地表粗糙度調整對模式大氣及預報效能之評估

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摘　要

由於現行中央氣象局WRF模式 (Weather Research and Forecasting model) 在臺灣地區近地面之10米風速預報普遍有高估的情形，尤其是臺灣西部地區於日間之風速高估為顯著，為瞭解此模式之系統性偏差成因，本研究透過增加地表粗糙度實驗 ($Z0_{mx04}$) 與控制組 (CTL) 實驗做比較，以探討地表粗糙度差異對模式大氣結構的影響，並比較兩實驗於2017年冬季 (12月) 期間的預報效能差異。

實驗結果顯示，$Z0_{mx04}$實驗於日間之熱通量 (sensible heat flux) 及潛濕通量 (latent heat flux) 向上垂直傳輸較CTL實驗為大，使得$Z0_{mx04}$實驗於邊界層大氣呈現較CTL實驗暖濕的情形；$Z0_{mx04}$實驗增加地表粗糙度，增加u*造成風速減小，較CTL實驗風速減小約0.3 m s^{-1}。兩實驗之預報效能比較得知，$Z0_{mx04}$實驗預報臺灣地區之10米風速的高估情形較CTL實驗約可降低0.5 m s^{-1}，尤其是在臺灣西部地區之日間風速高估的改善較為顯著（約 > 0.6 m s^{-1}）。

To evaluate the influence of surface roughness adjustment to model atmosphere and forecasting performance

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Abstract

The 10-meter wind speed forecasting of CWB's WRF model (Weather Research and Forecasting model) is generally overestimated, especially in western Taiwan at daytime. In order to understand the systematic bias of 10-meter wind speed, we compare the CTL and surface roughness ($Z0_{mx04}$) experiments to investigate the influence to the atmospheric structure and the forecasting performance of the model from the difference in surface roughness in the winter (December, 2017).

The experimental results show that the vertical transmission of sensible heat flux and latent heat flux of the $Z0_{mx04}$ experiment are greater than the CTL experiment in the daytime, to induce the $Z0_{mx04}$ is warmer and more moisture in the boundary layer atmosphere than the CTL. The u* of $Z0_{mx04}$ (the surface roughness is added) is increased causes the 10-meter wind speed to decrease about 0.3 m s^{-1} than the CTL. To compare the forecasting performance of these two experiments, the 10-meters wind speed of the $Z0_{mx04}$ can be improved about 0.5 m s^{-1} than CTL, especially in western Taiwan at daytime (about > 0.6 m s^{-1}).