

Interactive comment on “The dispersion characteristics of air pollution from world’s megacities” by M. Cassiani et al.

Anonymous Referee #2

Received and published: 7 December 2012

This paper presents calculations by a state-of-the-art Lagrangian Particle Dispersion Model on the environmental impact of megacities on themselves and their regional to global surroundings. Detailed plume dispersion studies are performed for several artificial tracers based on black carbon and within a 48-day time window. My impression of this paper is more positive than that of reviewer #1, and I recommend publication, although I agree that the complete absence of measurements or evaluation is a weakness. However, the main purpose of this paper is as far as I understand, a comprehensive and consistent comparison between many different megacities at different locations and with different meteorological conditions using the same scientific tool and same type of analyses. It should be made clear in the paper that for this type of study only a model can be used and an evaluation against measurements for each of the studied megacities would be beyond the scope of this paper. In addition more refer-

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ences have to be given on previous dispersion studies where FLEXPART has been successfully evaluated (more recent than Stohl et al 1998).

A general comment is that the paper is very long and tiresome to read. Since I have not written down all the instances where less important information is given I'll let go. But for future publications the authors are encouraged to be more concise, focus less on small details and more on the important things (my feeling is that this paper could be at least 30% shorter without loss of value).

Minor revisions (page numbers given as xx in '263xx')

page 53, line 7/8: '...outside the city boundary...', 'inside the city boundary'

page 53, line 14: 'ten millions' -> 'ten million'

page 53, line 23: rewrite as 'Lawrence et al. (2007), called LO7 in the remainder of this paper, investigated...'

page 54, line 14: remove comma after 'domain'

page 54, line 17: 'question' -> 'questions'

page 54, line 20: 'near ground' -> 'near-ground'

page 55, line 15: 'of significant numerical' -> 'from significant numerical'

page 56, line 2: remove comma after 'as'

page 56, line 3: '...41, 41...' -> '...41, and 41...'

page 56, line 6: 'see later' -> 'see below'

page 56, line 20: 'Notice' -> 'Note'

page 57, line 22: remove 'of the latitude' (2x)

page 58, line 26: remove comma after 'extracted'

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page 59, line 12: 'apparent how initially' -> 'apparent that, initially,'

page 61, line 4: rewrite '... the distance, on the Earth sphere, of the center of the grid point with indices (i,j) from the source position.' -> '...the distance, along the Earth's surface, between the center of the grid point with indices (i,j) and the source position.'

page 61, line 10: 'noticed' -> 'noted'

page 64, line 10: 'did not split grid cell' -> 'did not split grid cells'

page 66, line 1: 'Figure 8b reports' -> 'Figure 8b shows'

page 66, line 13: 'this additional factor' -> 'this factor'

page 66, line 19: 'explain' -> 'explains'

page 69, line 6: 'non European cities' -> 'non-European cities'

page 69, line 27: NYC is not 20 times larger than St. Petersburg. I know you have this from your table 1, but these population figures must have been derived differently (and thus inconsistently) for the two cities. For NYC 46 million includes the entire 'agglomeration', for St.P. 2.6 million is probably only within the administrative boundary. For an emission impact study one should use the agglomeration number in both cases.

page 70, line 5: 'as large as that' -> 'as large as those'

page 70, line 29: BCtr and BCdp

page 71, line 28: 'Saint Petersburg (population 2.6 million)', see above.

page 72, line 11: contributions

page 72, line 19: 'due to the generally longer distances' I think another important reason is the generally weaker meridional transport in the Southern Hemisphere, isn't it?

page 73, line 6: 'as well' -> 'also'

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page 73, line 9: São Paulo

page 75, line 9: values

page 75, line 21: 'this threshold' or 'these thresholds'

page 75, last line: São Paulo (or Sao Paulo), here and everywhere

page 78, line 12: again, 2 million seems low

page 78, line 16: 500 millions -> 500 million

page 79, lines 6/7: BCtr, BCdp

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