**The Cryosphere
Discussions**

Interactive comment on "Modeling the thermal dynamics of the active layer at two contrasting permafrost sites" by J. Weismüller et al.

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Overall, this paper is original and publishable with revisions. I would have liked to see more detail on why the model did not simulate the Tianshuihai site for vapor and convective flow, it seems to me that they could have forced the model boundary with a flux rather than the observed moisture content. Also there is no discussion point on the estimation of the freezing characteristic and its effects on the summer soil temperatures. It seems to me that too cold simulated conditions in summer would be a logical effect of having too much ice in the profile, or the temperature gradient while thawing is not steep enough.

Specific comments: P238 L4 The gas content of the medium should also depend on the ice content. P240 L16 Explain how the energy and mass balances where check

using the rain and net radiation P243 L6-13 forcing the lower boundary also hides problems with parameterization in the upper profile. P244 L23 and L26 twice the same information. P245 L14 the 100% is not shown in figure 9 did you test this sepperately? P245 L18 why did you not simulate vapor if only convection is a problem? Vapor is likely very interesting in this dessert site. P246 L1-14 Why did you not use the gradient in moisture content and temperature to simulate this with a boundary flux? P246 L28 What is a reasonable value? It would be good to show a figure of the thermal conductivity properties in the model domain this is very easy in COMSOL. The values for Khsoil seem rather high. P248 L7-17 non-diffusive fluxes in the soil profile are included, just not in macro pores. Freezing characteristic curve misfits are not discussed. Snow melt infiltration in macro pores is not discussed. P249 L6-7 evaporation does not make the soil warmer, but it does make the model cooler. You should be able to check on this flux in the model. P249 L15 Air convection does not transport heat down, only forced air convection can do this, like wind blowing over the surface causing a pressure gradient. P250 this is a rather long description for something that is not likely to be real P251 The mechanical aspect should deviate the temperature is winter not in summer, why discuss this? P253 L2 remove 'that could not be reproduced by the model' this is double, because you mentioned deviation.

Interactive comment on The Cryosphere Discuss., 5, 229, 2011.