

Supertyphoon Boosters in the Western North Pacific Ocean

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Abstract

With increasing observations of devastating category-5 cyclones, such as Hurricane Katrina (2005), Rita (2005), Mitch (1998), Opal (1995), and supertyphoon Maemi (2003) found to intensify on warm ocean features (i.e., regions of positive sea surface height anomalies detected by satellite altimeters), there is much interest to study the role ocean features play in the intensification of category-5 cyclones. Using 13 years of satellite altimetry data, *in situ* and climatological upper ocean thermal structure data, Joint Typhoon Warning Center's best track data, together with an ocean mixed layer model, here we systematically study the 30 western North Pacific category-5 supertyphoons occurred during the May-October typhoon season from 1993 to 2005. We find that positive-SSHA features act as 'boosters' to supertyphoons. If given typhoon's translation speed, the background climatology can not provide sufficiently-thick layer of warm water to support intensification to category-5, then encountering boosters is needed because these boosters can effectively increase the thickness of warm layer to support intensification to category-5. Among the 30 supertyphoons, 10 (i.e., 33%) reached category-5 due to the boosters. These cases are primarily found in the western North Pacific South Eddy Zone (i.e., 127-170°E, 21-26°N) where the background warm layer is relatively shallow (D26 ~ 40-65m). However, in regions where background climatological warm layer is sufficiently thick with respect to typhoon's translation speed, then it is not necessary to encounter boosters since the background climatological UOTS can already provide sufficiently thick layer of warm water to support intensification to category-5. These cases are primarily found in the gyre region (120-170°E, 10-21°N, D26 ~ 110m) where the background warm layer is relatively thick (D26 ~ 90-120m).