# Development of synoptic disturbances over the Philippine Sea associated with the boreal summer intraseasonal oscillation and the Pacific-Japan pattern

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The development mechanism of synoptic-scale disturbances over the tropical western North Pacific associated with the boreal summer intraseasonal oscillation (BSISO) under different phases of the interannual Pacific-Japan (PJ) pattern is investigated. Intraseasonal convection is enhanced widely over the western North Pacific for BSISO phases 5–7 in the positive PJ years, when seasonal-mean convective activity over the tropical western North Pacific is enhanced. Meanwhile, developed convection is confined over the South China Sea in the negative PJ years. Similar features are also found in the horizontal distributions of eddy kinetic energy (K’) representing the activity of synoptic-scale disturbances and of tropical cyclone occurrences. The difference in location of intraseasonal convection and the activity of synoptic-scale disturbances between the positive and negative PJ years may lead to different midlatitude responses. The non-PJ years show mixed features of the positive and negative PJ years. A K’ budget analysis reveals that the energy conversion from eddy available potential energy to K’ (PeKe) associated with synoptic convection primarily contributes to K’ generation during the convectively active phases of the BSISO. Moreover, the barotropic energy conversion from mean kinetic energy to K’, KmKe, is the second largest contributor to the K’ increase in the lower troposphere, especially during the early stage of development of synoptic disturbances. Large K’ produced by PeKe and KmKe in the tropics is advected to the subtropics by the mean flow (AmKe) in the later or mature stage of development. There are two factors that can determine the different locations where synoptic disturbances develop associated with PeKe and KmKe. The first is intraseasonal SST warming during convectively suppressed phases of the BSISO preceding the active phases. The other is convergence or shear of seasonal-mean horizontal winds associated with the strength of monsoon westerlies over the western North Pacific.

Keywords: boreal summer intraseasonal oscillation, Pacific-Japan pattern

 