

## ***Interactive comment on* “Black carbon ageing in the Canadian Centre for Climate modelling and analysis atmospheric general circulation model” by B. Croft et al.**

**B. Croft et al.**

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The authors wish to express their thanks to referee 1 for the helpful comments, which have assisted in the revision of this manuscript. Our response to these comments is addressed point by point in the text below.

The authors agree that the BC ageing due to the chemical processes is associated with the greatest unknowns. The discussion in relation to the oxidation parameterization has now been rephrased. We model the contribution due to oxidation to be small, and discuss why this was done in terms of previous studies and our results from the COND-COAG simulation. However, we no longer state that our results 'show' or 'can be used

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to lead to the conclusion' that the contribution from oxidation on a global scale is small. This is simply not known conclusively as yet.

We agree that more detailed equations related to the prediction of number densities and deposition should be included in the manuscript and these have been added.

The outlook section of the conclusion has been adjusted to make the main points as concisely as possible, in particular with regard to future research directions.

Specific comments:

In our opinion, the further shortening of the names for the individual runs might make it more difficult for the reader to retain the meaning of the actual simulations, and so we have not adjusted these at this time. However, we do add a table that summarizes the assumptions related to the individual model runs. Shortened names were used to create a legend for Figures 10-12.

Figure 2: subplot 1000-2000 m AGL is now 1000-6000m AGL.

Figure 3: Ordinate is labelled.

Figure 5: Ordinate is labelled.

Figure 7: Headings are as shown on left side subplots.

Figure 9 and 10: Legend using the suggested abbreviations is included.

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