

Small scale structure in temperature and salinity over the Mindanao Dome

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In June-July 2011, Japan Meteorological Agency carried out the regular observation in the Pacific Northwest along the longitude line of 137 E. Continuous observation data were obtained every minute from a Thermo Salino Graph. Small scale spikes in both temperature and salinity are found between the latitude 5 N and 10 N over the Mindanao Dome, where cold-salty waters are upwelled. It should be noted that the area where the small scale structure was observed correspond to warm pool.

Soundings of temperature and salinity from the Conductivity Temperature Depth profiler showed that upwelled water are present up to 50 dbar in 8 N. The sharpest spike structures in temperature and salinity is found in 7N and 9N, where Dissolved Oxygen is supersaturated; These data indicate that the active mixing occurs.

Thermohaline staircase, extending vertically for a few of dbars, are found in some latitudes. In case of 5 N, the height of staircase is about 4 dbar and the roughly estimated buoyancy frequency is about 0.007 (1/sec). The horizontal scale of the spike is about 1 km.

What causes the small scale structure of temperature and salinity over the Mindanao Dome? It is well known that thermohaline staircases are often observed when salt finger convection occur. However, the observed horizontal scale is about 1km and the vertical scale is about 10 m; The shape of the cell is not "finger".

Second, it is possible that internal gravity wave is generated by convection (Michael Le Bars et al., 2015). They experimentally investigate the dynamics of a turbulent convective layer adjacent to a stable stratified layer. This condition is very similar to the vertical profile of Mindanao Dome area. They find that the convectively excited internal waves propagate in the stratified zone. I will describe the comparison between the ship observation and the results of their experiment.

Keywords: internal gravity wave, salt finger, Mindanao Dome