

# Investigation of QPF Produced by LM-z, the Z-Coordinate Version of the Non-Hydrostatic Model LM

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## 1. Introduction

Improvements of Quantitative Precipitation Forecasts (QPF) achieved by the non-hydrostatic model LM-z were investigated. LM-z (see Steppeler et al. 2002b for the 2-d version) is the z-co-ordinate version of the non-hydrostatic model LM (Steppeler et al., 2002a). The numerical approach used in LM-z differs from that of Mesinger et al. (1988) by correcting a numerical error which has been pointed out by Gallus and Klemp (2000).

A total of 39 forecasts using LM-z in different model configurations were done to investigate the precipitation forecast. For each of these model runs LM-z produced better precipitation forecasts than LM, which differs from LM-z only by the use of the terrain following co-ordinate. Fig. 1 (top) gives the threat scores for 29 cases using a model area covering most of Europe with a resolution of 7 km. The 6 hr precipitation sums in 6 hr intervals are given in Fig. 1, bottom. The precipitation verifies much better for LM-z. There is a smoother movement of the frontal rain band and a better representation of the convective rain associated with the cold front, in particular for the time interval 12hr-6hr.

Vector wind verification against radiosondes of the 24 hr forecast shows also a considerable improvement with LM-z, as shown in Fig. 1, top right.

## REFERENCES.

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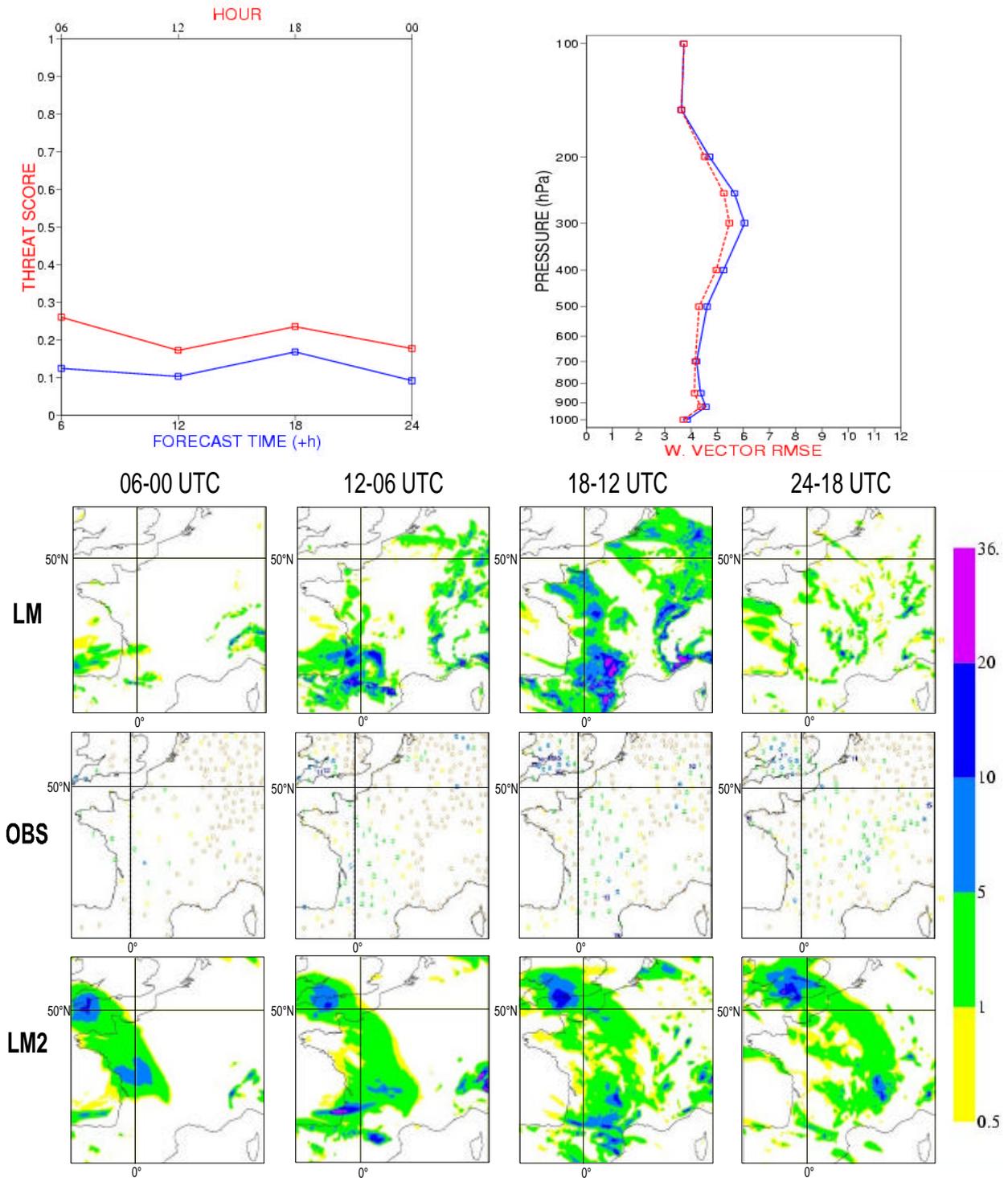


Fig 1 top left: Threat score for QPF amount 2mm/6hr for 29 cases 24 April to 22 May 2005 for LM-z (red) and LM (blue); top right: as top left, for vector wind verification against radiosondes;

bottom: 6hr accumulated precipitation for different times of a 24 hr forecast from 29 March 2005 by LM and LM-z and corresponding SYNOP observations