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Atmospheric Measurement Techniques Discussions

Interactive comment on "A quantitative analysis of the impact of wind turbines on operational Doppler weather radar data" *by* L. Norin

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Reply to Anonymous Referee #1

Let me start by thanking the referee for his/her constructive comment and suggestion that have led to clear improvments in the manuscript. Below, please find a reply to the comment (reproduced in part in italics).

Specific comments

My lone concern comes in the attribution of the deviations from normal in radar scan data above the wind turbines to anomalous propagation as opposed to increased turbulence or sidelobes. The authors use a fairly coarse method of assigning blame by

divvying up the year into periods in which anomalous propagation (AP) is likely based on typical thermodynamic profiles associated with specific seasons. I am unfamiliar with Swedish boundary layer structures, and so I don't know how representative a typical sounding is of the atmospheric conditions on any given day. It may be that this method is acceptable given appropriate justification of the typical structure. However, it seems like there are more elegant ways of discerning if AP is present. Obviously, scans could be matched up to individual soundings, but it may also be possible to investigate non-turbine impacted cells for evidence of AP. If AP is present, for example, cells azimuthally adjacent to the turbines would show an expected temporal change in reflectivity as the inversion develops; if both turbine cells and non-turbine cells are showing the same general form of a change in reflectivity with time, AP is a stronger candidate to be the culprit than if the temporal change in reflectivity is limited to the turbine cells. These kinds of analyses would provide a stronger case that the enhanced spectral moments are due to AP.

I thank the referee for the suggested analyses. An extended investigation of anomalous propagation has been performed for the period April 2010–December 2013 (after the construction of the wind farm). Beam propagation using ray tracing was calculated every hour using vertical profiles of refractivity (constructed using data from Sweden's operational NWP model). The results of the investigation show that anomalous propagation is unlikely to be the reason for the impact observed on scans with higher tilt angles. A new section has been added to the manuscript that discusses anomalous propagation, increased turbulence, and radar sidelobes.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 8743, 2014.