

9-10TH JULY 2007 PO VALLEY SEVERE WEATHER OUTBREAK

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I. INTRODUCTION

During the 9-10th July 2007 the Po Valley experienced one of the most severe weather outbreaks of the last years. Two different types of convective systems developed in the afternoon of the 9th of July and during the following night.

Deep convection took place in different areas of the northern Italian plains with the occurrence of tornadic supercells and severe hail storm producers. Different mesoscale conditions across the Po Valley led to this dichotomy of phenomena.

Storm chasers and observers contributed helped through their manifold observations to better understand what happened in these 36 hours.

II. PRESENTATION OF RESEARCH

A detailed synoptic analysis based on global and high-resolution limited area models permitted to define the exact environment within which the convective events took place.

The situation is characterized by the presence of large Atlantic upper-level trough associated with a pronounced jet streak and strong cyclonic divergent flow over northern Italy. A strong temperature gradient was in place across the Alps while the lower levels experienced warm advection from North Africa. A complete frontal system was present at the surface and small scale pressure minimum formed over the region Piemonte at 9 July 12UTC with subsequent eastward propagation. This synoptic configuration gave rise to two distinct kinds of convective systems.

In particular, the western and central part of the Po Valley experienced supercellular tornadic storms and long-lived thunderstorms; i.e. multicellular storms in Piemonte, and tornadic supercells in eastern Lombardia and Veneto. This is consistent with the presence of a pre-frontal dry-line and strong low level jet associated with cross Appennine flow that enforced the positive/clockwise wind shear. Accordingly, an EF-2 tornado was observed in eastern Lombardia, a landspout in eastern Piemonte, and an EF-1 tornado in mountainous terrain of northern Veneto. This is the very first time that three different tornados were observed in the same time-frame northern Italy.

In the eastern Po Valley (Veneto and Friuli) storms developed from the beginning of the 9th afternoon to the end of the following night. An MCS originated exhibiting embedded non-tornadic supercells. The four distinct main severe hail producing storms in Friuli indeed developed in

the region of maximum convective available potential energy (CAPE) and relative humidity; not as severe but similar phenomena took place in Veneto where both CAPE and relative humidity were significantly lower.

A study of the single events was performed with the simultaneous use of ARPAV's multisensor network (radars, MSG satellite and surface network data), pictures taken by observers and storm-chasers, as well as videos and reports. In this event many people experienced the effects of severe weather and large damage was reported due to the direct effects of tornados and hail.



FIG. 1: Main severe weather events locations.

III. RESULTS AND CONCLUSIONS

Radar data from both Veneto C-Band systems allowed to detect all the typical features of supercells (hook echoes, WER, V-notch, FFD and RFD). The Storm Cell Identification and Tracking (SCIT) algorithm helped to both quantify and better understand the severity of phenomena.

For the first time a tornado is observed in a mountainous terrain in Veneto. Pictures and videos taken by storm chasers were in perfect accordance with instrumental data.

IV. ACKNOWLEDGMENTS

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