EGU2020-6882
https://doi.org/10.5194/egusphere-egu2020-6882
EGU General Assembly 2020

Ocean Response to Successive Typhoons Sarika and Haima (2016) in the Northern South China Sea

Han Zhang
State Key Laboratory of Satellite Ocean Environment Dynamics, Second Institute of Oceanography, Ministry of Natural Resources, Hangzhou, China (zhanghan@sio.org.cn)

Tropical cyclones (TCs) are natural disasters for coastal regions. TCs with maximum wind speeds higher than 32.7 m/s in the north-western Pacific are referred to as typhoons. Typhoons Sarika and Haima successively passed our moored observation array in the northern South China Sea in 2016. Based on the satellite data, the winds (clouds and rainfall) biased to the right (left) sides of the typhoon tracks. Sarika and Haima cooled the sea surface ~4 and ~2 °C and increased the salinity ~1.2 and ~0.6 psu, respectively. The maximum sea surface cooling occurred nearly one day after the two typhoons. Station 2 (S2) was on left side of Sarika's track and right side of Haima's track, which is studied because its data was complete. Strong near-inertial currents from the ocean surface toward the bottom were generated at S2, with a maximum mixed-layer speed of ~80 cm/s. The current spectrum also shows weak signal at twice the inertial frequency (2f). Sarika deepened the mixed layer, cooled the sea surface, but warmed the subsurface by ~1 °C. Haima subsequently pushed the subsurface warming anomaly into deeper ocean, causing a temperature increase of ~1.8 °C therein. Sarika and Haima successively increased the heat content anomaly upper than 160 m at S2 to ~50 and ~100 m°C, respectively. Model simulation of the two typhoons shows that mixing and horizontal advection caused surface ocean cooling, mixing and downwelling caused subsurface warming, while downwelling warmed the deeper ocean. It indicates that Sarika and Haima sequentially modulated warm water into deeper ocean and influenced internal ocean heat budget. Upper ocean salinity response was similar to temperature, except that rainfall refreshed sea surface and caused a successive salinity decrease of ~0.03 and ~0.1 psu during the two typhoons, changing the positive subsurface salinity anomaly to negative.