

Contributions of different time scale variations to tropical cyclogenesis over the western North Pacific

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The present study investigates relative contributions of different time scale variations of environmental factors to the tropical cyclone (TC) genesis over the western North Pacific (WNP) during July-August-September-October (JASO). Distinct from previous studies that are concerned with large-scale spatial patterns during a certain period, the present study focuses on local and instantaneous conditions of the TC genesis. Analysis shows that the contribution of convection and lower-level vorticity to the TC genesis is mainly due to intraseasonal and synoptic variations. The contribution of vertical wind shear is largely related to synoptic variations. The contribution of mid-level specific humidity is almost two times more from intraseasonal variations than from synoptic variations. The contribution of sea surface temperature (SST) to the TC genesis is mainly due to interannual and intraseasonal variations. The barotropic energy for synoptic-scale disturbances during the TC genesis comes mainly from climatological mean flows over the southwest quadrant and from intraseasonal wind variations over the northeast quadrant of the WNP, respectively. The contribution of interannual variations to the TC genesis is enhanced over the southeast quadrant of the WNP. More TCs form under weak easterly and westerly vertical shears, respectively, during El Niño developing and decaying JASO. The contribution of interannual variations of SST tends to be larger during the El Niño decaying than developing JASO.

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