The influence of the Gulf Stream on wintertime European blocking and North Atlantic jet

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The influence of Gulf Stream over the North Atlantic and Europe sector are investigated by analyzing NCEP-CFSR dataset and conducting a pair of 20-year integrations of 50-km grid-spacing AGCM (AFES). For the boundary condition, observed SSTs are used for control experiment (CNTL) and spatially smoothed SST for the other experiment (SMTH) over the Gulf Stream region. Between these experiments, substantial differences are found in European blocking and in North Atlantic eddy driven jet. For both phenomena, CNTL reproduces better the observed features than SMTH, which misses some of essential features of each phenomenon. This indicates that the realistic SSTs and high-resolution atmospheric models are important in reproducing these phenomena, including cold spells, long-lasting low surface air-temperature condition, resulted from European blockings. In the presentation, we will show that how these phenomena are related to meridional heat flux of the lower atmosphere and other atmospheric processes. Also, we would like to introduce HighResMIP in CMIP6, because HighResMIP can provide us very-near-future opportunities for the first time to investigate consistencies of mid-latitude atmospheric responses to the oceanic fronts and eddies are consistent among numerical. How robust consistencies we can find for what phenomena will affect our future trajectories of mid-latitude air-sea interaction studies.

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