A PRELIMINARY ANALYSIS OF SUMMER SEVERE STORMS IN THE BASQUE COUNTRY AREA: SYNOPTIC CHARACTERISTICS

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I. INTRODUCTION

Short and medium range forecasts of scenarios that can cause adverse meteorological phenomena have suffered a large improvement in the last years. The actual computational resources, that permits execute numerical mesoscale models with high resolution, joint to the improvements in parameterizations and better satellite products have contributed to this progress in forecasts.

Despite of these improvements, quantity precipitation forecast continues being very difficult to prognosticate.

Numerical Weather Prediction models (NWP) have high efficiency in rain forecast of stratiform precipitation, frontal pass and persistent precipitations; however, in convective situations some uncertainties appear, specially, in time, location and amount of precipitation.

II. PRESENTATION OF RESEARCH

Severe storms events for the summer period (defined from May to September) for the last 6 years have been considered. Cases are selected basing on a precipitation rate threshold criteria and lightning activity presence. Events with precipitations that exceed ten millimetres in ten minutes usually produce some kind of problems in this area, so, days with this threshold surpassed in any rain gauge from the automatic weather station network of the Basque Country are considered.

For these selected situations, some relevant synoptic fields are used; 500 hPa topography, sea level pressure and some instability indexes are taking into account. The propose of this work is to do a preliminary study of the synoptic situations associated with these summer storms events, in order to characterize these severe weather events and to improve some prediction techniques that are used in the operational weather forecast in the Basque Country Meteorological Agency.

III. RESULTS AND CONCLUSIONS

In summer period, as above defined, the troposphere is warmer and can afford more water vapor. During July, August and September the sea temperature is the highest of the year. In August of 1983 happened the most important flooding in the Basque Country in the last years. This flooding event caused several damages.

The TTI value is the instability index that produces better results in the forecast, for our region, of storms produced by thermal instability. The analysis of this index gives us the probability of severe storms. These severe storms can surpass 10mm in 10 minutes or 30mm in 1 hour, with strong wind gusts and hail episodes associated. Anyway, thermal and dynamic instability must exist to generate/create serious floods; the most singular situations for this case are the cold pools in high levels.

Convective intense precipitations, usually, are observed with barometric swamps or relative thermal lows, i.e. few defined situations in surface. In these situations, the type of pattern is local and the surface synoptic patterns give little information, because there are very slight pressures gradients. In high levels can be observed zone, meridian or detached circulations, but the dynamic instability is not too strong. In all these cases weather forecasts are very complicated. Is very important the analysis of instability indexes, buoyancy, Q-vector divergence in different levels, convergence areas in low layers, precipitable water, potential vorticity, etc. This information completes the little information obtained from synoptic surface configuration

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