Geophysical Research Abstracts
Vol. 20, EGU2018-11661, 2018
EGU General Assembly 2018

Development of a Scale-Adaptive Parameterization of Deep Moist Convection in the WRF Model: A Real Case Evaluation

Wei Huang (1), Jian-Wen Bao (2), and Baode Chen (1)

(1) Shanghai Typhoon Institute, Chinese Meteorological Administration, Shanghai, China (huangw@mail.typhoon.gov.cn), (2) NOAA/ESRL, Boulder, Colorado, USA

When the horizontal grid size of a numerical weather prediction (NWP) model is between 1 and 10 km, which is referred to as the gray-zone, updrafts in convective clouds cannot be fully resolved explicitly and a subgrid cloud parameterization scheme is still necessary. However, some critical assumptions in conventional subgrid convective parameterization schemes become invalid when the horizontal grid reaches a size smaller than 10 km. As such, an alternative subgrid cloud parameterization that is distinct from the conventional ones is required in NWP models at the gray-zone resolutions. To meet this requirement, a new subgrid cloud parameterization scheme has been developed in the Weather Research and Forecasting (WRF) model. Unlike the existing schemes for subgrid cloud parameterization in the WRF model, this new scheme determines the scale-adaptiveness using the Arakawa-Wu unified parameterization and the cloud work function.
A set of sensitivity experiments with the WRF model is conducted for a heavy rainfall case over North China. The results show that the new scheme outperforms the existing scale-adaptive schemes in the WRF model at 9 km and 3 km. The use of the new scheme is found to be critical to alleviating biases in precipitation forecasts.