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Forecasting the weather
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A 500m WRF hindcast of a microburst event in The Netherlands

D van Dijke, Y.B.L. Hinssen, and F Bijlsma
Meteo Group, Netherlands (vandijke@meteogroup.com)

On July 14th 2010 a few high voltage pylons near Vethuizen (small village in The Netherlands) were blown down. This day there were many reports of damaging wind gusts. The wind gusts were caused by a microburst area that moved in a north-east direction over the eastern part of the country.

Official meteorological observation sites are not present in the direct vicinity of Vethuizen. Therefore, the operator of the high voltage lines asked Meteo Group to numerically investigate the magnitude of the wind gusts. For this purpose, Meteo Group used WRF (v3.2.1) with 3 nests (500m, 1km and 3km) in a 9km mother domain. Since the extreme weather event moved fairly fast, a 5 minute output interval was used. Most attention was paid to the simulated radar reflectivity and the maximum wind in the past 5 minutes.

WRF showed good agreement with the shape (e.g. the bow-echo structure), intensity and timing of the precipitation system. Compared with the observed radar, the location of the extreme weather system was simulated more to the east. The simulation results showed a large area, spreading from west to east, with high wind speeds that moved rapidly towards the north east. The high resolution runs (500 m and 1 km) revealed micro-burst structures in combination with streaks of high wind speed.

The maximum simulated wind speed at 10 meter height is about 134 km/h. The wind patterns at 35 and 70 meter are similar in shape, only the wind speed increases with height (maximum 160 km/h at 35 m and 171 km/h at 70 meter). During the passage of the bow-echo near Vethuizen, the simulated wind direction was south-southwest, and this is in agreement with the observed damage.

In summary, WRF has proven its potential in resolving the complex weather system down to the scale of micro bursts.