Atmos. Chem. Phys. Discuss., 8, S6856–S6857, 2008
www.atmos-chem-phys-discuss.net/8/S6856/2008/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Implementation of a boundary layer heat flux parameterization into the Regional Atmospheric Modeling System (RAMS)" *by* E. L. McGrath-Spangler et al.

E. L. McGrath-Spangler et al.

Received and published: 9 September 2008

We agree that observational data are important for the evaluation of the model parameterization and have in fact conducted a detailed case study of the summer of 1999, using both the "control" and modified SiB-RAMS model. The new experiment includes realistic distributions of surface properties and time-varying lateral boundary conditions rather than the idealized simulations explored in the present paper. We have compared the simulation to eddy covariance measurements, to radar profiles of PBL depth, and to variations in surface temperature, humidity, and wind speed across most of North America over a period of several months, and will report on these comparisons in a second (longer) paper that we are currently preparing for submission. Including these much more elaborate experiments and comparisons to data would more than double

the length of the current paper.

The primary focus of the current study is to explore the sensitivity of land-atmosphere exchange of heat, moisture, and CO2 to PBL entrainment that is often neglected in regional-scale models, and to recommend a computational approach to their treatment. The idealized setup was specifically designed for this purpose in that it eliminates all outside influences of varying weather. The restrictions used to produce an idealized simulation, namely lack of cloud formation and a recycled air mass, produced conditions that are meaningless to compare to observations taken at specific places on specific days. On the other hand, the idealized experiment isolates the effects of entrainment rather than variations due to simulation of specific weather and biogeophysical processes. We argue that this sensitivity study is an essential first step in properly evaluating the impacts of PBL top entrainment on land-atmosphere interactions and the impact of this small-scale process on the carbon budget.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 14311, 2008.