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

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This in an interesting paper on the importance of ageing processes. Since a number of years modellers make assumptions that are essentially similar to the ones made by Cooke and Wilson in the 90s, without proper evaluation of the importance of these assumptions. Meanwhile more measurements are available and it is time to make such an evaluation.

Let me first remark that I prefer the words 'insoluble and mixed' rather than 'insoluble-soluble' describing fresh BC and aged aerosol; there is quite some incorrect use of the

term solubility in the literature (see also abstract).

When I understand the paper correctly, all three ageing schemes are relatively fast and converge to a lifetime of approximately 5-9 days. Can the authors based on an evaluation with measurements make a statement which scheme is better?

I found the sensitivity study with the emissions not very relevant for this study. In contrast I would recommend to perform all or some analysis on different model resolutions; I would expect a rather strong impact on 1) the lifetime of aerosol itself and 2) the relative impacts of the ageing parameterisations, due to non-linaerities in wet removal processes.

One last question: the main removal process in the 'no-ageing' simulation is still wet removal. Does this refer to below cloud scavening and is this the same for fresh and aged BC?

kind regards,

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