

#### **5.4 Evaluation of PBL parameterizations in WRF at sub-kilometer resolution: Turbulence statistics in the convective boundary layer**

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Evaluation of the planetary boundary layer (PBL) parameterization up to the present time has focused on profiles of mean and parameterized vertical flux, since the parameterization has been developed for horizontal resolutions that cannot resolve any turbulence in the PBL. Meanwhile, the recent increase in computing power has been allowing numerical weather prediction at horizontal resolution finer than 1 km, at which kilometer-scale large eddies in the PBL are partly resolvable. In this study, the performance of six PBL parameterizations in the Weather Research and Forecasting (WRF) model is evaluated at sub-kilometer resolution. The evaluation focuses on resolved high-order turbulence statistics, given that modeling at high resolution is aimed at improving the simulation of resolved fields. The six parameterizations include five nonlocal PBL schemes – the Yonsei University (YSU), Asymmetric Convective Model 2 (ACM2), Eddy Diffusivity Mass Flux (EDMF), Total Energy Mass Flux (TEMF), and ShinHong schemes, and one local scheme – Mellor-Yamada-Nakanishi-Niino (MYNN) level 2.5 model.