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Interactive comment on "A comparison of four receptor models used to quantify the boreal wildfire smoke contribution to surface PM$_{2.5}$ in Halifax, Nova Scotia during the BORTAS-B experiment" *by* M. D. Gibson et al.

Anonymous Referee #2

Received and published: 19 October 2014

Summary: This manuscript describes a comparison of different receptor models. The work appears relatively novel and appears to merit publication. However, I do not have direct experience of the application of such models and hence my review comments are general in nature.

Improvements to the manuscript are necessary to clarify details of the methods used, and the results reported. I have suggested some possible ways of addressing these points below.

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Abstract: It would be beneficial to include a brief quantitative summary of key metrics of model performance to illustrate why one model is preferred over the others etc.

Methods: It would be useful to highlight which combinations of the metrics of model performance are regarded as being indicative of suitability for the application.

Results & Discussion: It would be more succinct and would aid comparison between models to combine Tables 4-6.

The data in Table 7 could be incorporated within Figs 1-4.

It would be more succinct and would aid comparison between models to combine Figs 1-4 in a composite figure with 4 plots. It would also be beneficial to keep the axis scale ranges the same in each plot to aid comparison.

It would be more succinct and would aid comparison between models to combine Figs 5-8 in a composite figure with 4 plots. It would also be beneficial to keep the axis scale ranges the same in each plot to aid comparison. There is limited interpretation of the data in Figs 5-8; hence it would appear to be of benefit to include further discussion of these figures. The existing discussion of Ni and V concentrations is unclear.

I'm not convinced by the authors' suggestion that models with intercepts in mod-obs plots are 'not able' to predict below the intercept value. The prediction can presumably be made from the regression line in the mod-obs plots with a quantifiable metric of uncertainty (which could be given and which is different from being 'not able'). Similarly it would be more appropriate to refer to the 'lowest' rather than the 'best' intercept.

Conclusions: The implications of the findings for wider research could be outlined in a clearer and more direct manner.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 24043, 2014.

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