

## ***Interactive comment on “Behaviour of tracer diffusion in simple atmospheric boundary layer models” by P. S. Anderson***

**Anonymous Referee #2**

Received and published: 31 January 2007

General Comments: This is an interesting addition to the CHABLIS special issue with a simple analytical method being developed to predict the vertical behavior of tracers in a diurnally varying boundary layer. Because of the linearity in the model, a number of physical and chemical processes may not be well represented but it does provide a simple conceptual model of the diurnal and vertical variation of NO and NO<sub>2</sub>. It would be useful to lay out the critical assumptions that underlie the analysis and their potential limitations earlier in the manuscript rather than introducing them sequentially through the text. In some places the text becomes a bit wordy and could be made more direct and to the point.

Specific comments: Introduction: the discussion of diffusivity belongs in a technical section P13112, L23: note that not only altitude differences are important but also the

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

partitioning between latent and sensible heating. P13113, L18-19: Is the assumption of well mixed BL consistent with the results of King et al. who point out that Halley is characterized by much less convection than Dome C. P13113, L28: Is it accurate to say that diffusivity is proportional to height (i.e. a linear dependence) rather than more generally a function of height. P13113, L29: Profiles of “what” evolve to straight lines? (I assume U and T) P13114, L26: The discussion of the loss term is critical to elucidate at this point: If I have this right, the observed time series of NO and NO<sub>2</sub> together with the diurnal cycle of the actinic flux constrains the diffusion model: the loss term then captures all that is not known about the details of the BL behavior and chemical conversion terms. This needs to be made very clear. P13115, L23: The diurnal variation of J(t) seems to be critical - care to comment on other locations where there is no diurnal variation? P13116, L16-19: I assume that K(z) proportional to z is an initial condition? It might be useful to organize this section around boundary conditions, initial conditions, and forcing functions explicitly. P13117, L4:  $u^*$  does not change with height by definition.

---

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 13111, 2006.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper