The roles of latent and sensible heat fluxes in the atmospheric response to the Kuroshio/Kuroshio Extension

*Kohei Takatama[1], Niklas Schneider[1], Hisashi Nakamura[2], Masami Nonaka[3], Bunmei Taguchi[3]

1.University of Hawaii at Manoa, 2.Universiy of Tokyo, 3.JAMSTEC

It has been known that heat fluxes from extratropical SST fronts play important role for modifying the stormtrack activity and its position. (e.g. Nakamura et al. 2008; Taguchi et al. 2009). The heat flux consists of the latent and the sensible heat flux, which are released in different altitudes. To investigate their contribution for the stormtrack response, we have conducted a series of experiments for simulating the western North Pacific, using a regional atmospheric model. High-resolution SSTs are used for calculating both the latent and sensible heat fluxes in Experiment A. Low-resolution SST is used for calculating the latent heat flux in the Experiment B and for the sensible heat flux in the Experiment C. The difference between the Experiments A-B indicates the response induced by the latent heat flux from the SST front and A-C that by the sensible heat flux.
It is found that precipitation enhancement along the SST front is mostly caused by the response to the latent heat flux. The sensible heat flux induces near surface moisture convergence, but it does not contribute to the precipitation. Only the response to the latent heat flux significantly increase the storm track activity defined as high-frequency SLP fluctuation along the Kuroshio/Kuroshio Extension. Paths of cyclones are tended to be shifted by the latent heat flux toward north a few degrees. Meridional eddy heat transports due to the latent and sensible heat flux averaged along the Kuroshio Extension region take the maximum at 850 hPa and 1000 hPa, respectively. The vertically integrated heat transport due to the latent heat flux is three times larger than that due to the sensible heat flux.

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