

Impact of land-atmosphere interaction on meteorological simulation in Vector Vorticity Equation Model by implementing Noah land surface model

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Abstract

The land-atmosphere interaction, including the exchange of heat, momentum and mass between land surface and the atmosphere, plays an important role in the hydrologic cycle and surface energy budget. In this study, we aim to understand the impact of the land-atmosphere exchanging processes on the development of the convective systems. Thus, we first implemented the Noah land surface model (LSM) into the Vector Vorticity Equation Model (VVM) to illustrate the effect of land-atmosphere interaction on meteorological simulation in the area of Taiwan. In order to demonstrate the impact, two idealized experiments (named Coupled and Uncoupled) are designed. Coupled experiment is conducted by using the VVM/LSM coupling system, while Uncoupled experiment is conducted by VVM solely with prescribed surface heat fluxes from Coupled experiment.

The preliminary results show that the accumulated precipitation is less in the Uncoupled experiment. We speculate that the reduced precipitation is due to wrong position of surface heat flux. In other words, the land-air interaction could promote the convective systems. In the uncoupled experiment, the surface heat fluxes and precipitation are not matched with each other after the convective systems built. The shifted surface heat fluxes would weaken the strength of cold pool below the convective systems and lead to the decrease in strength of systems. The detailed discussion will be presented in the workshop.