25.6 kn from SW
on station 127

Another week, another storm. Weather systems wrapping around New Zealand and others coming directly north from the Southern Ocean reach us at our current position in the middle of the South Pacific Ocean, reminding us that it is the height of winter in the southern hemisphere after all. The past weekend was rough with a stationary low pressure system centered to the east of us, interrupting operations several times. We are slowly doing stations, whenever possible, and are hoping for the bad weather to finally dissolve tonight or tomorrow. Prior to the weekend, the ocean was almost flat and it was sunny, which gave us a (short) impression of tropical realm already.

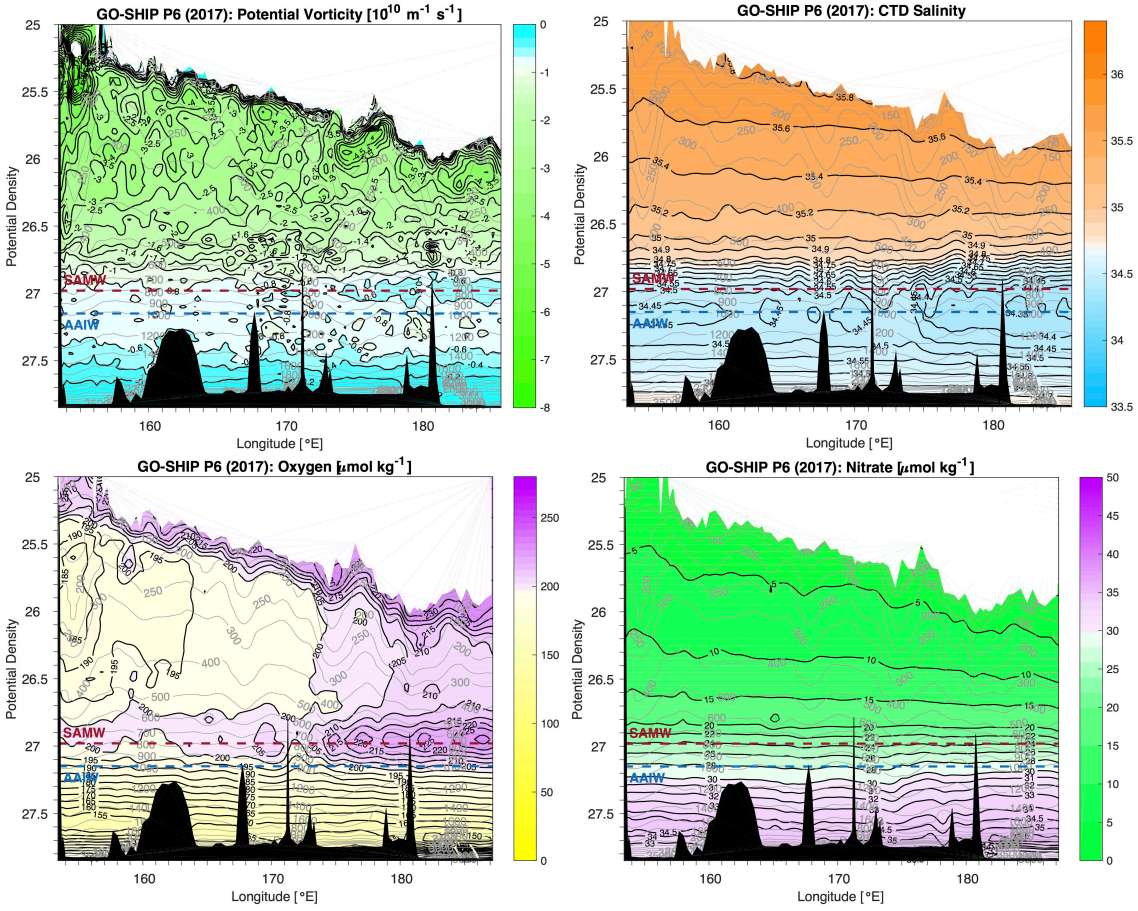
As we are working our way eastward, we continue to find Antarctic Bottom Water (AABW) and Circumpolar Deep Water (CDW), both coming from Antarctica, within 1000-3000m above the ocean bottom. Based on previous cruises, we expect to see the AABW/CDW signature as far as east as about 150°W, basically until the end of leg 1, when the bottom topography starts to become shallower toward the East Pacific Rise. We are also observing the typical water masses of the upper ocean. In particular, Subantarctic Mode Water (SAMW; low stratification) at about 750m depth and the underlying Antarctic Intermediate Water (AAIW; low salinity) at about 1000m depth are found throughout much of the South Pacific Ocean. SAMW and AAIW also come from down south, being formed and subducted (leaving the surface) in the Polar Frontal and Subantarctic Zones of the Southern Ocean. They have been used as indicators of climate change and shorter term variability (on the order of decades), using measurements of, for example, oxygen and nutrients as well as salinity to investigate changes in subtropical gyre speeds and the hydrological cycle, respectively. One goal of the GO-SHIP cruises is to monitor these changes and to combine our observations of a plethora of oceanic properties with global models, for better prediction of the future state of the ocean and the atmosphere, including the effects of global warming.

In addition to the Argo and SOCCOM floats, we launched the first SIO Deep SOLO float of leg 1 this past week, with the next one in line for deployment upon departure from this station (#127). The Deep SOLO floats are a new design that, as the name says, allow autonomous measurements (temperature, salinity, pressure) at greater depths (close to the bottom of the ocean) than before. With less than 10 days left on leg 1, including 4 steam days to Tahiti, we are all looking forward to our final stations and float/drifter deployments, hopefully in calmer seas, and to handing over to leg 2 scientists soon. We wish all newcomers for leg 2 “bon voyage” to Tahiti.

- Sabine Mecking and Isa Rosso

http://usgoship-p062017.blogspot.com

Drifter deployment at night (photo by G. Aukon), SOCCOM float deployment (photo by N. Zielinski), and getting ready for a SIO Deep SOLO float deployment, wondering what's inside the cardboard boxes (SIO SOLO floats are deployed within their boxes, so we never get to see them).



Preliminary sections of potential vorticity (PV = vertical density gradient x Coriolis parameter/density; planetary part only), salinity, oxygen and nitrate for the western part of P06, leg 1, with potential density (as anomaly in kg/m^3) as the y-axis. Gray contours show the depth of the density surfaces. The densities of Subantarctic Mode Water (SAMW) and Antarctic Intermediate Water (AAIW) are marked by the horizontal dashed lines. SAMW is characterized by a vertical minimum in PV (low stratification) that exists as far west as ~170°E. AAIW is characterized by a vertical salinity minimum that extends westward all the way to the Australian coast. SAMW is also associated with high oxygen concentrations, but does not have a distinct signature (min./max.) with regard to nutrients (e.g. nitrate).