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Analisis super cell , which is, taking south and southeast part of Serbia on 30. Jun 2005

Ruzica Radovanovic-Bulic, Ivan Bulic, Zoran Vucinic

Republic hydrometeorological service of Serbia, Belgrade (Serbia).

1 Introduction

According to its climate characteristics the territory of Serbia is a region with frequent development of convective clouds. The development of convective clouds usually occurs during the warmer part of the year (from April to October). The average annual number of days with the development of convective clouds is 106. This cloudiness is followed by frequent thunder, rain, showers and hail.

June 30, 2005 was a rather specific day for this time of the year, due to frequent thunderstorms which appeared across the whole territory of Serbia. The most distinctive storm was the one that overtook the eastern and southeastern parts of Serbia during the early afternoon.

2 Data

This analysis includes data from all radar centers which were active on that specific day, i.e. the data collected from the Mitsubishi RC-34A radars, which, in the last few years were modified and digitalized, Eferica et all (1997), by the use of HASIS software. The Gematronik radars are located much further to the north compared with the location hit by the storm, and unfortunately weren't able to cover this particular area, although their data would certainly be of a priceless value to our study.

For the analysis of the atmospheric conditions of June 30, 2005 we used the maps, meteorological observations and measurements made at the Republic Hydrometeorological Service of Serbia, as well as the data and analyses of upper soundings made at the University of Wyoming (USA).

Correspondence to: Zoran Vucinic.

z.vucinic@hidmet.sr.gov.yu

3 Atmospheric conditions

On that day, the synoptic situation over Serbia was characterized by a weak gradient field with southeastern upper wind (Fig. 1.).

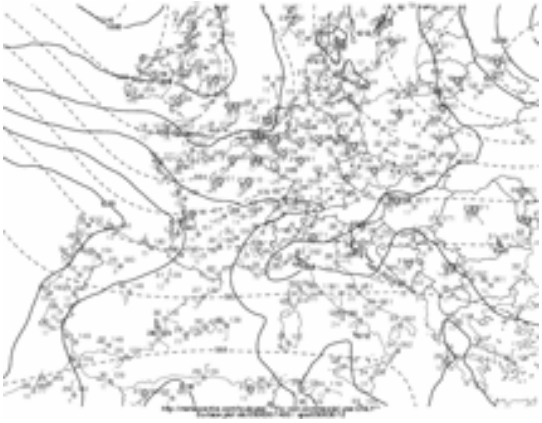

Fig. 1. Surface pressure chart (14:00 UTC)

Analyses of upper soundings made at the stations Belgrade and Sofia had shown that the atmosphere over Serbia was extremely unstable with favorable conditions for the development of very strong cumulonimbus clouds. The CAPE values were extremely high and much above the limits indicating severe storms, and the values of all indexes of stability were showing that strong cumulonimbus clouds might grow into severe supercell storms (Fig, 2.).

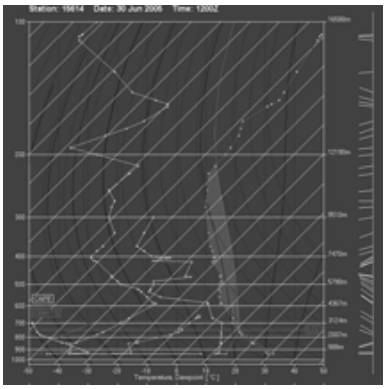

Fig. 2. Upper sounding analysis (Sofia - station)

4 The supercell over southern and southeastern parts of Serbia

During the night and in the early morning, over the major part of Serbia, strong cumulonimbus clouds were detected. After short calm period, around noon, new cumulonimbus development had occurred, so all radar centers in Serbia were activated to observe and track the clouds. Unfortunately, the storm was out of range of the modern Doppler radars, therefore this analysis is based only on the information collected from the Mitsubishi RC-34A radars, which, in the last few years, were modified and digitalized by the use of HASIS software, Rancic et all (1997). In our study we used the radar reflectivity images from several radars (Sjenica, Crni Vrh, Krusevac, Nis and Kukavica) which were in position to track the supercell.

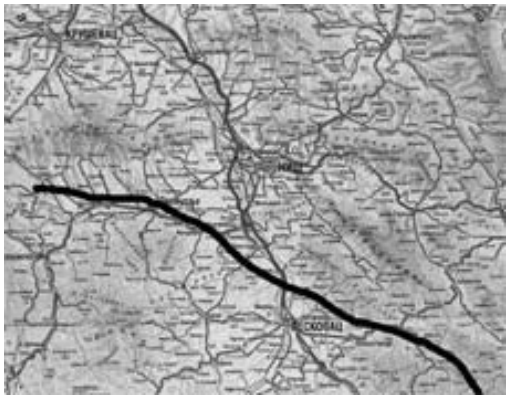

Fig. 3. The path of the supercell in southern and southeastern parts of Serbia

Very strong convective clouds moved from the west and northwest over the Kopaonik mountain. At 12:30:21 UTC, (14:30:21 according to the local time), at the eastern mountainsides, ahead of this supercell, in front and to the right, a rapid development of a new super cell suddenly occurred. Descending towards the Toplica river valley it got stronger and gained the characteristics of a supercell. Afterward, it moved forward to the east and southeast and crossed over to the Bulgarian territory. The overall lifetime of the supercell was approximately 2 hours and 35 minutes (14:30:21-17:05:00, local time), its path length about 120 km, path width between 12 and 18 km, speed 50 km/h, and hit area surface: 3120 km^2. Hail was detected at 27 observation stations. As the supercell moved over to the Bulgarian territory further surface measurement data weren't available.(Fig. 4.).

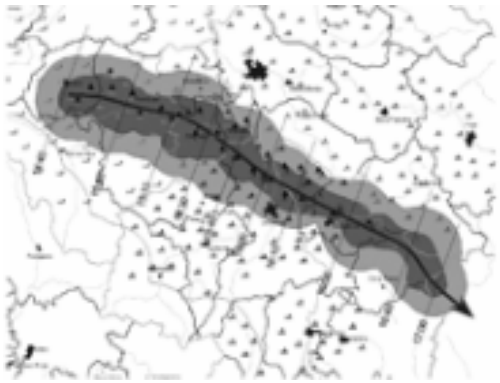

Fig. 4. The characteristics of the path of the supercell.

Fig. 5. shows RHI display of this supercell in phase of formation.

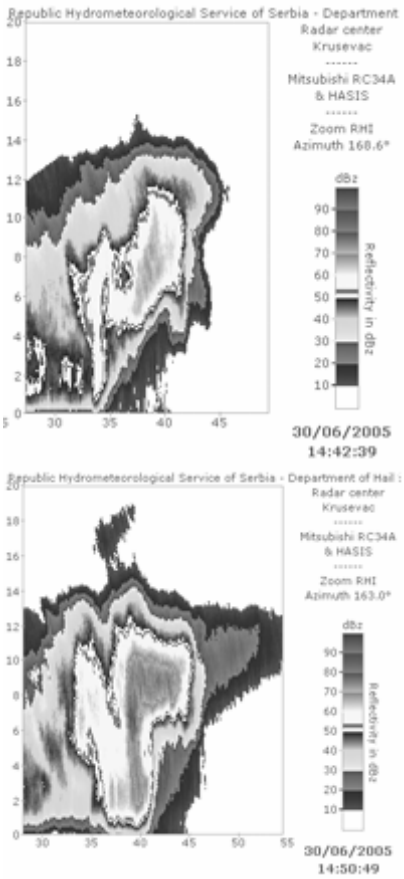

Fig. 5. RHI display of the supercell at 14:42:39 and 14:50:49 (local time).

The zoomed in PPI display of the formation phase of this supercell is shown in Fig. 6.

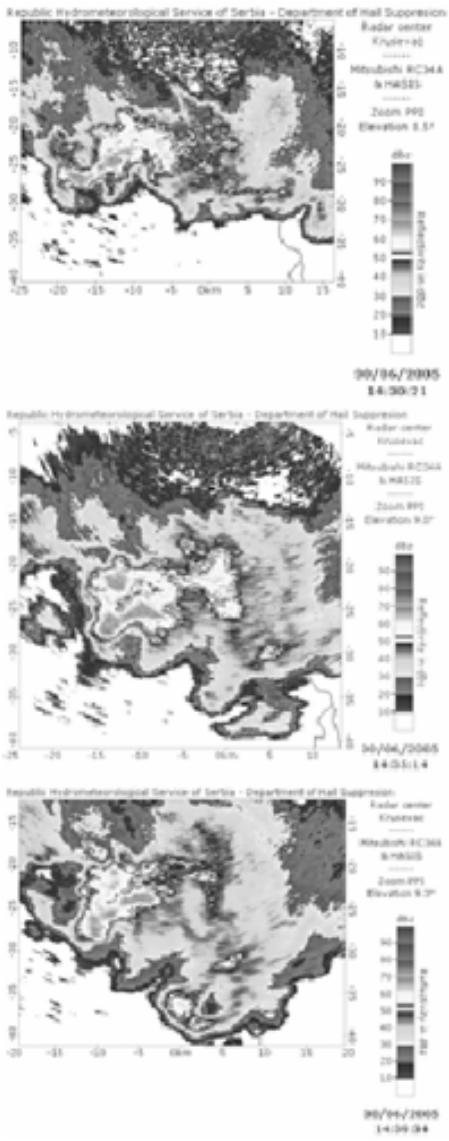

Fig. 6. PPI display (zoomed in) of the supercell in phase of formation

Figures displayed in grayscale do not allow detailed explanation of the formation and the characteristics of this supercell, however, during the poster presentation a set of color images will be available.

Fig.7. shows RHI display of this supercell in phase of maximal development.

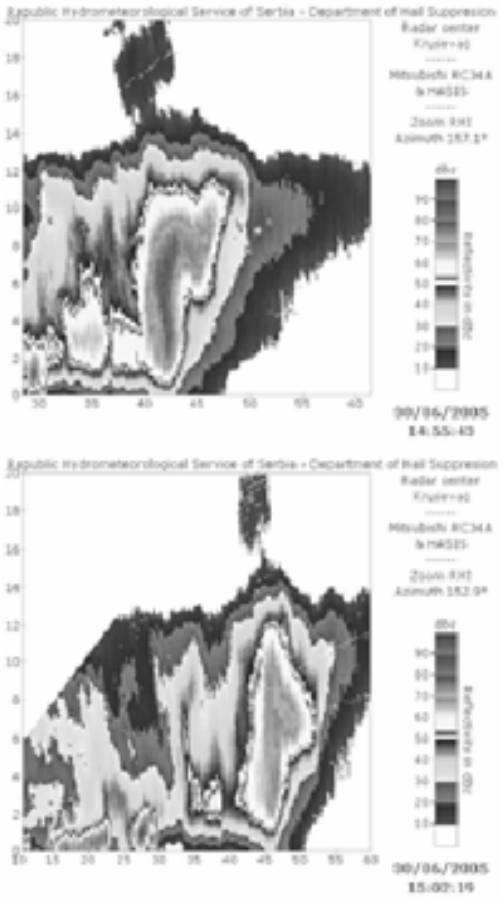

Fig. 7. RHI display of the supercell at 14:55:49 and 15:07:19 (local time)

Along the whole path, in the front-right part, a new cell continued to appear, which prolonged the life of this supercell by reproducing it continuously. Unfortunately, the more detailed analysis requires the data about the supercell after it moved to Bulgarian territory.

References

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