

Interactive comment on “Wind turbine impact on operational weather radar I/Q data: characterisation and filtering” by Lars Norin

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Received and published: 20 February 2017

General comments

The paper addresses the problem caused by the clutter from wind turbines on weather radars. It characterise the clutter signature, in order to automatically identify echoes from wind turbines. Additionally, it proposes a filtering method to identify and remove the clutter from wind turbines that provides quite good results. Both the characterization of the wind turbine signatures and the evaluation of the efficiency of the proposed filtering technique are based on a huge dataset recorded by a weather radar of the SMHI network.

Though previous works have been developed in the recent years to characterize the signature echoes from wind turbines, all of them were developed under the assumption

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of a fixed radar beam pointing at the wind turbine during several seconds. Till now, none of these studies has analysed the real situation of a scanning radar beam, where the wind turbine is illuminated during a very short time. In this last case, the signature from the wind turbine is more difficult to obtain, and therefore, to filter it out in the radar receiver. This study addresses this complex situation, based on a wide dataset from measurements and a thorough analysis of the recorded data. Additionally, a filtering technique is proposed and applied to the recorded dataset. Results seem to be really good and the proposed filtering technique seems to be efficient. Though there is still further investigation to be done (close wind turbines and effect on other radar moments such as radial speed and spectrum width), the research line is really promising and encouraging.

Specific comments

The paper is adequate for the topics and the scope of AMT. The topic is timely and of interest for the research community. It addresses a significant problem for weather agencies that requires detailed research. The manuscript is well structured and the organization of the contents is logical and easy to follow. The abstract provides a clear and complete summary of the content of the paper. The methodology, the results and the subsequent analysis are well argued and described. The description of the analysis is sufficiently detailed to allow the reproduction of a similar study. The figures are clear and they provide helpful information for a better understanding. The conclusions are thoroughly argued and discussed along the text of the paper; they are in line with the results shown in the paper. The methodology is properly referenced; references included in the manuscript are appropriate and provide a good view of the state of the art of the recent research. In summary, the quality of the paper is very high, the methodology is solid and the results useful and interesting for the research community.

Questions to the author

Author states that the shape of the normalised signature is independent of the yaw

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angle of the wind turbine. Nevertheless, results from several studies referenced in the manuscript show differences in the amplitude of the echoes up to 40-50 dB, due to the variability of the scattering pattern of the rotor. One of the references of the paper demonstrates that these variations do not occur for a short range of elevation angles, as the mast is the main reflector in this sector (Angulo et al., 2015, referenced in page 8, line 27). Does the author think that this is the reason of the absence of variability with the yaw angle? If not, what could be the reasons that could justify this unexpected result?

Technical corrections

Just a minor comment about the description of the results. In some sentences, mainly those in the first part of the manuscript, where the methodology is still to be described, it should be clearly specified if signatures from wind turbines are normalised or not; otherwise, this may cause ambiguity. As an example, the sentence in the abstract "...is manifested as a distinct and highly repeatable signature. The shape of this signature is found to be independent of the size, ..." may be understood as the size of the turbine is not relevant for a not-normalised signature. A review according this aspect is recommended.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-12, 2017.

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