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Interactive comment on "Community specific hydraulic conductance potential of soil water decomposed for two Alpine grasslands by small-scale lysimetry" *by* Georg Frenck et al.

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We thank the reviewer for the comments and we address the various concerns below. Reviewer comments are highlighted (R), with our response below (A) in each case.

R: [It would be definitely worth to explain more clearly what the results really mean for Alpine grassland ecosystems.]

A: We will explain more clearly the impacts on Alpine grassland ecosystems and specifically management implications in a future environment. Agriculture worldwide is relying heavily on ample water supply, either through natural precipitation or artificial

irrigation. Water availability, especially in the light of changing climate in Europe in the next 100 years, is already seen as a limited and valuable resource with the potential of socio-economical conflicts. Therefore, the importance of grassland management becomes evident in the wake of changing climate conditions with longer drought periods and more extreme temperature events, as estimated by the IPCC-Report (IPCC, 2007). The plant cover in a certain ecosystem can have effects on the water fluxes and circulation, as plant species react differently to changing soil water content due to differences in rooting depth, root anatomy, osmotic adjustment capacity and other drought defence mechanisms. It has been determined that foremost grasslands in Alpine ecosystems show decreased evaporation under dry climate conditions, leading to less desiccation of the soil. These relationships are therefore of crucial importance for the optimization of a future use of grassland. A farmer can use this knowledge to adapt the composition of the species accordingly and to manage it in a sustainable way. Understanding the specific hydraulic conductance potential of soil water for varying grassland ecosystems is a prerequisite to achieve a maximum yield in a future environment.

R: [...sometimes the authors use long chain of words which could be simplified for a better readability]

A: We will improve readability as suggested by reviewer1 within a revised version of the manuscript.

R: [My main criticism is about the relationship presented in Figure 5. I think this apparently strong correlation is mainly related to the fact the two variables are not completely independent from each other (ET and ET/DW). Please check this paper by Kenney (1982). Figure 5 and its explanation should probably be removed from the manuscript. Moreover, the methodology provided by Renton and Poorter (2011), for the log-log scaling method, appears to be different than that presented by the authors in lines 222-225.]

A: The rationale behind Fig.5 is to show that variation of evapotranspiration rates of

the canopy can have two sources: variation in total biomass (-DW; i.e. more biomass releases more water than a small amount of biomass) and variation in the activity of water release per unit biomass ([ET$\times$DW-1] -i.e. the same mass of leaves have stomates open or closed). In this sense, total ET is defined as: ET = [ET$\times$DW-1] $\times$ DW. For a trait C, which is a factorial combination of trait A and B (C = A $\times$ B) Renton & Poorter suggested log-log-scaling to reveal the underlying source of variation in trait C (our case ET) – Is it because trait A differs among the experimental strata, or is because of variation in trait B.

log(A) = na + ma log(C) and log(B) = nb + mb log(C),

where ma + mb=1 and reveal the relative importance of variation in A and B on the variation in C. Therefore Fig 5 is relevant to reveal that different rates of total ET measured in our experiment were not caused by differences in the amount of biomass between the experimental populations but by differences in the activity of releasing water to the atmosphere of a given unit of biomass. According to the editors taste Fig5 can be moved to an Appendix

R: [Specific comments & Technical corrections]

A: We are thankful for the specific points made by reviewer1. A revised version of the manuscript will clearly benefit from implementing these suggestions.

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