Review Comments on HESS-2015-535

"*Dominant controls of transpiration along a hillslope transect inferred from ecohydrological measurements and thermodynamic limits*"

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Major Comments:

This paper reports an important finding that transpiration is dominated by radiation forcing while VPD and wind speed adds no explanation power. The analysis based on field observations in the theoretical framework of maximum convective power principle is sound and convincing. This study opens new possibilities of modeling transpiration, which requires VPD and wind speed using the conventional methods. I recommend acceptance of the paper hoping that the finding is disseminated quickly in the Earth system modeling communities.

I suspect that the finding is more general than indicated by the paper title as the field data used in this study were collected "along a hillslope transection". Would the same conclusion be true over a flat land surface? Topography only affects the magnitude of surface net solar radiation as Eq (5) appears to hold regardless of topography. It is unclear the experiment sites were selected by design or convenience (existing observation facilities).

The word "atmospheric evaporation demand" is misleading. As shown in Eq (5), the atmospheric demand E_{opt} is mainly due to net solar radiation that has little to do with the atmosphere.

Editorial Comments:

Page 8: "… diffusivity … $k_w = 2.5 \cdot 10^{-5}\ \mathrm{m\,s^{-1}}$ …" should be "… $k_w = 2.5 \times 10^{-5}\ \mathrm{m^2\ s^{-1}}$ …".

Technical details of "Sap flow measurements", "Upscaling of sap flow to tree and stand transpiration" and "Root water uptake estimation" may be put in appendices.

Text narrative can be substantially shortened. For example, large part of the conclusion may be either cut down or put in "Discussion", which is better shortened as well.