TORNADO CHASING IN HUNGARY - THE TORNADIC SUPERCELL ON THE 20TH OF MAY 2008

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I. INTRODUCTION

In Hungary there are numerous severe storms in every year, and considerable part of these events are produced by supercells. Some of them are particularly strong, similarly to the supercells in the USA, however the frequency of such significant severe events is not so high. There is an increasing scientific and public interest in these damaging storms in our country because of some catastrophic situation occurred in the past few years. On the other hand, the official Hungarian meteorology (OMSZ - Hungarian Meteorology Service) and the amateur meteorologists (A-MET - First Hungarian Association of Amateur Meteorologists) turn more and more attention to dangerous weather, simultaneously with the European and international tendencies.

As the part of this progression, some years ago we created a website – called **szupercella.hu** –, which was the first site in our country that extensively introduced these dangerous phenomena to the public. Our main activities in line with szupercella.hu are:

– developing GFS and WRF model outputs with convective parameters for operational use,
– making convective forecasts,
– setting up storm chases and damage surveys,
– collecting photos and videos of severe events,
– publishing scientific works, case studies,
– organize meetings and courses.

The szupercella.hu team is often shows up in the media (TV, radio, newspapers, news portals), when there is a programme / article about this theme, or a serious storm damage occurs. Our most successful storm chase (that also got big publicity) was on the 20th of May 2008, when we caught a spectacular supercellular EF1 tornado near Gátér from 1.2 km distance. This is the first Hungarian tornado that was recorded during an organized storm chase.

II. SYNOPTIC SITUATION, CONVECTIVE PARAMETERS

On the 20th of May 2008, a quasi-stationary front was situated over Hungary, which developed a wave, creating ideal conditions for severe storms, supercells. The WRF outputs suggested high instability (SBCAPE 1400-1800 J/kg), overlapping suitable shear (0-6 km shear 15-20 m/s, 0-1 km shear 10-15 m/s) and helicity (0-3 km SRH 150-300 m^2/s^2) values, especially from E of the river Danube during the afternoon hours. This setup was accompanied with abundant low-level moisture and low LCL level. The overall situation seemed **favorable for tornadogenesis** – as we mentioned in our convective forecast –, besides 2-5 cm hailstone size and wind gusts over 90 km/h.

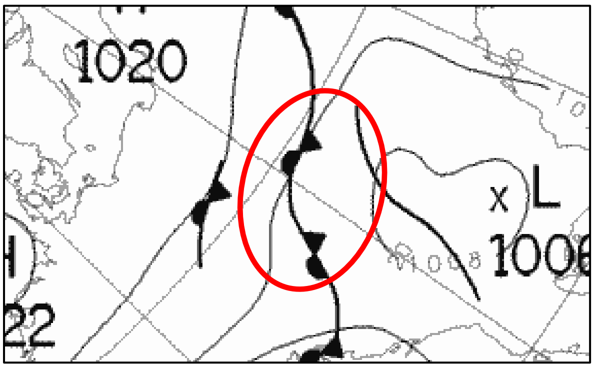

FIG. 1: Quasi-stationary front with a wave (signed by a red ellipse) located over Hungary on the 20th of May 2008, 18 UTC (source: MetOffice)

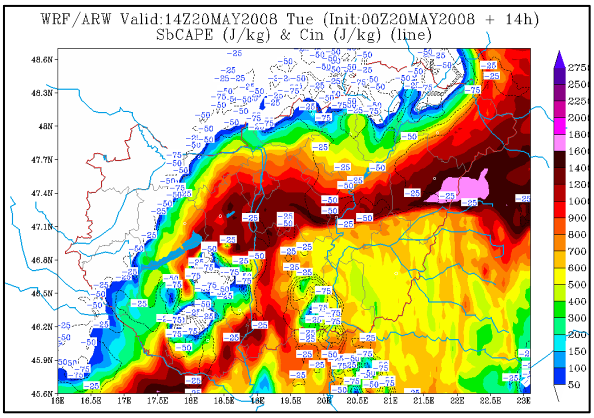

FIG. 2: SBCAPE & CIN values on WRF output on the 20th of May 2008, 14 UTC (source: szupercella.hu / metnet.hu)

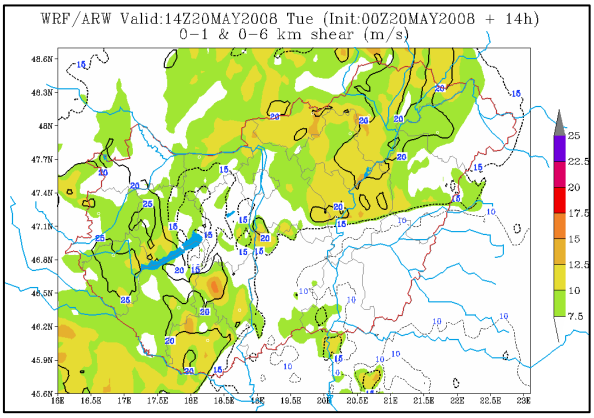

FIG. 3: 0-6 & 0-1 km shear values on WRF output on the 20th of May 2008, 14 UTC (source: szupercella.hu / metnet.hu)

III. SUPERCELL DEVELOPMENT, TORNADOGENESIS

The convective activity started with linearly organized supercells, which were at first more or less isolated, then later conglomerated into a more continuous mesoscale convective system with a bow echo. In many cases in the early stage of supercells the splitting process was apparent, especially on the high resolution radar reflectivity images.

The szupercella.hu storm chaser team started from Budapest as soon as the first supercell appeared on radar, and its originating convergence line became clearly seen by cumulus clouds on satellite images. We positioned ourselves onto that line to wait for new supercells. Near the village Gátér a rapidly growing, very low based, right moving cell started to show signs of strengthening rotation, so we stopped in an ideal place with great sight, close to the updraft / downdraft interface, near the developing mesocyclone in the vicinity of inflow notch.

The first funnel cloud appeared at 13:39 UTC from a compact wall cloud. Despite of the fact that the bottom of the funnel was close to the ground, at that time the touchdown still wasn't evident. However later, the rotation of the wall cloud became more and more heavy, resulting in subsequent tornadic vortices, which touched the ground and sucked up dust and debris. The most spectacular state of the tornado was after 13:47 UTC, when it turned into a **classic cone shaped funnel**, with nice **suction vortices** on its base. Finally, as the part of mesocylone occlusion process, the growing RFD (rear-flank downdraft) intrusion gradually wrapped up the center, and the tornado roped out, then disappeared around 14 UTC.

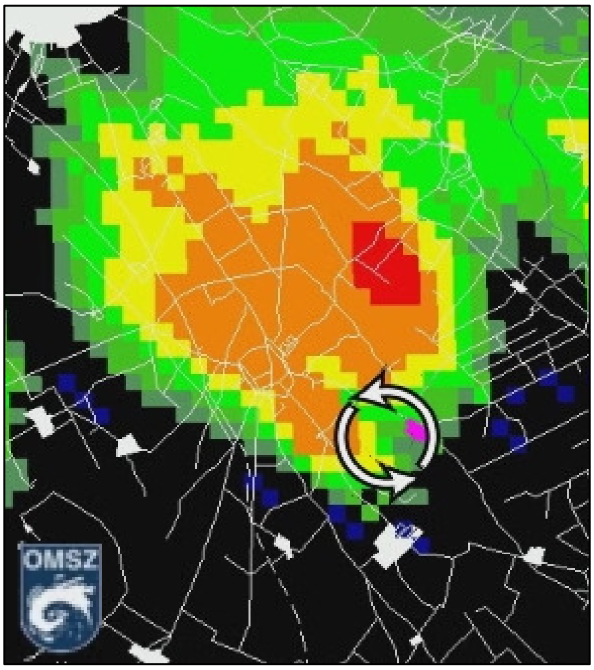

FIG. 4: High resolution radar reflectivity image of the right moving, tornado producing supercell, showing the area near Gátér (purple spot), where the mesocylonic rotation (white arrows) was located on the 20th of May 2008, 13:45 UTC (graphic: based on OMSZ radar image)

FIG. 5: The most spectacular state of the tornado, with a typical cone shaped funnel on the 20th of May 2008, 13:49 UTC (photo: szupercella.hu - Ákos "Storman" Molnár)

IV. RESULTS AND CONCLUSIONS

As the example of my case study shows, with adequate technical background (car, laptop, mobile internet, GPS, camera), good quality – model, radar, satellite – data and sufficient knowledge about severe storms it is not impossible to successfully chase supercells or even tornadoes in Hungary. Amongst our many efficient supercell chases this case is outstanding, because it was the first Hungarian tornado that was recorded during an organized storm chase. It means a further step towards the more effective and diverse research.

Soon after the tornado event we set up a **damage survey**, and we established that the tornado was **EF1 on the Enhanced Fujita Scale**. The tornado was moving mainly on uninhabited area, but it reached some houses on the edge of the village Gátér. No fatalities or serious injuries occurred during the event.

V. AKNOWLEDGMENTS

I would like to thank all the contributors who helped us to carry out the successful storm chase, especially my storm chaser partners (Viktor "Skyshooter" Veres, Tamás "Dzsibzon" Hubay) and the OMSZ coordinator, Zoltán "Meteorman" Polyánszky.

VI. REFERENCES

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