

Seasonal variability of the Upper Mixed Layer Temperature in Sulawesi Sea

*Xiaofang Wan¹, Aijun Pan¹

1. Third Institute of Oceanography, Ministry of Natural Resources, China

Using all available data, including remotely sensed SST, rainfall, surface winds, sea level anomaly and assimilated temperature product, seasonal changes of the upper ocean hydrodynamic features are investigated in Sulawesi Sea. It reveals that Sulawesi Sea maintains a high SST exceeding 28.5°C all-year round and specifically, a cold tongue-like SST pattern emanating from eastern gap between Philippines and Sangihe Islands can be detected in wet season and which, is assumed to be a branch of the ITF intrusion under favorable northeast monsoon forcing.

Further by employing an thermal equilibrium equation, contributions from Surface heat forcing, Ekman advection, Geostrophic advection and Vertical entrainment to the mixed layer temperature tendency are diagnosed quantitatively. It presents that upper mixed layer temperature has drastic seasonality in Sulawesi Sea. As regard to the wet season, Surface heat forcing, Ekman advection and Geostrophic advection all tends to warm the mixed layer during the cooling period (October-January), except the Vertical entrainment, which acts to cool the mixed layer with -0.14°C/month cooling rate. Comparatively, Surface heat forcing contributes over 79% to the mixed layer warming in the warming phase from February to April. As for the dry season, Ekman advection and Vertical entrainment contributes -0.23°C/month and -0.25°C/month, respectively, to the mixed layer cooling and largely offsets warming effect induced by Surface heat forcing in the cooling phase of the mixed layer. And for the warming period, again, Surface heat forcing is testified to be a dominant contributor, with 0.27°C/month warming effect. Further exploration suggests that impacts from Geostrophic advection on the mixed layer temperature exists throughout the whole calendar year, but with relatively subtle contribution.

Keywords: Sulawesi Sea, mixed layer, surface heat forcing, geostrophic advection, vertical entrainment