Cloud-resolving simulations for the DYNAMO northern sounding array with imposed and parameterized large scale dynamics

Shuguang Wang, Adam Sobel (Columbia University)
Zhiming Kuang (Harvard University)

We will present results from WRF cloud-resolving simulations (CRM) driven by large scale forcing dataset derived by the Colorado State University group for the northern sounding array. As many other studies, we impose large scale vertical velocity, sea surface temperature, and winds to the CRM. Our preliminary results indicate that the CRM tracks observations in precipitation and outgoing long wave radiation well. However, noticeable bias in free tropospheric temperature and moisture can be identified in some periods. Sensitivity of the model results to the radiation and microphysical schemes will also be discussed. We will also present some preliminary results using CRM with parameterized large scale dynamics in which large scale vertical velocity is derived instead of being specified. Two methods are used here: the weak temperature gradient method and the damped gravity wave method. Preliminary results using these two methods indicate that our model can capture the intraseasonal variations in rainfall to some degree using the radiative fluxes derived from the standard run. We will also discuss the complications related to the treatment of horizontal advection of moisture in these two methods.