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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "The XWS open access catalogue of extreme European windstorms from 1979–2012" *by* J. F. Roberts et al.

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Dear colleagues,

I have a comment regarding this conclusion (page 2027, line 5):

"We conclude that the underestimation of strong gusts (> 25ms−1) apparent in some storms is due to the underprediction of the geostrophic component of gusts, resulting from the underestimation of the central pressure depth and strong pressure gradients."

I agree that the underestimation of strong pressure gradients and cyclone depth contributes in general to the underespredictions of geostrophic winds and wind gusts in RCM simulations of windstorms. However, the underestimation of pressure gradients

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is not the main reason for the underestimation of wind gusts associated with windstorm Kyrill (one of the considered case studies). Storm Kyrill featured strong convection along the cold front, which lead to heavy precipitation, heavy convective gusts and even tornados (see Fink et al., 2009, for a general synoptic description and impacts). In fact, Kyrill is one of the two first identified "winter derechos“ over Europe (Gatzen et al., 2011), the other being storm "Emma“. The resulting "stripes“ on high gusts in the windstorm footprint can be clearly seen in the RCM simulations with COSMO-CLM at 7km resolution (e.g. Haas and Pinto 2012, Fig. 1c) and on the resulting heterogenity of the observed surface gusts over Germany (cf. Seregina et al., 2014, Fig. 9). The "stripes“ in the windstorm footprint of Kyrill are due to convective gusts associated with strong downdrafts along the cold front, as recently analysed by Ludwig et al. (2014, "Dynamic aspects of windstorm Kyrill (January 2007)“, Monthly Weather Review, submitted manuscript) with COSMO-CLM simulations at 2.8km. A general discussion on the reasons for the spatial and temporal heterogenity of wind gusts (due to the turbulent nature of the phenomena) can be found in Born et al. (2012) and references therein.

Given the above, I would like to suggest weakening the statement in page 2027, line 5, and refering that the underestimation of the pressure gradients is one of several mechanisms that may lead to the underprediction of gusts. However, for example for the storm Kyrill, the underestimation is also associated with the occurrence of heavy convective gusts (see reasoning above). Eventually, it could be helpful to pick up another case study, where the argumentation with the pressure gradients is less ambiguous. A further conclusion could also be that "windstorms featuring heavy convective gusts cannot be fully resolved with this set up“.

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Refs: Born et al. (2012) Wind gust estimation for Mid-European winter storms: towards a probabilistic view. Tellus A, 64, 17471

Fink AH, et al. (2009) The European storm Kyrill in January 2007: synoptic evolution

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and considerations with respect to climate change. Nat Hazards Earth Syst Sci, 9, 405-423

Haas R, Pinto JG (2012) A combined statistical and dynamical approach for downscaling large-scale footprints of European windstorms. Geophys Res Lett, 39, L23804

Gatzen C, et al. (2011) Two cold-season derechoes in Europe. Atmos. Res. 100, 740-748

Seregina LS, et al. (2014) Development of a wind gust model to estimate gust speeds and their return periods. Tellus A, 66, 22905

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