

***Interactive comment on* “Transport and chemical transformations influenced by shallow cumulus over land” by J. Vilà-Guerau de Arellano et al.**

Anonymous Referee #1

Received and published: 30 September 2005

Review of 'Transport and chemical transformations influenced by shallow cumulus over land' by Vila-Guerau de Arellano et al

This paper examines the influence of shallow cumulus over land on the distributions of reactive species. A number of different aspects of the problem are examined (eg effects of cumulus on vertical transports and on photolysis). Two independent LES models are used in order to gain some insight into the robustness of the results. Overall I found the paper to be interesting and well-written, and most of the issues raised below are relatively minor ones.

8813, line 9. What is meant by 'shallow cumulus clouds usually form in the same

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

meteorological situations that favour the acculation of pollutants in the ABL.

8813, line 21. Is the argument here simply that concentrations are higher above the boundary layer due to cumulus transport, and hence lower in the BL?

8815, line 16. Presumably there is at least some diurnal cycle in the friction velocity (larger with strong turbulent mixing in the afternoon than it is in the early morning)?

8820, line 7. Presumably the results are not extremely close to those of Brown et al (fig5) as the present simulations used the slightly more unstable profile designed to give more rapid cloud top growth.

8820, line 21. As the surface buoyancy flux is fixed, and the subcloud layer buoyancy flux profiles are presumably linear, does this imply a different cloud base buoyancy flux in the two models?

8825 equation 11 and following text. It was unclear to me what this quantity is really telling us (and specifically why it gives an indication of buoyancy driven transport). I also did not feel that enough details have been given of the cloudy simulation (how steady, what levels are cloudy, what the cloud cover is etc etc) to make the comparisons with simulation particularly enlightening.

8826 line 12. Is the z_i the depth of the subcloud layer (which I believe would be conventional) or the depth to the top of the cu (called h , but also referred to as boundary layer depth elsewhere).

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 8811, 2005.

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper