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Interactive comment on “Some practical notes on the land surface modeling in the Tibetan Plateau”

by K. Yang et al.

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Comment: They are attributed to the misrepresentation of soil stratification, particularly acute at the Eastern sites of the Tibetan plateau. However, this problem is quite general. Profile soil characteristics (texture, field capacity, etc.) are not easily mapped and their impact on the modelling of fluxes are not always (never?) represented well, on the Tibetan plateau or elsewhere. In particular, biases in soil moisture values are very commonly observed. Nevertheless, such biases may have little or no impact on the quality of the H and LE flux simulations provided the relative soil water content available to the plant is simulated well. What is the added value of representing accurately the soil stratification? Recommendation: Minor revisions.

Response: Thank you for your comments! I couldn't agree with you more. However,

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this soil stratification in the CE-TP should be addressed for the following reasons. First, the soil stratification in the CE-TP is very significant compared to that observed in other regions. Table 3 shows soil texture and parameters obtained from laboratory experiments of soil samples taken at Anduo sites. It is clear that the bulk density of the topsoil is nearly half of the deep soil and the soil porosity in the topsoil is much higher than that in the deep soil. Second, the topsoil is of significant importance for the land-surface interactions, because high-level radiation over TP is not damped by vegetation and thus the topsoil directly and strongly interacts with the atmosphere. Though SOMs also occur in forest and heavily vegetated areas, heat exchange and evapo-transpiration mainly occur in the canopy, whereas the exchange with the topsoil and the air is rather weak.

These two points were not clarified in the first version of our paper. They are added in the revised version (P9, L7-15).

Comment: P. 1295, L. 10: “with the surface emissivity given by the observers”, please explain. Response: As explained in the response to Reviewer #1’s comment, observational data-derived parameters (surface emissivity, albedo) and their values are summarized in a new table (Table 2) and all simulations are run with the thermal parameter values instead of default values. Correspondingly, we added the text “some key parameters for the surface radiation and energy budgets can be derived from observations. Their mean values are shown in Table 2, including albedo and surface emissivity at all sites and soil thermal diffusivity at the alpine desert sites. The albedo was directly derived from observed downward and upward shortwave radiations. At MS3478, there are two albedo values, respectively, for the dry-period and wet-period simulations. The emissivity at the meadow sites was optimized from sensible heat flux and meteorological data for near-neutral conditions (see Yang et al., 2008) and that at the desert sites was derived from radiation data by assuming thermometer measured surface temperature is reliable near sunset. The soil thermal diffusivity at the desert sites was derived from soil temperature data; however, the diffusivity at alpine meadow

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sites changes considerably with respect to soil moisture and thus its parameterization in the individual models are used in the simulations. These parameter values in Table 2 were used in all simulations to enhance the robustness of the simulated results. In particular, this setting is important for the simulations at the alpine desert sites where energy budget is the major land surface process.” (P6 L7-20).

Comment: Fig. 9: soil water content, at what depth?

Response: It is the soil water content in the top 15 cm. We have clarified (see new Figure 11)

Comment: P. 1303: how does the “excess resistance” translates in terms of thermal vs aerodynamic roughness length?

Response: we have added the text in the revised version to explain this (section 4.3)

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 1291, 2009.

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