



ECSS2025-107, updated on 18 Apr 2026

<https://doi.org/10.5194/ecss2025-107>

12th European Conference on Severe Storms

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Assessing tornadoes and downbursts in Catalonia: field surveys and operational insights

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Catalonia (32,000 km², northeast of the Iberian Peninsula) is affected every year by 5-10 severe convective damaging winds events (e.g., tornadoes, downbursts, or straight-line winds), posing risks to people, property, and public infrastructure. Although such events can occur throughout the country, they are most frequently observed in the coastal and pre-coastal areas, where the metropolitan areas of Barcelona and Tarragona are located.

Since 2020, the Meteorological Service of Catalonia (SMC) has systematically conducted in-situ damage surveys following reports of convective wind events. The objectives of these surveys are to (i) identify the phenomenon type, (ii) estimate the intensity using the International Fujita scale, and (iii) delimit the affected area. Over this five-year period, 11 reports have been published, encompassing 16 fieldworks. The Spanish public reinsurance company (*Consorcio de Compensación de Seguros*, CCS) has paid €2.6 million in compensation for damages caused by the analysed events.

The findings from these field surveys contribute to the development of a climatology of severe weather events, support the validation of severe weather early warning systems, and serve other scientific purposes including case studies. Furthermore, the reports are considered by insurance companies and the CCS, given that tornado damage is always covered by insurance in Spain, whereas other wind-related damage is only covered if wind speeds exceed specific thresholds. The information is also disseminated by the media due to its public relevance.

This work presents the SMC's procedure for responding to severe convective wind events and its experience in surface-based damage assessment acquired over recent years. It also describes the incorporation of drones as a complementary tool, in collaboration with the Catalan Rural Agents Corps—an environmental law enforcement agency similar to forest rangers in other countries—which provides valuable support in obtaining a general overview and detailed damage information, especially in forested areas and complex terrain.