Review of "Simulation of Surface Fluxes in Two Distinct Environments along a Topographic Gradient in a Central Amazonian Forest using the INtegrated LAND Surface Model" by Broedel et al. (2017)

This work investigates the variability of land surface mass and energy fluxes along the topographic gradient (i.e., at plateau and valley) of a catchment located in the central Brazilian Amazon rainforest using the INLAND model. A groundwater parameterization following Yeh and Eltahir (2005) was incorporated to improve the representation of subsurface hydrodynamics in the model. The observed and simulated data show differences in mass and energy fluxes at the plateau and valley of the catchment. Based on these results, the authors concluded that the model could reproduce the variability of land surface processes along the topographic gradient of the study area.

The scope of this work is suitable for Hydrology and Earth System Sciences journal in my opinion. Overall, the manuscript is well-organized. The methodology is written well, which ensures the reproducibility of the study. The results are well-presented using adequate figures, tables, and discussions. However, I have concerns regarding the hypothesis of the study (please see the major comments below). Consequently, I am suggesting major revisions before publication.

Major comments

1. The objective of the study was described as (L 106-109)

"The main objective of the present work was to determine and characterize the necessary components (including soil, vegetation and hydraulic) of the Integrated Land Surface (INLAND) model to simulate the plateau and valley environments in a primary forest in the central Amazon."

The hypothesis of the study was described as (L 110-113)

"We hypothesized that the model would simulate the differences in fluxes between the plateaus and valleys because the energy exchange dynamics of these ecosystems are different due to the large diversity in their surface characteristics."

When would the model simulate the differences well? After the inclusion of "necessary components" to simulate plateau and valley environments? Are you hypothesizing that after improving soil and vegetation, the INLAND model would show improved reproduction of land surface mass and energy fluxes? This is hypothesis is not intriguing enough in my opinion as the scope is too narrow. I would strongly suggest reformulating the hypothesis and merging it with the main objective of the study to make it more interesting for the broad readership of HESS (something along this line):

"We hypothesize that to capture the variability of land surface processes at the plateaus and valleys, explicit represent of soil and vegetation parameters in numerical simulations is necessary"

2. The authors made a commendable effort of incorporating groundwater dynamics in the model. However, the effect of representing subsurface hydrodynamics is completely ignored in the hypothesis. The conclusions section reports (L1002-1004)

"To better represent their characteristics, an adjustment of vegetation and soil parameters and the development of a lumped unconfined aquifer model was required to account for the water table dynamics in the valley area."

How does the "lumped unconfined aquifer model" improve the simulated differences in the plateaus and valleys? This point is not clear to me from the discussions presented in the results section.

3. The abstract should be re-written. Currently, this section does not reflect the objective (the central hypothesis) of the work.

Minor comments

1. L 476-478: "The INLAND model simulated very well the difference of ET fluxes between plateau and valley …"

This is not what I see in Figure 7a. The model predicted differences in LE over plateau and valley throughout the whole year. However, the observations show differences only during dry periods (which is more intuitive). What is the reason of these discrepancies?

2. L 553-554: "The surface runoff (R) simulated by INLAND on both areas was reproduced relatively well by INLAND during the period from 2002 to 2006."

Model results cannot be validated without measurements from the plateau region (Figure 7b).

3. Figure 5b: please revise the xlabel (set, mai etc).

4. Figure 9: Missing xlabel.