

Review of EGUsphere manuscript # 2022-217

Title: What is the Priestley-Taylor Wet-Surface Evaporation Parameter? Testing Four Hypotheses

The manuscript comprehensively evaluates different approaches about the Priestly-Taylor α parameter. Considering the broad application of P-T equation in quantification of evaporative fluxes at different scales, the study can potentially provide insights for hydrology and climate modeling approaches. However, there are some aspects in the study that need clarification or should be addressed by the authors.

- Acknowledging that the definitions of wet surface and potential evaporation are always controversial as reflected in different studies, I think the description in line 56 tacitly ignores the key role of atmospheric forcing and its coupling with land surface; in other words, if the surface was truly saturated then the measured meteorology would have been different.
- In the present structure of the manuscript and representation of section 2.2, it is a bit difficult to follow the linkage of the work with CR approach (of course a direct application of Priestly-Taylor α parameter is there). As already reflected in the title, the manuscript has a very clear objective. Perhaps rewriting of that section and better representation of the results around Figure 4 will improve the coherency of the manuscript.
- Eq. (6) and line 167: I think the \leq sign on the RHS is not intuitive here. Air is already saturated at equilibrium condition; $\alpha=1+\gamma/\Delta$ implies $LE=Rn-G$; this means H is zero or $Ta=Ts$. Since both surface and air are already saturated (i.e., $RH=1$), this means vapor pressure gradient suddenly approaches zero and evaporation stops!
- Line 128: simply even at equilibrium condition, part of available energy will be exchanged via sensible heat flux.
- Line 188: surface drying within the CR approach implies drier and “warmer” near surface air as part of available radiative energy not used by LE is now released in form of sensible heat flux.
- Line 35: is not it Bouchet (1963)?
- Line 64: it might be helpful to elaborate more on the objectives in Crago and Qualls (2013) and clarify differences.
- In general, the quality of figures and representation of information (especially statistical attributes in legends) remains a bit low. Captions can benefit more from direct interpretation of the results.