Reply to referee #2

We thank referee #2 for the review of our manuscript. Below you find our response to the three comments, and how we suggest to implement them in a revised version of the manuscript (the review comments in blue, our response in black).

1. The research progress in the effects of AI (or the water conditions) on the measured fluxes can be mentioned in the Introduction.

The aridity index (AI) is an indicator for dryness on yearly timescale. Several studies report land-atmosphere coupling for different climate types, although they do not necessarily include the AI as an indicator of climate. We will extend the paragraph (line 47-54) by citing the following papers:

- Costa et al. (2010) show that in wet Amazonian forest regions, seasonality in evapotranspiration is driven mainly by atmospheric factors (there is no vegetation control), while in dry Amazonian forest regions, vegetation control plays an important role.
- De Kauwe et al. (2017) find a stronger vegetation-atmosphere coupling for dry grasslands, compared to wet grasslands. Similar results were found for evergreen needleleaf forest and deciduous broadleaf forest.
- Mallick et al. (2018) show the strong vegetation control on evapotranspiration in arid sites, compared to mesic sites.
- Guo and Dirmeyer (2013) and Koster et al. (2004) show that the land-atmosphere coupling (soil moisture) is strongest at intermediate climatological wetness.

2. Are the precipitation data from the flux measurement sites? Or other meteorological sites?

We used the precipitation data delivered with the FLUXNET dataset. This precipitation data is downscaled from the ERA-interim reanalysis data. We will change line 131 to 133 into: "Meteorological measurements are delivered with the flux tower data. Precipitation data is downscaled from the ERA-interim reanalysis data (Vuichard and Papale, 2015). Net radiation and air temperature are measured at the flux tower and gap filled using the MDS (Marginal Distribution Sampling) method (Reichstein et al., 2005).".

3. What do the different cycles in Fig. 6 represent?

Figure 6 represents the slopes of the scatterplot between LAI and land-atmosphere fluxes. This figure shows the sensitivity of the fluxes to LAI across a broad range of aridity values.

Costa, M. H., Biajoli, M. C., Sanches, L., Malhado, A. C. M., Hutyra, L. R., da Rocha, H. R., Aguiar, R. G., and de Araújo, A. C.: Atmospheric versus vegetation controls of Amazonian tropical rain forest evapotranspiration: Are the wet and seasonally dry rain forests any different?, J. Geophys. Res.: Biogeosci., 115, https://doi.org/10.1029/2009jg001179, 2010.

De Kauwe, M. G., Medlyn, B. E., Knauer, J., and Williams, C. A.: Ideas and perspectives: how coupled is the vegetation to the boundary layer?, Biogeosciences, 14, 4435-4453, https://doi.org/10.5194/bg-14-4435-2017, 2017.

Guo, Z., and Dirmeyer, P. A.: Interannual Variability of Land–Atmosphere Coupling Strength, J. Hydrometeorol., 14, 1636-1646, https://doi.org/10.1175/jhm-d-12-0171.1, 2013.

Koster, R. D., Dirmeyer, P. A., Guo, Z., Bonan, G., Chan, E., Cox, P., Gordon, C., Kanae, S., Kowalczyk, E., and Lawrence, D.: Regions of strong coupling between soil moisture and precipitation, Science, 305, 1138-1140, https://doi.org/10.1126/science.1100217, 2004.

Mallick, K., Toivonen, E., Trebs, I., Boegh, E., Cleverly, J., Eamus, D., Koivusalo, H., Drewry, D., Arndt, S. K., Griebel, A., Beringer, J., and Garcia, M.: Bridging Thermal Infrared Sensing and Physically-Based Evapotranspiration Modeling: From Theoretical Implementation to Validation Across an Aridity Gradient in Australian Ecosystems, Water Resour. Res., 54, 3409-3435, https://doi.org/10.1029/2017wr021357, 2018.