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Crowdsourced severe weather reports in a high-impact situation: a showcase and its implications to maximize their value and usability

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On 23 September 2018, an unusually intense autumn storm named “Fabienne” crossed central Europe. The overall affected area was smaller, but the density and peak intensities of damages easily stand comparison to those of the infamous winter storms “Kyrill” 2007 and “Emma” 2008. Outstanding wind gusts occurred in central and southern Germany and the Czech Republic with the passage of a convective line that formed at the cyclone’s cold front. Short-range forecasting and nowcasting of this highly volatile storm was particularly challenging due to the striking concentration of damaging winds in space and time in conjunction with their extreme intensities, significantly enhanced by deep convection. Apparent discrepancies between routinely measured wind gusts and first damage reports immediately after the event added to a momentary confusion about this storm’s impact, intensity and dimensions.

This study presents the results of a comprehensive “ground truth” analysis obtained by the collection, location and intensity rating of more than five thousand available damage reports from action force units and eye-witnesses. The overarching goal is to highlight the enormous added value of crowdsourced information about severe weather events and their impacts. However, also important weaknesses of this information need to be discussed, which are related to its oftentimes purely qualitative character, its irregular distribution in space and time, and its inherent incompleteness.

These properties imply that the interpretation and processing of crowdsourced information must be substantially different to that of routinely available station measurements. A strategy is drafted to accentuate its strengths, mitigate its weaknesses and optimally contextualize it with conventional meteorological data. It is envisaged to help paving the way to a common “best practice” for a maximum usability of crowdsourced information for verification of operational severe weather warnings as well as for climatological studies.

Special emphasis is placed on the benefit of a real-time availability of severe weather reports, especially related to convective storms. While reports from voluntary observers are increasingly encouraged and used, e.g. through ESSL’s EWOB app and comparable initiatives on national levels, an inclusion of action force unit data is still surprisingly underdeveloped. However, they would play a crucial role to establish a real-time feedback loop between issuers and users of severe weather warnings. Thought experiments are run through for the actual “Fabienne” cyclone and finally close the circle back to this recent high-impact storm.