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Interdecadal variation of tropical cyclone genesis and its relationship to the monsoon trough over the western North Pacific

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This study reexamines the recent interdecadal shift in tropical cyclone (TC) genesis over the western North Pacific (WNP) in the late 1990s. An interdecadal decrease in the frequency of the WNP TC genesis was observed during 1998–2013 compared to the period of 1979–1997. The spatial distribution of the interdecadal decrease of the WNP TC genesis running northwest-southeast, consistent with the monsoon trough (MT) zone. The results imply that the WNP genesis may be closely related to the MT on the interdecadal timescale. After the late 1990s, the intensity of the WNP MT becomes weaker and it extends more westward, thereby providing an unfavorable condition for the TC genesis. Through a diagnosis of the energetics, we suggested that the barotropic energy conversion in the eastern part of the WNP MT tends to be weakened in the late 1990s, hence less energy to support the WNP TC genesis. Both the meridional shear and the convergence of the mean zonal winds over the eastern WNP MT have an important impact on the conversion from mean kinetic energy to eddy kinetic energy, which can be considered as the atmospheric cause of the interdecadal decrease of TC genesis. Additionally, the tropical depression (TD)-type waves associated with the WNP MT are significantly different before and after the late 1990s. Before the late 1990s, the off-equatorial TD-type waves could be distinctly observed, with clear transitions along the WNP MT. However, these transitions were vague after the late 1990s.