



Environments conducive for severe convective winds in Europe

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Each year severe convective storms in Europe cause damage to businesses and personal property and can cause fatalities. For example, a single convective windstorm in Poland in 2017 brought down tens of thousands of trees, resulting in 6 fatalities. Between 1950 and 2000, research on such European windstorms was relatively scarce. The European Severe Weather Database (ESWD) became operational in 2006 to collect and provide detailed and quality-controlled information on severe convective storms across Europe, and in turn, has enabled further understanding of the environments favourable for such events.

Other hazardous convective weather, such as hail and tornadoes, have attracted increasing interest in recent years in Europe, whereas non-tornadic severe winds, which usually originate from the storm's downdraft, remain relatively unexplored. In this study, radiosonde data within a defined distance and time of the severe convective windstorm are analysed to infer information about the storm environment. Furthermore, this information will be combined with the OPERA European radar dataset to produce a climatology of storm morphologies, something that is not thought to have been done before in published literature.

ESWD data shows 11,356 reports of severe convective winds occurring between 2000–2018, with 84% reports in summertime, over half occurring between 1500–2100 local solar time, and the highest density in central Europe, particularly in Poland. Preliminary radiosonde analyses show that severe convective winds occur when both 0–1-km and 500–700-hPa lapse rates are steep, and when most unstable convective available potential energy and 0–6-km wind shear are large. The next stages of research will evaluate the synoptic environments and storm morphologies of severe convective wind events.