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Research on Diagnosis and Prediction of Boundary Layer Height Based on COSMIC Data

Qixiang Liao*, Tianle Lv, Shudao Zhou

College of Meteorology and Oceanography, National University of Defense Technology, Changsha, China

* Correspondence: liaoqixiang2013@126.com

Abstract. Based on the COSMIC occultation refractive data from 2007 to 2012, combined with the improved refractive index breakpoint method, the seasonal and diurnal variation characteristics of the global maritime boundary layer height were analyzed, and the sharp coefficient was introduced to evaluate the results. The horizontal distribution of the high-value area of the boundary layer height shows zonal asymmetry. The boundary layer is the highest in several regions in the middle and low latitudes, decreasing from the equator to the north and south poles. In some areas controlled by the subtropical high pressure, the seasonal variation of the boundary layer height is not obvious. However, in the prevalent layered cloud areas on the west coast of the continent, certain seasonal variation characteristics are shown. The diurnal variation of the boundary layer height is relatively weak and slightly different in different regions. The evaluation results of the sharpness coefficient show that the sharpness coefficient is the largest in the subtropical zone, and the refractive index breakpoint method can obtain the accurate boundary layer height, while it is the smallest in the equatorial convergence zone and the South Pacific convergence zone, and the definition of the boundary layer height is relatively ambiguous. For the problem of boundary layer top height prediction, the LSTM and XGBOOST artificial intelligence algorithms are adopted to form a global boundary layer height prediction model based on the boundary layer height diagnosed by COSMIC.