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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effects of resolution on the relative importance of numerical and physical diffusion in atmospheric composition modelling" *by* M. D'Isidoro et al.

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We acknowledge the comments made by the anonymous referee #1 that helped us improving the readability of the paper. In particular, the title was reformulated to be more specific; we avoided the wrong use of the "competition" concept: in fact the two effects are not in competition as they have, forcedly the same sign. We also tried to present conclusion in an extended way. Manuscript was edited by a native English editor.

Detailed answers to all specific comments follow:

- *In the title the explicit reference to horizontal resolution and advection should be*

made. The present formulation is too generic and misleading

The Title has been rewritten adding explicit reference to horizontal diffusion.

- Editing of the paper by English editor is required. Several are the examples of sentences that just do not sound right like:" Broadly speaking, this smoothing is the same as to applying a filter in the wave number space, retaining only small wave numbers." Or "A systematic analysis of the relative importance between numerical and physical diffusion at different spatial resolutions is in order."

The manuscript has been edited by an English editor.

- At paragraph 5 at page 22867 the authors refer to competition. C8684 Strictly speaking I do no see a competition between numerical and physical diffusion for the simple reason that they are both diffusion and they work to produce the same result, whereas competition may imply contrast. I would refer to determining the conditions according to which one may dominate on the other in controlling the diffusion process

The paragraph has been rephrased.

- It should be specified that R is the horizontal dimension of the source

The term horizontal has now been specified in paragraph 3.1.

- Paragraph 5 page 22873 beginning, rephrase with: "The non-dimensional time at which the size of the puff is equal would be equal for a purely physical and a purely numerical growth can be computed combining Eqs. (14) and (15) by: . . "

The sentence has been rephrased as suggested.

- The conclusions are too synthetic,argumenting more extensively the findings of the paper could only be beneficial. With respect to the last sentence it would be nice to give numbers and figures corresponding to the typical air quality resolutions just to make your result more attractive to model users.

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The Conclusions have been rewritten and extended.

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