Interactive comment on "Combined neural network/Phillips-Tikhonov approach to aerosol retrievals over land from the NASA Research Scanning Polarimeter" *by* Antonio Di Noia et al.

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We thank Reviewer 2 for his/her comments. Below is our reply. The Reviewer's comments are highlighted in bold, our replies are in plain text.

Application of the neural network approach to airborne RSP measurements shows performance comparable with Phillips-Tikhonov approach with neural network first guess. This result seems a little bit confusing and requires more discussions in the manuscript, taking into account big potential of Phillips-Tikhonov approach with neural network first guess. It would be useful if authors could provide also some results of the synthetic test data retrieval both

with Phillips-Tikhonov approach and the neural network approach. In this case it would be possible to compare two approaches on the same controlled synthetic data set.

We have followed the Reviewer's suggestion. We have added a section to the revised paper, in which the results of a comparison between the combined algorithm (neural network + Phillips-Tikhonov) and the neural network alone on synthetic test data are shown.

Figures 10-13 do not contain any statistical characteristics like RMSE, BIAS, Correlation coefficient, number of used data. Adding these characteristics similarly to Figures 3-7 will make the presented results more clear.

We would prefer to keep the error statistics in a separate table, as it is in the current version of the manuscript. We feel that showing the statistics directly in the figures would make the figures overly filled with text. The figure captions point to the table in which the statistics are summarized, thus we believe there should be no risk of confusion for the reader.

On page 18 it is written: "We empirically found that a retrieval can be said to have converged successfully if it achieves a goodness-of-fit parameter smaller than 2." Looking at Table 4 and Figure 9, one can conclude that the percentage of the "converged retrieval pixels" is very small. To better understand the convergence of the approach, the percentage of "converged retrieval pixels" would be very useful as additional parameter, for example, in Table 4.

Table 4 would probably not be the best place where to summarize this percentage, because its goal is rather to show the dependence of the validation statistics on the co-location distance. At page 21 in the revised manuscript we mention that approximately 10% of the retrievals converged to a chi2 less than 2, and at page 25 we mention that this is probably not due to the neural network approach, since with the previous version of the algorithm (not employing the NN) the fraction of converging retrievals was even

smaller. In the revised version of the manuscript, we also summarize this information in the conclusions.