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The Impact of the Western North Pacific Subtropical High (WNPSH) on Tropical Cyclone Intensity

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The influence of the Western North Pacific Subtropical High (WNPSH) on the intensity of tropical cyclones (TCs) is investigated by using the NASA satellite remote sensing data (AIRS) and NCEP GFS analyses for the first time in this study. The total numbers of 38 TCs interacting with the WNPSH during the period 2000-2011 are identified and categorized into intensifying and weakening cases. The characteristics of the weakening and intensifying cases are computed and compared to address how the WNPSH plays a role in the development of TCs.
The dry air of WNPSH intrudes into both the weakening and the intensifying storms. Whether the negative impact of the WNPSH on TC evolution occurs depends on not only the position of the storm relative to the WNPSH, but also the extent to which the dry air of the WNPSH engulfed into the storm. When the storm moves stably along the southern border of the WNPSH, the flow exhibits weak westerly vertical wind shear on a TC, which favors interaction with relatively moist environmental air. The dry air of the WNPSH only impacts the far outside of the vortex beyond 500 km in this situation, the vortex can intensify continuously. However, when a TC begin to veer round to the north along the western border of the WNPSH, the flow with strong easterly vertical wind shear is favorable to the interaction between the dry air of the WNPSH with the storm. The dry air associated with the WNPSH substantially slows storm development when it rapidly wraps around the northern, western, as well as the southern sectors of the vortex, and intrudes into the southwest inner core regions of TC.