F3-TORNADO IN BELGIUM

Karim Hamid[1], Laurent Delobbe[2]

[1] *Royal Meteorological Institute of Belgium, Ringlaan 3, Belgium, Karim.hamid@oma.be*

[2] *Royal Meteorological Institute of Belgium, Ringlaan 3, Belgium, Laurent.Delobbe@oma.be*

Dated: April 17, 2007

I. INTRODUCTION

Due to its localization near the sea, Belgium is characterized by a very temperate climate with relatively cold summers and mild winters. Therefore, favourable situations for the development of severe tornadoes do not often occur in the country. Nevertheless, tornadoes of the type F0 or F1 are every year observed in Belgium and F2 and F3 tornadoes can also be observed in some particular circumstances. On the 1st of October 2006, several supercells developed over Belgium and The Netherlands. Some of them produced severe tornadoes.

II. SYNOPTIC SITUATION

The synoptic situation of the 1st of October was relatively favourable for the development of supercells. A diffluent upper air trough was located over England, with the Benelux situated downstream of this trough in an advection of maritime unstable air. After the passage of an occlusion around midday the atmosphere became quite unstable with CAPE around 1000 Jkg^{-1}. However, it was especially the wind shear which significantly increased with SRH0-3 between 250 en 400 m^2s^{-2} and BRN-SHEAR0-6 close to 60 ms^{-1} around 15 UTC. The low-level shear increased as well up to 12 ms^{-1} (0-1 km). The intense jetstreak (around 60 ms^{-1}) was also favourably positioned with the left exit over Belgium. The soundings show an atmosphere close to saturation with a very low LCL (some few hundred meters) and a CIN close to zero.

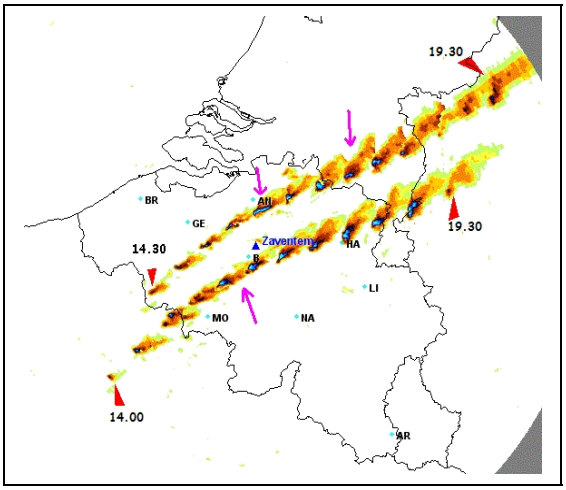

FIG. 1: Trajectories of the two main tornadic supercells derived from successive radar images. The purple arrows indicate the locations of the observed tornadoes. The red triangles indicate the time in UTC.

III. OBSERVATIONS

Several cells exhibited on the radar images a clear deviation to the right with respect to the mean flow and there were also different interesting examples of cell-splitting where the right-mover developed into a supercell. Some supercells remained active for more than 5 hours (Fig. 1). Weak hook echoes were also sporadically observed on the radar reflectivity images. On the radial velocity images, the signature of short-lived mesocyclones appeared at different moments (see velocity dipoles on Fig. 2).

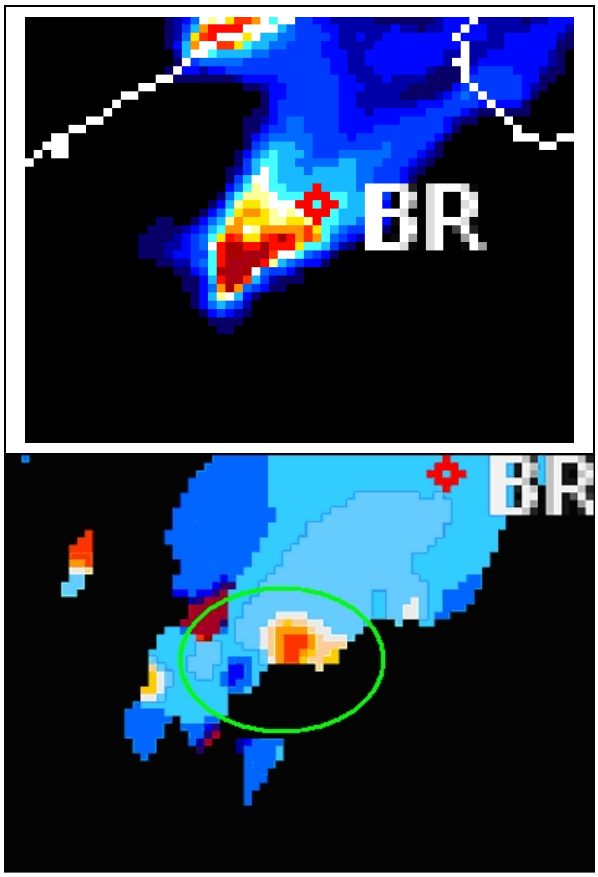

FIG. 2: Radar reflectivity (upper panel) and radial velocity (lower panel) of a supercell observed near Brugge. A mesocyclone is clearly apparent on the radial-velocity image (green circle).

Volume radar reflectivity data have shown that the top of the cells did not exceed 8 km which correspond with mini-

supercells according to the terminology of Burgess et al. (1995). Visual observations confirm the relatively low vertical extension of the storm cells.

Damage caused by the tornadoes can be classified as F2-F3. Fig. 4 gives an idea of the severity of the damage

FIG. 3: Tornado observed southwest of Brussels near 16.30 UTC (photo: K.Holvoet)

IV. CONCLUSION

This situation as well as other examples from the past show that intense (mini-)supercells and tornadoes regularly occur in Western Europe. The event presented here shows also that such tornadoes are not only observed in the summer but may also appear under less extreme static unstability. The windshear was clearly a dominant factor.

FIG. 4: Damage caused by the tornado shown in Fig. 3 (photo: K.Holvoet)

IV. AKNOWLEDGMENTS

The authors wish to thank Karel Holvoet who provided outstanding picture material of one of the tornadoes. Many observations and pictures were kindly made available by the weather forum www.weerwoord.be. Data from the Zaventem radar are provided by Belgocontrol.

V. REFERENCES

Burgess, D.W., R.R. Lee, S.S. Parker, and D.L. Floyd, 1995: A study of mini supercell thunderstorms. *Preprints, 27th Conf. Radar Meteor.*, Vail, Colorado, Amer. Meteor. Soc., 4-6.