Analysis of a complex rainfall episode in Catalonia on May 2005

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INTRODUCTION

A convective-stratiform rainfall episode occurred in Catalonia (Fig. 1). Fig. 2) on 16-17 May 2005 has been examined, focusing our attention on radar information. The more interesting frame of this storm was the mesoscale vortex developed at 17th. 00 UTC, which could be related to the precipitation processes themselves. Its initial radius was 100 km but it expanded developing to a synoptic scale vortex six hours later. This mesoscale vortex induced new convection, modified low and midlevel flows and conditioned the dimensions, motion and, therefore, the persistence of the rainfall field.

The analysis of the NWP model operational at the Meteorological Service of Spain (INM) were not able to reproduce correctly this mesoscale cyclone circulation and his evolution, although it generated a mesolow over the Catalonia-Balearic sea (200 km eastward/southeastward of the observed vortex) with its associated circulation, which could be linked to the main synoptic depression located 1000 km westward.

Hourly and daily rainfall accumulations of this event have been derived from radar information. A significant improvement could be observed from the comparison between raw and QC accumulation fields (especially, after correcting for radar attenuation). However, the effects of bright band contamination and path attenuation by rain remain in corrected fields and limit the quality of rainfall estimates from radar.

SUMMARY AND CONCLUSIONS

A weakening cold front and a cold low (-28 ºC geopotential height and wind fields analyzed by our attention on radar information. The more interesting feature of this storm was the mesoscale vortex developed at 17th. 00 UTC and the other developed a few hundred kilometers to the north (Fig. 22). From initial time to 04 UTC it is easy to follow the vortex with Z imagery but after this time, changes in Z field dimensions and pattern made difficult to identify it. From 06 UTC to 08 UTC the evolution is more complex. From INM Aragon radar it is possible to follow southwestward vortex movement (Fig. 23), but motion fields obtained from Catalonia radar (Fig. 24) shows an opposite movement (to the east). After a detailed subjective analysis has been concluded that from 06 UTC two vortices can be discriminate: the first moving westward and disappeared in a short time and the second one moving eastward with spiral structure around vortex. The system only showed a cold front (-20 ºC to -25 ºC), where mesoscale vortex developed, accompanied during the first hours of the event by scattered areas of stratiform precipitation. The visual radar be line developed at 06 UTC (Fig. 25) and was extended to the east, with a new vortex forming in an area near the cold front and conditioned by the mesoscale vortex.

REFERENCES

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