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Effect of High-Resolution SST on 60km-AGCM Simulated East Asian Monsoon

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The effects of sea-surface temperature (SST) on the East Asian monsoon were investigated using a high-resolution 60-km-mesh atmospheric general circulation model (AGCM).
First, as a winter monsoon, we investigated snowfall in Japan. We used a high-resolution SST dataset (original resolution, $\sim$20 km); the high-resolution SST data resolve warm boundary currents, such as those of the Kuroshio and Tsushima warm currents. The AGCM experiment using high-resolution SST data simulates snowfall increase (decrease) over warm (cold) SST regions in January better than the AGCM based on coarse-resolution SST data. A moisture budget analysis shows significant rainfall increase over a warm-SST band along the boundary current, where large evaporative fluxes supply moisture to the atmosphere. On the other hand, the moisture convergence anomaly is generally opposite to that of the evaporative flux anomaly, and hence acts to reduce rainfall.
Next, we investigated the effects of high-resolution SST on the East Asian summer monsoon, especially the cyclonic/anticyclonic anomaly over the northwestern Pacific (Philippine sea). The high-resolution SST experiment shows rainfall decrease over this region since summer monsoon onset, and hence anticyclonic anomaly is formed. From sensitivity experiments, cold SST band over the northwestern Pacific mainly causes such rainfall reduction and anticyclonic anomaly.