**Atmospheric
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Discussions

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Interactive comment on "Factors controlling pollutant plume length downwind of major roadways in nocturnal surface inversions" *by* W. Choi et al.

Anonymous Referee #1

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General

The authors develop a curve fit for 'dispersion coefficients' using a Gaussian dispersion model solution. However there is no real motivation given for using this approach rather than using dispersion models directly (e.g. ADMS-Roads, AERMOD, Caline etc). Indeed there is no actual discussion/consideration of these models at all which does seem very odd. Given this, it is not clear what the study has achieved nor what insight it has given into 'factors controlling plume length (as the title implies)' – there needs to be much clearer statement of this. Overall the paper lacks coherence and purpose and needs to be much improved.

C8112

There seems to be no conclusions/discussion. This should be added and at least cover the general applicability of the dispersion coefficients or otherwise. Can the work be applied elsewhere?

Contrary to the 'General Guidelines for Manuscripts & Submission' some sections of the paper do not have good sentence structure. For example, the paragraph below equation (4) in Section 3.4 has one sentence beginning 'Because...', and the following sentence begins 'In addition, because...'. There are also many instances of 'we' and 'our'; this reviewer would prefer these sentences to be re-worded to use a passive tense. There are many instances where a comparative adjective has been used to describe a noun, and it is not clear what the noun is being compared against, for example, the first sentence in section 3.4 'Hypothesis 2 states that more intensive plumes can decay faster due to larger concentration gradients between background and plume.' – more than what? Finally, a number of sentences begin with a formula (for example, the beginning of Section 3.4.1). This reviewer would like some effort to be made to re-word these sentences so that they begin with a word, and the formula is introduced later in the sentence.

Specific comments/questions:

Section 1.0 – The Share and Khare 2001 is an old reference, it would be helpful to reference more recent work (refer to, for instance, the special editions of the International Journal of Environment and Pollution which are published alongside the Harmo meetings http://www.harmo.org/, and the recent work by Heist et al. in Transportation Research Part D: Transport and Environment 'Estimating near-road pollutant dispersion: A model inter-comparison').

Section 2.1 – It would be useful to add map of area where data was collected with transects marked.

Section 2.2 – On p25258, line 8, a distance is given in non - SI units.

C8113

Section 2.3.1, Equation (1) – It would be good to comment on why a term taking into account reflections of the plume at the top of the boundary layer has been omitted from this expression. This term may be important in conditions where there are night time surface inversions.

Section 3.1 – The first sentence says that the curve fits provide excellent matches to the observations. Are we really surprised by this, given that the curves have been derived from the observed data?

Section 3.2 – What is plume intensity?

Section 3.3 - This is a rather poor description of factors controlling dispersion which are well known. The descriptions given do not give confidence that the authors really understand these processes; they should be improved.