EGU2020-8799
https://doi.org/10.5194/egusphere-egu2020-8799
EGU General Assembly 2020

Exchange coefficients derived from GPS-sonde and SFMR measurements in hurricane conditions

Olga Ermakova, Nikita Rusakov, Evgeny Poplavsky, Yuliya Troitskaya, Daniil Sergeev, and Galina Balandina
Russian Federation (o.s.ermakova@mail.ru)

Insufficient knowledge of the atmosphere layer momentum, heat and moisture transfer between the wavy water surface and marine atmospheric boundary layer under hurricane conditions lead to the uncertainties while using weather forecasting models and models of climate. In particular, there is a significant lack of data for heat and moisture exchange coefficients. In this regard, it is necessary to analyze and process the vertical profiles of wind speed and thermodynamic quantities. The present study is concerned with the analysis and processing of measurements from the NOAA falling GPS-sondes for hurricanes of categories 4 and 5 of 2003-2017, which represent an array of data on wind speed, temperature, altitude, coordinates, etc.

The proposed approach for describing a turbulent boundary layer formed in hurricane conditions is based on the use of the self-similarity properties of the velocity and enthalpy profiles in the atmospheric boundary layer, which includes a layer of constant flows, transferring into its “wake” part with height. Based on the proposed approach, the aerodynamic drag coefficients Cd and the enthalpy exchange coefficient Ck for a selected group of hurricanes were restored. As the value of Ck/Cd represents a determining factor in the formation of a hurricane, the dependence of this ratio on the wind speed was constructed.

This work was supported by the RFBR projects No 19-05-00249, 19-05-00366, 18-35-20068 (remote sensing data analysis) and RSF No 19-17-00209 (GPS-sonde data assimilation and processing).

How to cite: Ermakova, O., Rusakov, N., Poplavsky, E., Troitskaya, Y., Sergeev, D., and Balandina, G.: Exchange coefficients derived from GPS-sonde and SFMR measurements in hurricane conditions, EGU General Assembly 2020, Online, 4–8 May 2020, EGU2020-8799, https://doi.org/10.5194/egusphere-egu2020-8799, 2020