

Impacts of intraseasonal oscillations on tropical cyclones affecting Taiwan

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Abstract

This study examines the relationship between eight 30–60-day intraseasonal oscillation (ISO) phases and three tropical cyclone (TCs) tracks affecting Taiwan during July–September. These tracks include two northwestward tracks around northern Taiwan (NW-N) and southern Taiwan (NW-S) and a northward track around eastern Taiwan. In phases 7 and 8, the ISO features a north-south heating dipole and a major cyclonic circulation centering near Taiwan. TCs are steered by anomalous southeasterly flows with a NW-N track from the eastern and southeastern sections of the anomalous cyclone toward the central region. When this anomalous cyclone displaces eastward in phase 7, TCs appearing in the southern section of the anomalous cyclone are hindered by anomalous northeasterly flows from the north to move with a NW-S track. In phase 8, a weakened and westward displaced anomalous cyclone is paired with an anomalous anticyclone on its eastern side. Anomalous southeasterly and southerly flows between this circulation pair drive TCs with a northward track along the oceans east of Taiwan. In phases 4 and 5, the ISO features major convections over the South China Sea and western North Pacific and an associated north-south circulation dipole. TCs are driven by anomalous southeasterly flows between this dipole. TCs undergo a NW-N track when the southern anomalous cyclone extends northward across Taiwan, but a NW-S track when the northern anomalous anticyclone expands southward across Taiwan. In phase 1, a meridional wave train consisting of an anomalous cyclone centering over Taiwan and an anomalous anticyclone on its northeastern side guides TCs along a NW-N track. Variability features of real-time large-scale circulations associated with various TC-ISO relationship types are discussed.

Key word: intraseasonal oscillation, TC, Taiwan