Frontiers of extratropical air-sea interaction

Whether mid-latitude oceans influence the atmosphere or not is a long-lasting question. Recent studies using high-resolution observed data, including satellite and reanalysis products, and numerical modelings suggest that the mid-latitude oceans especially oceanic fronts and meso-scale eddies play important roles in the atmosphere. Various local atmospheric responses are detected by observational analyses and are reproduced by numerical modelings. Remote atmospheric responses to oceanic fronts or eddies are much more difficult to be studied than local responses, but some modelling studies showed interesting results, including influence of the Gulf Stream on European blockings and jet stream locations over the North Atlantic and the influence of the Kuroshio Extension on rapid explosive cyclones and their downstream influences onto US west coast. Remote atmospheric responses are also important in their socio-economic effects. In this presentation, I will try to summarize where we are in this rapidly developing research area of mid-latitude air-sea interaction.