Geophysical Research Abstracts
Vol. 13, EGU2011-2369, 2011
EGU General Assembly 2011
© Author(s) 2011

Effects of Vertical Wind Shear, Radiation and Ice Clouds on a Torrential Rainfall Event in China

Yushu Zhou and Shouting Gao
(zys@mail.iap.ac.cn)

The effects of vertical wind shear, radiation and ice clouds on surface rainfall processes associated with the torrential rainfall event over Jinan, China during July 2007 are investigated through a series of sensitivity experiments. All experiments are integrated with an imposed large-scale vertical velocity and zonal wind from the National Centers for Environmental Prediction (NCEP)/Global Data Assimilation System (GDAS) for 36 hours, while vertical wind shear, cloud radiative effects, cloud-radiation interaction and ice microphysics are, respectively, suppressed in the sensitivity experiments. The exclusion of ice clouds decreases model domain mean surface rain rate by 12.9% whereas the mean rain rates are less sensitive to vertical wind shear, cloud radiative effects and cloud-radiation interaction. The reduction in the mean rain rate resulting from the removal of ice clouds is primarily associated with the decrease in net condensation. The budget analysis of the mean perturbation kinetic energy shows that the barotropic conversion process associated with vertical wind shear does not increase perturbation kinetic energy and thus does not increase the mean rain rate. The increase in radiative cooling resulting from the exclusion of cloud radiative effects is largely offset by the decrease in heat divergence, which results in the insensitivity of the mean rain rate to cloud radiative effects.