Geophysical Research Abstracts
Vol. 13, EGU2011-2790, 2011
EGU General Assembly 2011

Systematical Model Errors in Simulating Cloud Cover during Tropical Cyclogenesis

Yongqing Wang, Nan Zhang, Min Liu, and Bizheng Wang

College of Atmospheric Sciences, Nanjing Univesrity of Information Science and Technology, Nanjing, Jiangsu 2110044, China (yongqing@nuist.edu.cn)

Several cases of tropical cyclogensis (TCG) during the period of 31 July to 8 August 2004 are simulated with the Weather Research and Forecast (WRF) model. Results show that the model can reproduce the wind and pressure fields reasonably well, but not the temperature and the corresponding warm core structures of typhoons. In this study, we attempt to explain these inconsistent results using the scale analysis techniques used in atmospheric dynamics. We first evaluated the diagnosis scheme in the WRF model for cloud cover, and found that no matter what relationship between cloud cover and other variables is, discrete or continuous [U+FF0C] the same conclusions can be reached. That is, the simulated cloud cover will be systematically less than the observed if their relationship is described by the convex function, and the opposite is true if their relationship is described by the concave function. Therefore, in Slingo-type cloud cover scheme, the large-scale cloud cover will be less than the observed, whereas in the case of cumulus convection, the corresponding cloud cover will be more than the observed. Meanwhile, it is shown that if a meteorological variable of interest oscillates at high frequency the relationship between the cloud cover and this variable is highly correlated locally, but the degree of correlation declines sharply when they are averaged at a long time scale. It is further shown that if such a variable is of stable type the relationship between the cloud cover and this variable is highly correlated locally with a long time average but weakly correlated with a short time average. Thus, there are systematical errors in the cloud cover scheme, including Slingo's scheme, and it is recommended that the existing schemes be replaced by any more physically sound scheme.