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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Speculations on the application of foliar ^{13}C discrimination to reveal groundwater dependency of vegetation, provide estimates of root depth and rates of groundwater use" *by* Rizwana Rumman et al.

Anonymous Referee #2

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The study presented here discusses the potential of delta 13C in leaf tissue as a surrogate for access to groundwater. Additionally, if the depth to groundwater is known information about rooting depth can be inferred. Furthermore, it seems that plant traits – here leaf vein density – allow to retrieve information about water availabilities and access during plant /leaf development. The paper is well written and organized. But, the authors have to check rigorous for typos, comma placement (especially when references are cited!). This study is of high importance for the scientific community. Especially it shows potential use of a simpler method to infer water resource use in water-

limited environments instead of using several isotopes and a relatively high number of samples from several soil depths and plant tissues. I would suggest to include a map in which the Ti Tree Basin and the sites are shown (maybe one showing Australia and inserted / zoomed in to Ti Tree Basin region showing (e.g. add. also showing groundwater reservoir?)). I think, the map would be helpful for non-Australian.

Specific and technical comments:

p.1 line 23: add 'basin' at end of sentence. p.1 line 28: change 'attributes' to 'traits' p.3 line 9: change to 'deep-rooted' p.3 lines 30 f.: Change 'One' to 'Another'. And, Please introduce DTGW – right now it is introduced the following page. p.3 lines 26 ff.: What are the distances (min., max., average) of the meteo station to your sampling sites? p.5 line 7ff.: How deep is the water table situated in the eastern part? p.5 line 21: Is it four sampling plots per site? p.6 line 4: Are the distances stand for? This is not clear to me. p.6 line 9: "2.2 Leaf and water sampling protocols and meteorology" p.6 line 13: How did you collect the bore water samples? Could you briefly describe the collection process? Introduce once wet and dry season (the months) and then stick to these categories. It is easier to follow. p.6 lines 21 ff.: What apparatus did you use for the distillation? Maybe it is useful to describe briefly the extraction process. p.7 line 3: maybe add 'powder' at end of the sentence p.7 line 5: What do you mean with "generating three representative independent values per tree"? You had three leaves samples per tree and measured these independently? p.7 line 12ff.: Please give more information for the formulae? Maybe some reader need info about the difference between the two different notations of 13 C. p.8 line 10: Mention here that you used a (segmented) linear regression. How was the maximizing of R2 done? Results: Maybe you could also provide some values (e.g. for vpd, isotopic signals) in the text beside the figures. p.8 line 18: DTGW ! p.9 line 11 ff.: Does the DTGW decreases with the distance to the creek? Maybe there is a strong relationship between these parameters? p.9 line 12-13: This would be a species-specific relationship. Delete 'either'. p.9 line 16: Leaf vein density (LVD) p.9 line 18: correct the ANOVA value, please. p.9 line

27f: Could you give values for water potentials and sapwood density? p.10 line 6f: Another possibility is that not the water access but the biochemistry is limiting (Rubisco limitation). p.10 line 8ff.: Please mention the Figures in the text where this information can be found would be helpful. p.10 line 15: . . .if the species-specific signatures (or 'behavior') under well-watered (or groundwater access) and reduced water availability are known. I would think. p.10 line 29: What species was studied in Rumman (2017)? p.11. line 1-11f.: For me it was not easy to follow during this paragraph. Would it be possible to rephrase this paragraph. I got the point – but it took a bit. Especially this information in here is very important and interesting!

Figures

As I mentioned before, it could be helpful to readers to have a map where Ti Tree basin is located. Figure 1: I would recommend to include the precipitation data (mm d-1) within the cumulative precipitation figures. Eastern and western tower data should have the same scaling (not only for easier comparison). Precipitation (mm d-1) could be shown on right hand side (y-axis). All these panels could be moved closer (no gap in between), esp. for eastern and western tower individually. This saves also space. The use of ticks on the x- and y-axis could also make it easier to 'follow'. Figure 2: Maybe you can change the coordination. Right upper corner would be 0/0 – because x- and y-axis show both negative values. I would also start at 0/0. Figure 3: Symbol and Font sizes should be larger and uniform. Upper and lower panels could be closer (no gap). Maybe change the months to wet and dry season. In the caption insert 'depth-to-groundwater' before 'DTGW'. Figure 4: These panels could also be closer (no gap). I would prefer the DTGW data as continuous and NOT as categorical (same distances) between bars! Maybe the use of scatter plot instead of bar plot would also be more appropriate. Maybe change the months to wet and dry season. In the caption insert 'depth-to-groundwater' before 'DTGW'. Figure 5: Is there a relationship between distance from creek and DTGW? Did you test this? Figure 6: Symbol and Font sizes should be larger and uniform. In the caption insert 'DTGW' after 'depth-

to-groundwater'. (b) or panel b is missing in panel b. LVD at 9 m DTGW and 12 m DTGE are not significantly different and with increasing DTGW depth LVD increases till 20 m DTGW. What is the R2 and p-value for this linear regression. I am skeptical about this segmented regression on LVD with changing DTGW. Figure 7: Would it be possible to use different colors or symbols for the two different tree species in panel (b)? This would give the reader more information for the two species and their adjustments. Please use similar scaling for (a) and (b). Font and symbol sizes could be a bit larger. Figure 8: It would be great if the authors could show the 95% confidence interval for the linear regression. This would add more information. Please state in the caption what the black arrows stand for.

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