

Multi-satellite observation on upwelling after the passage of Typhoon Hai-Tang in the southern East China Sea

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Abstract

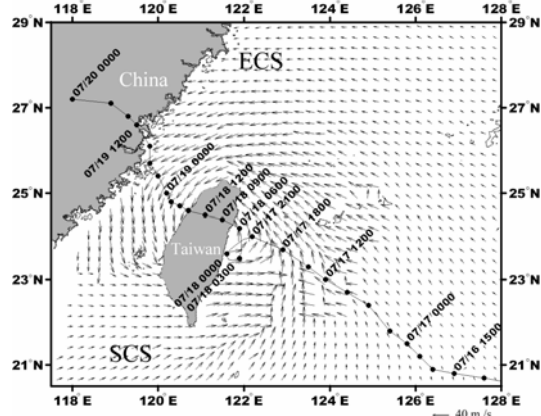
It was revealed that large scale of upwelling within large regional enhancement of chlorophyll-a (Chl-a) concentration in the southern East China Sea (ECS) after the passage of super typhoon Hai-Tang in July 2005. After the typhoon on 22 July, the upwelling area (<26°C) expanded rapidly to 9146 km² on the shelf-break. The large increased upwelling persisted for more than a week. Ocean color images also revealed that high Chl-a concentration of >3.0 mg/m³ appeared in the shelf region, where the high Chl-a pattern matched the upwelling in terms of location and time. On the other hand, a large offshore SST cooling was also observed mainly to the right of typhoon track on 20 July, it lasted in a period of 2–3 days. It is evident that typhoon significant increased upwelling and Chl-a concentration in the southern ECS.

Data and Method

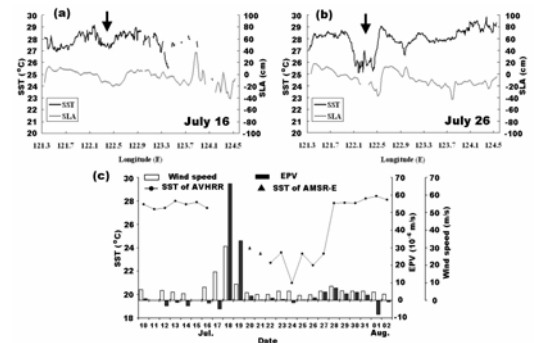
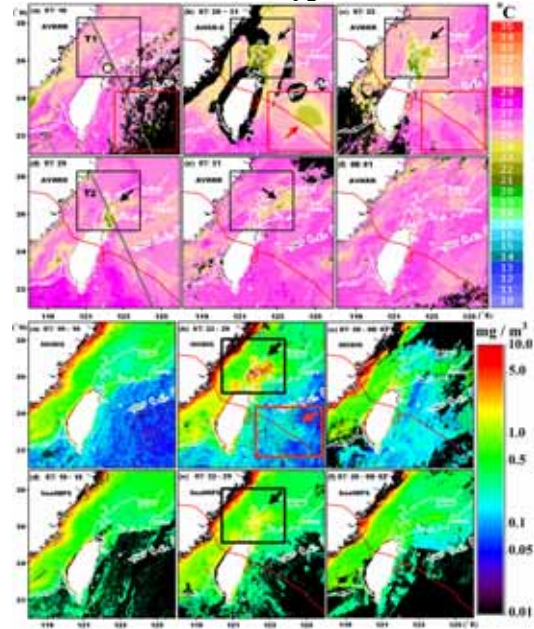
The data of AVHRR 5-channel radiations are used to produce daily SST images through MCSST algorithm. The microwave SST is measured by AMSR-E are also used in this study. The variation of Chl-a concentration was observed by both of MODIS and SeaWiFS onboard satellites. During the study period, only 25 images have been received. Because the activated coverage was low, weekly mean map are composed before and after the typhoon passage. Sea surface wind vector and stress were obtained from the daily QuikSCAT. We also calculated the wind induced Ekman pumping velocity (EPV) from the wind vectors.

Increased Upwelling and Chl-a concentrations

Hai-Tang was a classical typhoon formed over the tropical Pacific Ocean on 12 July 2005. It traveled relatively slowly (4.8 m/s) on the western part of Pacific Ocean from 13 to 16 July, then moved rapidly (11.1 m/s) westwards and became a super category 5 typhoon on 15:00 UTC 16 July and kept moving westward. Upon entering the southern shelf of ECS on 21:00 UTC 17 July, Hai-Tang lingered at a near stationary slow speed (<4 m/s) on the eastern coast of Taiwan, while it reduced to a category 3 typhoon with maximum sea surface wind speed of 34.58m/s.



Ocean Feature after Typhoon



Conclusion

Intense winds to the right of typhoon track will induce the vertical mixing and result in larger SST cooling. Based on the synergy of multi-satellite data sets provide a rare opportunity to observe the air-sea interaction and biological response to strong typhoon in the southern ECS.