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Investigating different bio-responses of the upper ocean to Typhoon Haitang using Argo and satellite data

Yu Ping Guan (1), Haixia Shan (2), and Jianping Huang (2)

(1) State Key Laboratory of Tropical Oceanography, South China Sea Institute of Oceanology/Chinese Academy of Sciences, Guangzhou, China (guan@scsio.ac.cn), (2) Key Laboratory for Semi-Arid Climate Change of the Ministry of Education ,College of Atmospheric Sciences, Lanzhou University, Lanzhou, 730000, China

The responses of the upper ocean to typhoon Haitang in July 2005 are investigated using Argo float and multi-platform satellite data. The results show decreasing sea surface temperature (SST), a deepening of the mixed layer depth, and enhanced Chlorophyll-a (Chl-a) concentration. Two extreme cool regions are identified. While the magnitude of SST cooling in the two regions is similar, the biological response (Chl-a enhancement) differs. Ekman pumping and the intrusion of the Kuroshio played an important role in the cooling process and in the enhancement of Chl-a in one region (region A). A cold eddy provided the material source for the formation of the cold center in the second region (region B), where mixing was dominant. Because of the relatively high translation speed (5 ms-1) in this region, Ekman pumping had little influence on the cooling and Chl-a enhancement processes. Moreover, the mixed layer depth was shallower than the nutricline, which couldn't make nutrient have a great increase in the euphotic layer when the mixing was dominant, where the nutrient concentration was uniformly depleted. Sea temperature, in contrast, gradually decreased with depth below the bottom of the mixed layer. In contrast to region A, region B showed no significant enhancement of Chl-a but strong SST cooling.