Role of midlatitude SSTs on Extreme Precipitation Events

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Satellite-derived sea surface temperature (SST) products are widely used as the lower boundary condition for numerical weather predictions and atmospheric simulations. However, cloud contamination is problematic in producing high-resolution infrared-based SST data. Temporal and spatial optimal interpolation is often used for constructing high-resolution gap-free SST products. This interpolation, however, can in effect smooth out temporal high-frequency SST variations or fine SST structures such as oceanic fronts and mesoscale eddies, which can potentially influence atmospheric simulations.

Torrential rains organized lines of deep convective cells often occur in the western Kyushu during the early-summer season. The prevailing low-level southwesterly transports the conditionally unstable air from the subtropics toward the coasts where the convection can develop often triggered by a flow interaction with orography. Yet, some observed and numerical studies demonstrate that the early-summer warming of SSTs over the East China Sea acts in maintaining the conditionally unstable air. Conversely, the relative cooler SSTs over the East China Sea suppress the convective activity. The similar air mass transformation can occur over the other midlatitude oceans.

Here we will discuss the impact of SST uncertainty on heavy precipitation events simulated in a regional atmospheric model. The sensitivity experiments to SST uncertainty for Akita-Iwate Heavy rainfall event on August 9, 2013 suggest that SST bias may alter both the area-averaged precipitation and the geographical locations of intense precipitation, which can potentially impact flash flood and landslide warnings. We will also demonstrate the results of other rainfall events to understand the role of midlatitude SSTs on extreme events.

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