TORNADIC EVIRONMENT IN ROMANIA

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I. INTRODUCTION

The environmental conditions before the initiation of convection are critical in determining what type of weather will occur. After the first tornadic supercell observed in Romania using Doppler radar data, at Facaeni (Lemon et al. 2003), Romanian forecasters are challenged to recognize environmental conditions that favor the onset of supercellular thunderstorms. An understanding of the "ingredients" for a particular weather event allows forecasters to better focus their attention toward severe weather potential during the process of forecasting.

Deep moist convection is a result of three ingredients: lift, instability, and moisture (Johns and Doswell 1992). Another key ingredient supporting the development of tornadoes is wind shear. The climatological distribution of those ingredients may not be useful for forecasting tornadic storms on a particular day; but it can be used in making the differences between events that happened because of different circulations. In same time, the regional characteristics of the environments in which tornadoes occur, are very important in order to compare them with those from other parts of the world.

In this paper, the tornadic environment in Romania is analyzed together with the mesoscale patterns and the conceptual models of the local features that favore the development of surface boundaries.

Unlike the previous studies that analyzed the tornadoes from the point of view of their occurrence, areal of extend, intensity and environments (Romero et al., 2007) in Italy (Giaiotti et al., 2007) , Czech Republic (Setvak et al., 2003), Balearic Islands (Gaya et al, 2001), Greece (Sioutas, 2003), this study is focused mainly on the conceptual models of local flows.

II. PRESENTATION OF RESEARCH

In attempting to determine the relationship between large-scale environmental variables and tornadoes, we use the proximity soundings. For the proximity sounding we used the definition proposed by Craven and Brooks (2004): the events occur within 3 h of the sounding time and within 185 km in space.

Four years (2003-2006) of rawinsonde data (1200 UTC) from Bucharest sounding where evaluated for the cases with tornadic supercells in the proximity area. In accordance with Brooks et al. (2007) the following parameters were analyzed:

(1) mean mixing ratio in the lowest 100 hPa;

(2) mean lapse rate from 700 to 500 hPa;

(3) Convective Available Potential Energy (CAPE) using a parcel with the mean properties of the lowest 100 hPa;

(4) the magnitude of the difference of the wind vector between the surface and 6 km above ground level.

The distribution of tornadic events from 2005, represented in Fig. 1, continued the same tendency as that one for 2002-2004. From this distribution it can observed that the majority of cases (11) were reported in the southern and south-eastern part of Romania.

Three different types of surface boundaries that precede some severe convective episodes in southeastern Romania are presented. The boundaries are related to local topographic circulations and the general synoptic flow; they include: convergence lines induced by the S shape of the Carpathian Mountains in the south of Romania, the Black Sea breeze convergence line, boundaries induced by convection like outflow boundaries, and differential heating boundaries. The conceptual models suggested in the paper, and emphasized with some examples, try to explain the low level special conditions for supercells in Romania that form in the vicinity of boundaries.

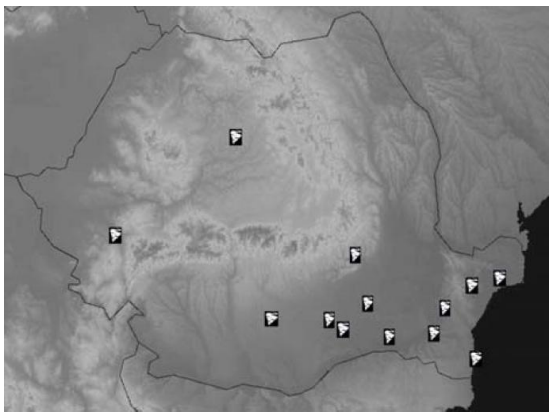

FIG. 1 Distributions of tornadic events during 2005 in Romania.

III. RESULTS AND CONCLUSIONS

The results presented in his paper will be important for weather forecasters, because unlike the previous studies we will present not only the ingredients associated with tornadoes occurrence in Romania, but also the tornadoes climatology based on local circulations. Also, the geographic distribution of all the data will be presented. In Romania our results show that mesoscale conditions are necessary to get the environmental conditions supportive of the most severe convection, but local condition like boundaries are crucial for the specific place of occurrence. As far as these boundaries develop according certain "climatology" we also try to connect the tornado climatology in Romania with the boundaries climatology,

using the local conceptual models for the airflow in low levels.

V. REFERENCES

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