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Verification of precipitation and humidity forecasts in the MM5 model versus reanalysis

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To comprehensively diagnose model capabilities of simulation of atmospheric flow and relevant microphysics processes, the verification of simulations versus precipitation and humidity fields from ERA40 reanalysis is applied. This approach allows identification and comparison of meaningful features of various parameterization schemes available for the model as well as quantitative estimation of model error. Various combinations of parameterization schemes for cumulus, PBL, moisture and radiation are used to identify which one provides a lesser difference between the model state and reanalysis. Basic attributes of model errors are measured to identify spatial structures, vertical profiles, geographical regions and synoptical patterns. The verification is applied to precipitation and humidity forecasts on a coarse resolution grid over the North Atlantic - Europe region. Results of the comparisons provide the insight into advantages and shortness of each parameterization scheme set. They show that each type of parameterization scheme, namely, microphysics, cumulus, PBL and radiation, is important for precipitation and humidity forecasts. For example, the most optimal parameterization set to simulate both these atmospheric variables is the mixed phase (Reisner) for microphysics, Anthes-Kuo for cumulus, Eta by Mellor-Yamada for PBL, and CCM2 for radiation. But this combination of schemes is not as good as the Kain-Fritsch for cumulus and MRF by Hong-Pan for PBL schemes in producing dynamical features of the atmospheric flow. The later becomes important for proper simulation of the advection in middle and extended range runs.

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