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A Scale Interaction Study on East Asian Cyclogenesis Using a General Circulation Model Coupled with an Interactively Nested Regional Model

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This study newly developed the interactively nested climate model (INCL) using a general circulation model (GCM) interactively nested with a regional atmospheric model (RAM). One interactive experiment with finer RAM topography and another with coarser topography, as well as offline versions of each experiment, were performed to investigate the effects of subsynoptic-scale eddies and subsynoptic-scale mountains in Northeast Asia on larger-scale climate, using the GCM with T42 atmosphere and the RAM with 40-km mesh size in the INCL system. The subsynoptic-scale eddy effect restrictively increased synoptic-scale eddy activity within the RAM domain. In contrast, subsynoptic-scale mountains had the effect of robust anticyclonic circulation around the Sea of Japan and effectively forced larger-scale circulation. The effect was positively fed back to the mean field and amplified the anticyclonic circulation accompanied by suppressed storm activity in Northeast Asia. The results suggest that subsynoptic-scale mountains affect not only subsynoptic-scale eddies but also global climate.