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Abstract

Drag coefficient is an important parameter when estimating the air-sea momentum flux correctly. The drag coefficient, however, hasn't been accurately established due to variations in the data from field observation. Thus, a number of drag coefficient models have been formulated. Since these models define an effective low wind speed range (e.g., 6 m/s), it is important to correctly estimate the air-sea momentum flux in such an effective low wind speed range. Nevertheless, with regard to such models, the air-sea momentum flux is commonly extrapolated out of the effective low wind speed range that is defined for each model. Therefore, such an estimated drag coefficient is not always correct, and the difference in the drag coefficient is reflected by the particular model that is used. In this study, we investigated the effect of the various drag coefficient models concerning the air-sea momentum for the low wind speed range in two processes: (1) calculating the drag coefficient in the effective low wind speed range, and (2) extrapolating the drag coefficient out of the range. Six drag coefficient models were used (Charnock, 1955; Smith, 1980; Large and Pond, 1981; Yelland and Taylor, 1996; Large and Yeager, 2004; Takagaki et al., 2012). We found the largest difference between the maximum and the minimum annual mean global air-sea momentum flux on the estimated data in the effective low wind speed range at 98.5% while 19.1% was observed on the extrapolated data. When taking into consideration both the 10-degree latitude and the proposed seven sea areas, we also found that significant impact on the air-sea momentum flux was apparent when the occurrence frequency of low wind speed was high. These results show that the parametrization of the drag coefficient is imperative for the low wind speed range.