



Environmental Influences on the Intensity Changes of Tropical Cyclones over the Western North Pacific

Shoujuan Shu, Fuqing Zhang, and Yuan Wang
China (sjshu@nju.edu.cn)

The influence of environmental conditions on the intensity changes of tropical cyclones (TCs) over the western North Pacific (WNP) is investigated through examination of 37 TCs during 2000-2011 that interacted directly with the western North Pacific subtropical high (WNPSH). Comprehensive composite analysis of the environmental conditions is performed for two stages of storms: one is categorized as intensifying events (maximum wind speed increases by 15 kts over 48 h) and the other is categorized as weakening events (maximum wind speed decreases by 15 kts over 48 h). Comparison of the composite analysis of these two cases show that environmental conditions associated with the WNPSH play important roles in the intensity changes of TCs over the WNP. When a TC moves along the southern periphery of the WNPSH, the relatively weaker easterly environmental vertical wind shear helps bring warm moist air from the south and southeast to its southeast quadrant within 500 km, which is favourable for the TC to intensify. On the other hand, when a TC moves along the western edge of the WNPSH, under the combined influences of the WNPSH and an upper-level westerly trough, a strong westerly vertical shear promotes the intrusion of dry environmental air associated with the WNPSH from the north and northwest, which may lead to the inhibition of moisture supply and convection over the west half of the TC and thus its weakening. These composite results are consistent with those with additional geographic restrictions, suggesting that the dry air intrusion and the vertical wind shear (VWS) associated with the WNPSH, indeed affect the intensity changes of TCs over the WNP beyond the difference related solely to variations in geographical locations. The average sea surface temperature (SST) of 27.6° for the weakening events is also lower than an average of 28.9° for the strengthening events, but remains above the critical value of 27° for TC intensification, suggesting that the SST may be regarded as a less positive factor for the weakening events.