



Surface wind data assimilation in the NCAR/PSU MM5 coupled with a land-surface process model: a case with complex terrain.

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A surface wind data assimilation system was developed in this study. The NCAR/PSU MM5 coupled with the Noah land-surface model (LSM) was used to perform the assimilation simulations. The assimilation system was performed every 12 hours and run the integration for 48 hours. There are four nested domains in the model with the grid size of 90 km, 30 km, 10 km, and 3.3 km, respectively. Ten years (1996-2005) 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 is no such data available in Taiwan, fortunately 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 which can be used to run the off-line LSM.

A linear regression model was introduced to examine the model performance and to regress the model output into the observations. The results show that the assimilation system can well capture the wind climatology over plain and sea, but not over urban and mountain areas. This is due to that the model does not include the sub-grid micro features of land surface. A possible remedy for this deficiency is to use the data over plane area and to cooperate with a micro-scale wind energy analysis program to cover the wavy region. .

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