WIND
ENERGY
SCIENCE
DISCUSSIONS

Interactive comment on "Wind inflow observation from load harmonics" *by* Marta Bertelè et al.

Marta Bertelè et al.

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Reply to Reviewer 1

We thank Reviewer 1 for the detailed analysis and constructive inputs. A list of point-by-point replies to the Reviewer's comments is detailed in the following.

Reviewer *Excellent paper with clear explanations and detailed analysis. The introduction and conclusion sections are especially well crafted in explaining the motivation, background references and motivations for the work. The analysis is convincing and thorough. Great!*

Authors Thanks!

Reviewer *One detail I struggled to comprehend was the distinctions made on page 8 and continuing, regarding white box (I don't know what this is, could you define?), gray box and black box. The authors say they are switching to black-box from page 8 forward, and yet it still seems a lot of internal structure is maintained, for example which harmonics to include in the model. Somehow when I hear black-box, I think of completely blind structures, like neural networks, where there is an input-output relationship, but the internal structure is not physically meaningful in anyway. I prefer the approach in the paper which I would have thought is gray in that it seems like estimation of harmonic coefficients, but is that a misunderstanding? Or is the translation to harmonics performed external to the black box? Also on page 8 it is said that the disadvantage of black-box is a necessary rich data-set. I typically add that the internals of a black-box are perhaps without physical interpretation, but this is somehow not true of this work? Sorry for a long point, but perhaps some further explanation around this point could be included.*

Author We have added the definitions of white, gray and black box models, and we also cited the following reference on this topic: Ljung, L.: Perspectives on system identification, Annual Reviews in Control, 34(1), 1–12, 2010.

The reviewer is right in pointing out that, while on the one hand we use a black box (blind) approach, on the other we bring some structure (and knowledge) into it when we defined as outputs the load harmonics. However, this operation comes prior to the definition of the model that, as a result, is defined as in Eq. (10). We have modified the text to make this point clearer.

Reviewer *Another point of confusion for me is at the top of page 14, there is a 2xRev harmonic discussion, but I thought I had understood from earlier explanations that only 1xRev harmonics are included because of challenges in interpreting 2XRev.*

Authors The fact that only $1\times$Rev harmonics should be included in the models is one

of the results of the paper, and it is anticipated in the Introduction. At page 14 this results has not yet been obtained, and the paper still treats the general case of multiple harmonics. It is only immediately later on, in section 2.3.6, that the reason why 2×Rev should not be considered is explained.

Reviewer *Small comments: equation (37), what is meant by the tildas?*

Authors The symbol means 'approximately'. We added the definition of this notation immediately after Eq. (37).

Reviewer *figure 15, what is the averaging window length?*

Authors 10 minutes, and this has now been added to the text.

We have taken the opportunity to make several small editorial changes to the text, in order to improve readability. A revised version of the manuscript is attached to the present reply, with the main changes highlighted in red.

Best regards.
The authors