An Evaluation of ECMWF Analyses Sounding Parameters in Thunderstorm and Severe Local Storm Forecasting for Europe.

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I. INTRODUCTION

This study describes the environmental atmospheric characteristics in the vicinity of local severe storms in Europe during 2006 and 2007. Parameters of nearby radiosoundings were analysed to classify thunderstorms into none, weak and severe events.

II. PRESENTATION OF RESEARCH

Severe weather events from the European Severe Weather report Database ESWD (http://eswd.eu) were used to get information about different types of convective severe weather: damaging winds > 25 m/s, tornados and funnel clouds, large hail > 2 cm and heavy precipitation.

Additionally, we focused on significant tornados (F2 or more) to obtain severe events without large reporting biases. A selection of cases excludes coastal and maritime effects.

High resolution ECMWF Analyses from the T799 model were used, which are available for 2006 and 2007. The operational datasets from ECMWF cover Europe with spatial grid resolution of about 25km, temporal intervals of 3 hours and 91 vertical levels. This aspect allows us to create close pseudo proximity soundings to investigate environmental conditions associated with severe thunderstorms.

The use of high-resolution data sets takes into consideration, that in Europe local influences, e. g. from orography, are predominant. For example, in Austria a typical value of the relative storm helicity (0-3km) for severe convective events is approximately 85 m²/s² accompanied by moderate CAPE. This value is low in comparison with significant severe environmental conditions in the US central plains.

Lightning data were analysed to distinguish and classify thunderstorm activity on a European scale into three categories: none, weak and strong.

These data were compared to the ESWD data and ECMWF data, from which proximity sounding parameters are calculated: low level and deep shear, CAPE, instability index, LCL height and cloud top information .