**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.

Anonymous Referee #1

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The paper is synthetic and effective in presenting the arguments. I have no objection to the publication provided that the following minor comments are taken in to account:

- In the title the explicit reference to horizontal resolution and advection should be made. The present formulation is too generic and misleading - 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." - At paragraph 5 at page 22867 the authors refer to competition.

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

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 22865, 2009.