EGU2020-21662, updated on 19 Sep 2020
https://doi.org/10.5194/egusphere-egu2020-21662
EGU General Assembly 2020

Effects of momentum and enthalpy exchange on the typhoon intensity in the atmospheric boundary layer considering sea spray and rainfall

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Typhoon intensity changes according to the momentum and enthalpy flux supplied from the boundary layer. MPI theory uses the ratio between a drag coefficient and an enthalpy exchange coefficient, which are indexes that indicate how much momentum or enthalpy is exchanged between the air and the sea. Each is a coefficient depending on wind speed, temperature and SST.

However, Lighthill (1999) is shown that latent heat exchange varies because sea spray generated from the sea surface evaporates in the boundary layer. In addition, Barenblatt (2005), inspired by Lighthill (1999), showed that the Karman constant changes according to the Froude number and the drag coefficient changes. Since both changes can change the MPI theory, it is necessary to quantitatively evaluate the effect of the droplets generated from the sea surface in order to grasp both accurately. In addition, it is necessary to consider the effects of rainfall in actual storms, which often involve rainfall.

In this study, to evaluate the flux exchange in the boundary layer quantitatively, we show the drag coefficient and the enthalpy exchange coefficient taking into account sea spray and rain. In addition, we show the results of observation of sea spray and rain using disdrometer and X-band radar.

How to cite: Okachi, H. and Yamada, T.: Effects of momentum and enthalpy exchange on the typhoon intensity in the atmospheric boundary layer considering sea spray and rainfall, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-21662, https://doi.org/10.5194/egusphere-egu2020-21662, 2020