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Response of Snow Cloud Bands to Sea Surface Temperatures over Japan Sea

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The response of snow cloud bands to the increase in sea surface temperatures (SSTs) over the Japan Sea was investigated. We focused on a typical snowfall event in Japan by intense cloud bands around a convergence zone on December 25, 2021. After confirming that a regional atmospheric model fairly reproduced the event, we conducted three sensitivity experiments replacing the initial and boundary values with air temperatures and/or SSTs uniformly increasing by 4 K. The results revealed that the model experiment with higher SSTs or lower air temperatures supplied more evaporation to the planetary boundary layer, which encouraged the higher cloud to along the convergence zone. This dominated the transversal mode (T-mode) of cloud bands in the east of the zone, diagnosed by a newly developed technique that discriminates it from the longitudinal mode (L-mode) by means of the absolute value of horizontal advection of hydrometers. In contrast, the experiment with lower SSTs or higher air temperature exhibited wider areas dominated by the L-mode cloud bands over the Japan Sea.