INFLUENCE OF MODEL RESOLUTION IN COMPLEX REGIONS AND A COMPARISON WITH OBSERVATIONS IN SELECTED CASE STUDIES

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In the last five years many studies about numerical simulations in complex areas have been performed at Epson Meteo Centre. Particularly, hydrostatic and non-hydrostatic computations have been made in many ideal and real cases, considering different resolutions (Salerno and Borroni, 2002), also investigating the behaviour of the semi-implicit, semi-lagrangian scheme in complex topography and many range of flows with idealized mountains (Salerno, 2003), and comparing different models in the alpine area with resolution of 5, 10, 20 and 50 km. Many numerical simulations have been also made in the Himalayan and Indian areas by using a global and a regional model (Bollasina and Bertolani, 2002).

This work shows some preliminary results about the model resolution influence on weather predictions in a few areas in the world considering some relevant case studies, particularly in the monsoon and high-mountain regions. Quite large grid meshes cannot resolve some characteristics of the circulations and, particularly in complex areas, the vertical wind velocities, which do not affect only dynamics, but the thermal and moisture distribution, which has an influence on the wind characteristics and the occurrence and strength of precipitations. High-resolution mesoscale simulations can get better results to describe the circulation patterns, the surface parameters and the precipitation amounts, to be compared to local and satellite observations, e.g. the measurements collected in the CEOP framework.

The simultaneous use of mesoscale models may give a further improvement in the description of weather dynamics and thermodynamics. Very recent winter tests have been made comparing models prediction against observations on selected locations in the alpine region. Particularly, three models (WRF, CEM Mesoscale Model and MesoNH) have been used at “operational” resolutions ranging from 7 to 20 km. All models have shown quite good predictions detecting the precipitation episode with values close to observations, even if the time location of the maxima resulted somewhat moved (and slightly lower) respect to the observed ones, an aspect more evident with decreasing resolutions.