**Interactive comment on “Contrasting roles of interception and transpiration in the hydrological cycle – Part 1: Simple Terrestrial Evaporation to Atmosphere Model” by L. Wang-Erlandsson et al.**

Anonymous Referee #3

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This manuscript studies various components of terrestrial evapotranspiration using the STEAM model developed specifically for this study. Unfortunately, the scientific goal of the manuscript is not clear and the reported results are not cohesive. Considerable amount of effort has gone into developing the STEAM model. However, I am not convinced that this model is absolutely necessary because the work could have been done using other models. For this work to be published in ESD, the authors must formulate a science question and simultaneously demonstrate that the STEAM model is necessary and it represents a significant advancement over current modeling capabilities.

Transpiration is a process that accompanies photosynthesis. Jarvis-type empirical schemes do not dynamically represent photosynthesis. Even though these schemes
perform well, they do so when calibrated/tuned with good data. The problem with
tuned schemes is that often their predictive capability is poor especially when the cli-
mate regime changes. The authors have invested an enormous amount of hard work
in developing this model. I am surprised that they chose to use a Jarvis-type scheme
instead of a mechanistic scheme like Ball-Berry-Collatz that is based on photosynthe-
sis.

The study ignores surface and subsurface hydrology. That is not desirable but OK
because many models do not. However, I believe that all new models on ET should
attempt to incorporate this feature because surface hydrology does play a role in ET by
changing soil moisture availability, precipitation patterns through soil moisture feedback
and by generating mesoscale circulations. At least a discussion of these issues is
warranted instead of a blanket statement that these processes are not important.

Many parameters used in the model such as the area reduction factor, dry out param-
eter, 21 day timescale to calculate leaf area, irrigation efficiency, etc. are assigned
arbitrary values. They may be reasonable but these must be supported by citations or
physical justifications.

It is not clear if the root depth parameter is relevant in STEAM. Is vegetation seasonality
solely represented by leaf area?

The authors correctly point out the limitations of the land use change experiments due
to the lack of feedback from the atmospheric component of the hydrologic cycle. In that
case, how robust/realistic are the changes in flux partitioning?

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