

## ***Interactive comment on “Plant water resource partitioning and xylem-leaf deuterium enrichment in a seasonally dry tropical climate” by Lien De Wispelaere et al.***

**Anonymous Referee #2**

Received and published: 8 October 2016

"Plant water resource partitioning and xylem-leaf deuterium enrichment in a seasonally dry tropical climate" by Wispelaere et al. reported isotope data from a data scarce region and used the data to investigate the variations of plant water use both spatially and temporally. The study was carefully conducted and the manuscript is generally well written. I think this would be a valuable contribution to Biogeosciences. At the same time, I think some aspects of the work need to be improved before it could be accepted for publication.

1. The novelty of the study needs to be further emphasized in the Abstract. The objectives and results are clear here, but it reads more like a regional case study. The novelty or importance needs to be emphasized to warrant a publication in an interna-

C1

tional journal.

2. Line 53. This statement requires modification. Based on field observations from a dryland region, a recent study showed that fractionation doesn't occur during root water uptake and it likely occurs during the water redistribution after water uptake. Please refer to Zhao et al. Significant difference in hydrogen isotope composition between xylem and tissue water in *Populus euphratica*. *Plant Cell Environment* 2016, for more details.

3. "Study site" section could be incorporated into the "Materials and Methods" section.

4. The sampling time is not clear in the Method section. The non-steady condition in the morning could result in very different isotope signatures of the leaves. More details are needed for the sampling time.

5. Why grass stems were not sampled? It would be a nice comparison between the stem and leaf water isotopic compositions for grasses.

6. The authors used laser spectroscopy method to quantify the isotopic compositions of rainfall, groundwater and plant waters. However, recent studies have showed the potential issues of organic contamination of the spectral signal in the laser spectroscopy method (e.g., West et al. 2010, *RCM*, 24: 1948-1954, Zhao et al. 2011, *RCM* 25: 3071-3082). Particularly, Zhao et al. 2011 showed that the isotopic composition differences could be up to 76% for leaf waters between IRMS and laser spectroscopy methods in water-stressed environments. In light of these earlier findings, I think the authors of this study should at least validate some of the leaf water isotope measurements.

7. I like the concept the evaporation distance. If it is cited from others' work, a reference is needed here. Otherwise, the authors should make it clear that "we developed the evaporation distance...". The evaporation distance calculation doesn't seem to be correct. I think the "2H" should be "18O" in the equation. Please double check.

8. There are multiple factors considered in this study, e.g., plant family, growth form,

C2

leaf phenology, habitat, how ANOVA was used for analysis is not clear to me.

9. There are limited rainfall events in the study period and 2014 is an abnormal year. In this context, I think using air trajectories to take a look the source air region of the precipitation could be useful in the interpretation. This reference could be useful in this regard. Soderberg et al. 2013. Using atmospheric trajectories to model the isotopic composition of rainfall in central Kenya. *Ecosphere*.

10. The plants at the lakeshore produced higher evaporation distance than other two locations. However, the deuterium enrichment from xylem to leaf was smaller for plants at the lake shore compared with other two locations. This is counter-intuitive and needs to be better explained.

Minor comments:

Title: I think "leaf-xylem deuterium enrichment" makes more sense.

Line 91 What is "Voi"?

Line 195 Comparing with global meteoric water line is useful, it would be more meaningful to compare the local meteoric water line with other studies in this region (e.g., Soderberg et al. 2013. *Ecosphere*).

The "3" and "4" in "C3" and "C4" should be subscripted throughout the manuscript.

---

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-354, 2016.