Reviewer 1

The study introduces the concept of hydraulic functional types, which represent distinct combinations of plant hydraulic traits and which may contribute to an improved parameterization of vegetation in land surface models. It is further evaluated if hydraulic functional types can present an alternative to commonly used plant functional types. The study thus presents indeed new insight into the spatial distribution of certain trait combinations that might be relevant for further applications in global vegetation analysis. The manuscript fits well into the scope of the journal and might attract readers interested in vegetation modeling. The manuscript is well structured and the methods are described appropriately. I only have minor comments.

Authors: We thank the reviewer for providing positive and constructive comments. The response to each individual comment, along with associated edits to the manuscript text, are listed below in black.

- Define which correlation coefficient was used - assuming it was the Pearson correlation coefficient?

Authors: We now clarify that the Pearson correlation coefficient was used in both the results section (line 294) and the caption of Fig. 1.

- Information about the PFT-names should be included in the main part when PFTs are first mentioned.

Authors: Thanks for the suggestion. In the introduction (lines 40-42), where PFTs are first mentioned, we added "At large scales, plant traits are often parameterized based on plant functional types (PFTs), such as evergreen needleleaf forests, evergreen broadleaf forests, deciduous broadleaf forests, mixed forests, shrublands, grasslands and croplands".

- Add a conclusion section referring to the main result

Authors: We added a conclusion section at the end of the manuscript to summarize the main result, as follows:

"This study derived ecosystem-scale plant hydraulic traits across the globe using a model-data fusion approach. The retrieved traits enable our hydraulic model to capture the dynamics of leaf water potential and ET, based on comparison to remote sensing observations. While the traits derived here are consistent with across-PFT patterns based on in situ measurements, they also exhibit large within-PFT variations (as expected). There is some discrepancy between our derived $\psi_{50,x}$ and values derived from interpolating between forest inventory plots, though it is unclear if this discrepancy is caused by errors in the model-data fusion retrievals, errors in the upscaled inventory data due to intra-specific variability and spatial interpolation imperfections, or both. Uncertainty is also induced by whether or not our retrievals represent the same effective values as a community-weighted average (see Section 4.2). Nevertheless, reasonable correspondence between the across-PFT variations in our derived traits compared to in situ measurements add confidence to the dataset introduced here.

As an alternative to PFTs, we constructed “hydraulic functional types” based on clustering of the derived hydraulic traits. Using the hydraulic functional types, rather than PFTs, to drive averaged traits by functional types improves the accuracy of estimated ET and VOD, even as the number of functional types is reduced relative to a PFT-based representation. This suggests that hydraulic functional types may form a computationally efficient yet promising approach for representing the diversity of plant hydraulic behavior in large-scale land surface models. We note that the exact values of the derived hydraulic traits depend on the specific data and model representation used here and therefore are subject to model and data uncertainties. However, our findings highlight opportunities and challenges for further investigation of plant hydraulics at a global scale.”