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Optimization of air-sea exchange coefficients in a tropical cyclone by use of a variational data assimilation system

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A tropical cyclone (TC) intensifies and maintains its circulation against surface friction through the self-inducement of anomalous heat fluxes from the sea surface. Therefore, uncertainty in the values of air-sea heat and momentum exchange coefficients has a detrimental effect on TC numerical modeling. Since a TC is one of the most destructive disasters, a method is required to reduce such uncertainty with respect to disaster prevention and scientific progress. In this study, impact of optimizing air-sea exchange coefficients by a variational data assimilation system is investigated for TCs. Our results show that the air-sea exchange coefficients are successfully improved by using the available observational data. The updated air-sea exchange coefficients yield improvements in the the maximum wind speed, the inner core structure and the location of vortex center in comparison with the data assimilation experiments in which the initial condition is selected as a control variable. Furthermore, it is implied that the optimization leads to enhanced prediction skill. See more details in Ito et al.(2010, SOLA).

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