

# The Effects of Land Surface Processes on the Regional Climate in Taiwan.

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## Abstract

This study used the NCAR/PSU MM5 coupled with the Noah land-surface model (LSM) to simulate the effects of land surface processes on the regional climate in Taiwan and surrounding areas. There are four nested domains in the model with the grid sizes of 90 km, 30 km, 10 km, and 3.3 km, respectively. [The initial and lateral boundary conditions of the model are from the ERA40 with 2.5°x 2.5° horizontal resolution and 12-hr time interval.](#) The control (everyday) run combined with a surface assimilation system was performed every 12 hours in 2001 and run the integration for 48 hours. Four experiments (the combinations among w/ or w/o lsm or little-r options) were continuously integrated for four months started from May 1 to August 31. The hourly surface observations of more than 200 stations over Taiwan are compiled and input to MM5's little-r deck with 3DVAR option.

The LSM needs soil moisture for the initial condition. Although there [are](#) no such data available in Taiwan, we can still use the off-line mode of the Noah LSM to simulate these data. However, only 23 stations fully comply with the WMO-standard in Taiwan are used to run the off-line LSM.

The off-line and on-line simulations of LSM were compared and contrasted to the station data to examine the model performance. The effects of land surface processes on the regional climate in Taiwan are investigated in terms of regional climate variability, temperature extremes and heavy rainfall events.