Potential Use of Argo Floats in Studying Typhoon-upper Ocean Interaction

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It is well known that the development and intensification of typhoon depend not only on sea surface temperature but also on the entire upper ocean column. The lack of in-situ, real-time oceanic observations has been a major limitation on our understanding of typhoon-ocean interaction and on the accuracy of typhoon prediction. The Argo network has the potential to fill this gap, especially in the northwestern Pacific. So far, the usability of Argo for typhoon research has been a pleasant surprise. Argo has greatly increased the number of in-situ observations of oceanic response to typhoon, has confirmed the vital importance of upper ocean structure for typhoon intensity, and has started to make an impact on typhoon prediction.

With the current spatial and temporal resolutions, the Argo network in general is marginally useful for operational typhoon model initialization in the northwestern Pacific, while having rather limited use in other regions of tropical cyclone activities. Even within the northwestern Pacific, however, the uneven distribution of Argo floats could make some cyclones largely under-sampled. Therefore, we need to increase the temporal and spatial resolutions of the Argo network in the breeding ground and along the main routes of typhoons. In particular, we should increase the number of Argo floats that have two-way communication capability, so that their sampling frequency and depth can be adjusted in real-time when a typhoon arrives. Here we describe a pilot project using such floats, in association with other field observations, to study typhoon-upper ocean interaction in real time.