USE OF DOPPLER RADAR IN ROMANIA FOR NOWCASTING AND WARNING

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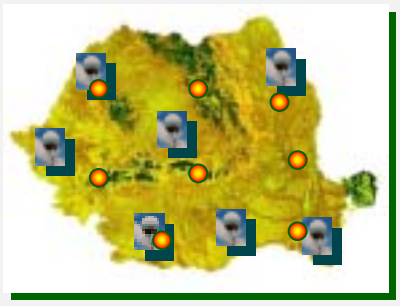
The Weather Service in Romania operates two types of weather radars. These are C and S-band Doppler radars. Immediately upon installation our forecasters faced one challenge that is the storms in Romania have never been before observed with Doppler radar.

Hence it was not known how different the fields of Doppler velocity might be comparing with those cited in literature and if the signatures of severe weather phenomena could be readily detected. After nearly 4 years of observations several of the severe storms attributes have been observed with the Doppler radars.

Although this is a short time for statistical evaluations answers to questions such as what is the prevalent storm type that causes severe weather are beginning to emerge. It is confirmed that rotating storms (mesocyclones) do occur and some have produced tornadoes. These storms are principal causes of strong winds, severe hail, flash floods, and intense electrical activity.

FACAENI TORNADO, 12 AUGUST 2002: RADAR-BASED TORNADO SIGNATURE AND DAMAGE SURVEY

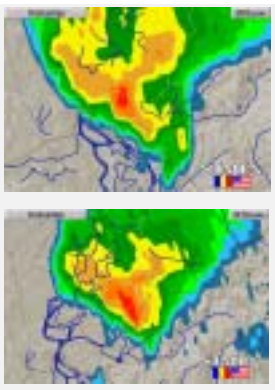


Radar and Lightning detection Networks in Romania

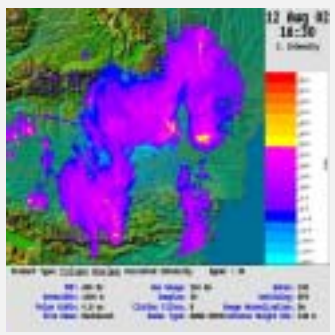
S- and C-Band Doppler Radars (WSR-98D & DWSR-2000C)

Lightning Detectors

Facaeni tornado path, black bold. Footprint produced by the fast moving tornado (about 80 km/h). Danube River in blue.



Reflectivity as measured by the ANM radar for 0.5° antena elevation angle, 12 August 2002, 1700 UTC (top) and 1710 UTC (bottom) respectively few minutes after Facaeni village was struck.



This was the first supercell observed in Romania observed with a Doppler radar. The velocity data were not available

The storm phenomenon was responsible for at least three fatalities, a large but undetermined number of injuries, 33 home destroyed and 428 damaged.
After the event, the forecasters declared in mass-media that the damages were caused by strong winds or by a pseudo-tornado, saying that the latitude of Romania was too far north to permit tornados and the tornados are "confined to the tropics."

Terminology
The survey of the damage path and type indicated an F3 + tornado. However, due to the fact that this phenomena is rare in Romania, it took some time for the terminology "tornado" to be accepted by the forecasters. They prefered to use the term "strong winds".

Damaged power pole within the tornado path (upper) and a destroyed commercially made red brick home in Facaeni (left hand-side) image.

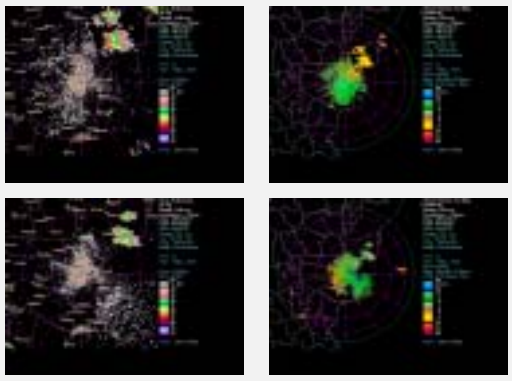
Downed trees along Danube (left hand-side) and destroyed forest near Danube and Facaeni (right hand-side).

FLASH FLOOD PRODUCED BY A HIGH-PRECIPITATION SUPERCELL, 27 AUGUST 2003

About one year after the Facaeni event another supercell was identified on S band radar image in the southestern part of Romania. This supercell was stationary for about 5 hours in the same location producing flash floods in 2 villages. There were two fatalities.

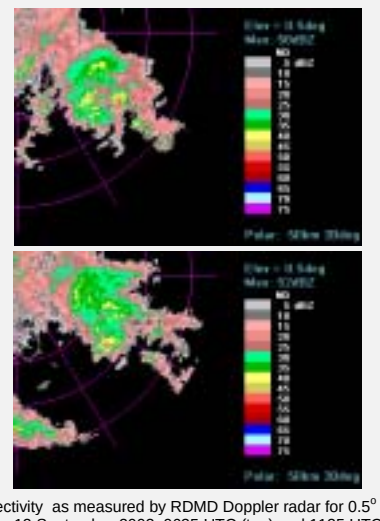
The automatic algorithms helped in identifying the mezocyclone and the posibility of big size hail. The presence of a mezocyclone should be one of criteria for severe convective weather warning but it is not sufficient to rely on algorithms alone for it's identification.

Radar data from RDMD as processed by OmniWxTrac (Baron) application identifying severe weather using automatic algorithms. The image above shows a mezovortex identified in AO location with characteristics enumerated in the Meso "AO" New legend.

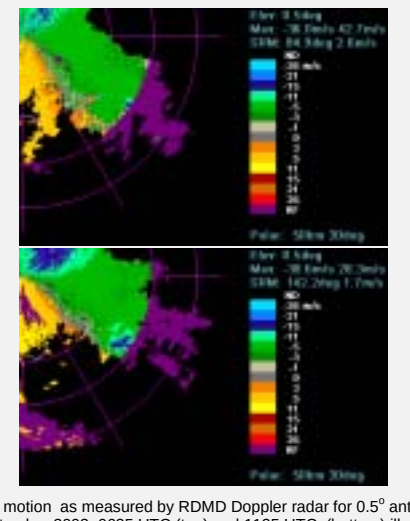


Reflectivity (top and bottom left) and Storm Relative Motion (top and bottom) data as measured by RDMD WSR-98D (located in Medgidia, nearby the Black Sea) for 0.5° antenna elevation angle, 12 September 2003, 0635 UTC (top) and 1125 UTC (bottom) respectively. The images illustrate the quasi-stationary supercell storms.

A MEZOVORTEX OVER THE BLACK SEA, 12 SEPTEMBER 2003



Reflectivity as measured by RDMD Doppler radar for 0.5° antenna elevation angle, 12 September 2003, 0635 UTC (top) and 1125 UTC (bottom) illustrating the mezovortex over the Black Sea.



Storm relative motion as measured by RDMD Doppler radar for 0.5° antenna elevation angle, 12 September 2003, 0635 UTC (top) and 1125 UTC (bottom) illustrating the mezovortex over the Black Sea.

This event was a mezovortex that developed in the western basin of the Black-Sea; two supercells formed in the eastern and then southern part of the mezovortex. The strong winds associated with the mezocyclones produced heavy damage to the Ukrainian ship Slavutici-7 that subsequently sank.

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