

HAIL FORECASTS WITH NWP DERIVED INSTABILITY INDEXES

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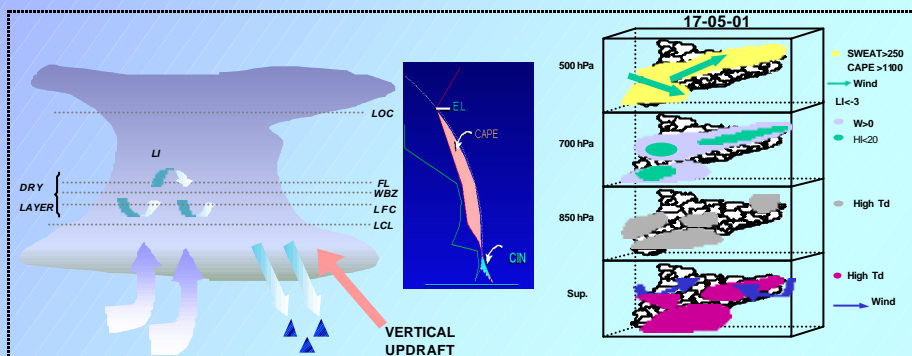
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Hailfall is one of the severe weather phenomena that often occur in Catalonia (NE Iberian Peninsula). It may cause significant structural damage in buildings or cars, and the effects on crops may be critical in intensively cultivated areas. A combination of dynamical and thermodynamical processes originate hailfall producing storms and, in some cases, local orography and the particular local geographical situation of the area where they take place may play an important role.

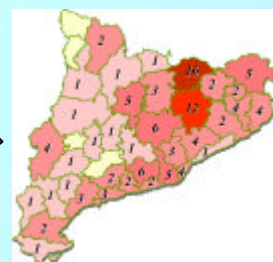
From the storm forecasting experience there has been an increasing interest to obtain an improved procedure based on a simplified conceptual model to describe and forecast hailfall. In such model, the relevant ingredients that favour hail occurrence are: low level warm and humid air supply, dry midlevel, strong vertical updrafts, latent heat release in midlevels due to water phase change in clouds and strong windshear, keeping convection in tropospheric midlevels.

CONCEPTUAL MODEL



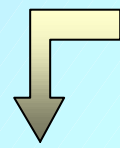
ANALYZED HAILFALL DAYS

(110 cases aprox)



All atmospheric properties are reflected in a number of stability indexes considered, which among others include CAPE, SWEAT, Wet Bulb Zero and Lifted Index. The indexes were calculated from the output of the operational runs of the MASS model.

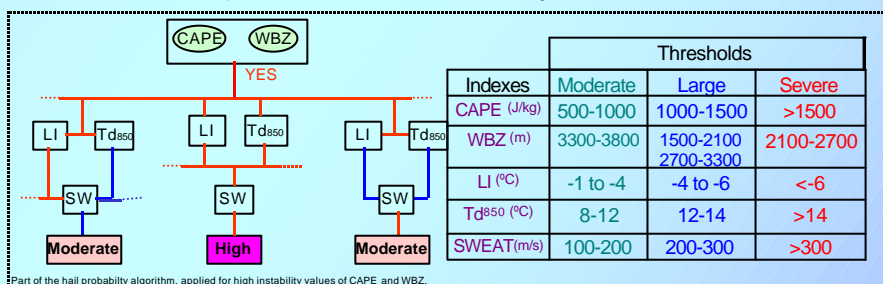
Using ground and radar observations, some hailfall events have been analyzed in order to discuss the performance of the algorithm and the behaviour of the hail forecast.



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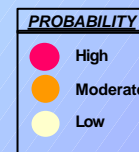
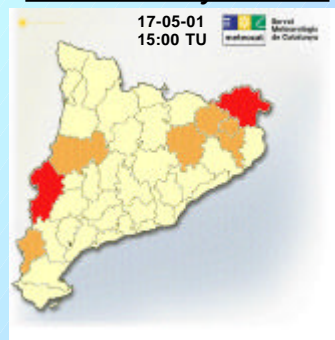
ALGORITHM

The objective is to derive an algorithm from the conceptual model to produce a probabilistic hail forecast, combining the different indexes considered.



Final product

Hail Probability Forecast



CONCLUSIONS: In this study a NWP hail probability algorithm has been constructed using 110 hailfall cases, and five events like the previous one shown have been used to verify it.

The results have been satisfactory in all zones observed with the radar. However, we have detected some areas where the algorithm fails, so it needs some adjustments. In the future we pretend to improve the algorithm using the parameters from radar data.



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