**Atmospheric
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Interactive
Comment

# *Interactive comment on* "Attenuation of concentration fluctuations of water vapor and other trace gases in turbulent tube flow" *by* W. J. Massman and A. Ibrom

**Anonymous Referee #1**

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This article is logically presented and well describes the process and assumptions involved in deriving the model for attenuation of traces gases which interact with the walls of a sampling tube. The content is highly relevant to the target audience (eddy covariance micro meteorologists) and may have relevance to other fields.

1) You have adopted a different model of velocity profile than you used in your 1991 paper. What is the justification for this change, and what is the potential impact of this change.

2) If your models of diffusivity are based on viscosity and the wall surface is saturated will the reduction in viscosity caused by the higher water vapour content of the

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air layer near the wall affect your model of viscosity and hence the assumed diffusivity profiles. Similarly, you state in your paper that substantial temperature variation can occur because of the adsorption/desorption of water; would such temperature variations substantially affect the model of diffusivity via its effects on viscosity?

3) Assuming zero humidity (for water vapour) your solution (equ 26) differs from the values obtained in Massman 1991 by an order of magnitude at small Re and by ˜25% at high Re. Should the previous formulation be abandoned in favour of this new model or should the Massman 1991 model be retained under particular conditions?

4) The inability of experimentalists to know the condensation and evaporation coefficients or the adsorption-site characteristics because of the variability of materials and pollutants means that parameterization of I* in equation 26 should capture the humidity and tube degradation characteristics of any particular experiment. Can the authors comment on whether the model distilled into equation 26 presents benefits greater than using a simple exponential decay model parameterized for a particular experimental setup.

5) The authors should consider having a table of variables to ease interpretation of the many equations. It is quite a chore searching for variables embedded in the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 9819, 2008.

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