



Reexamination of Tropical Cyclone Wind–Pressure Relationship Based on Aircraft Data prior to 1987 in the Western North Pacific

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The wind–pressure relationships for tropical cyclones (TCs) in the western North Pacific are reexamined based on aircraft data, TC best-track data and daily reanalysis data during 1957–1987. Minimum sea level pressure (MSLP) was estimated from aircraft reconnaissance, and maximum surface wind speeds (MSWs) were adjusted from the maximum wind speed at flight level. The mean MSLP was found to be higher during 1957–1964 than during 1965–1987 for each MSW group, presumably due to the change in reconnaissance instrumentation and technology around 1965. Therefore, utilizing data after 1965 (a total of 1,874 samples), the effects of TC center latitude, size, translation speed, intensification trend, and environmental pressure latitude on the wind–pressure relationships were examined. Results show that faster travelling TCs, with smaller in size, and located in higher environmental pressure at lower latitudes, exhibited a higher MSLP for a given MSW. However, the effect of latitude on the wind–pressure relationships was dependent on TC intensity. The MSLP decreased with increasing latitude for category 2 or weaker TCs (i.e. $MSW \leq 43 \text{ m s}^{-1}$). For category 3 or stronger TCs (i.e. $MSW \geq 49 \text{ m s}^{-1}$), the MSLP mostly increased with increasing latitude. A new wind–pressure relationship model was developed that explained 69% of the variance with a mean absolute error of 12.4 hPa during independent testing. The new model shows improvement over several former wind–pressure relationships.