

Interactive comment on “How plant water status drives tree source water partitioning” by Magali F. Nehemy et al.

Anonymous Referee #1

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This manuscript seeks to determine of tree water source changes as a function of plant water status. Specifically, the study paired point dendrometers, lysimeters, stable isotopes, and root distribution to try and discern if where plants obtained water changed as the water status of the plant and roots changed. They largely conclude that the answer to that question is “yes”. Tree water source changes as a function of plant water status. I consider the question being addressed as an important one that affects our understanding of water sourcing as well as how we model water uptake across time and space. While the question is important, I do have many specific comments that I would like to see addressed.

Specific Comments

Interpretation of mixing models. The major result of this study hinges on the conclu-

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sion that, using isotopes and the mixing model, water sources shift. The manuscript presents the results, with confidence intervals during $W=0$ and use the overlap of the confidence intervals to conclude that the values are not different. However, the results of all 3 values from the other two time periods are not reported in the text or Figure 8. Just looking at the one value reported for each of these time periods, I am concerned that there is overlap amongst the values, not allowing the data to conclude that there was a statistical shift in water sourcing across the 3 time periods. If there is no difference in these values, then there is no manuscript.

Small sample size. The data collection is thorough albeit the sample size is low. I understand that this is a tradeoff between replication and detail but it does concern me the level of conclusion being drawn from three stems on two plants. For example, does water source shift change as a function in water status in all types of plants? Plants with different rooting strategies? Plants with different ratios of fine roots? Plants with different hydraulic strategies? I am simply not confident that much can be concluded by 2 plants in 1 lysimeter.

Isotope sampling. Similar to sample size, the isotope sampling is comparing 1 single day across each of the 3 time periods. One single day on 2 plants to conclude that source water partitioning changes as a function of water status is not overly convincing that this phenomenon is consistent or real.

Issue of scale. They are comparing 3 broad periods but if water status truly affects water uptake then we would need to see analysis at finer temporal resolution. In other words, water potential (or water status) changes temporally and thus we would need to see a tighter linkages between water status and source partitioning. This would require more days where source water isotopes were sampled to derive this relationship.

Role of fine roots in explaining partitioning. The paper states “. . .that tree water source partitioning is driven by plant water status, and not by patterns if fine root distribution”. The analysis never really provides evidence that this response is due to water avail-

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ability at the expense of fine roots. In other words, the role of roots needs to be more definitively analyzed. Additionally, I am concerned about the conclusions from this that apply to field situations. This was a contained lysimeter that had fine roots throughout as opposed to broader strategies of fine root distributions seen in the field. Thus, there may be a role for fine roots that can't be captured here.

Technical Corrections Lines 76-80. Really, 3 of these questions are not effectively addressed in this paper. Lines 233-236. I do not entirely understand how the study separates out the "water deficit" and "intermittent water deficit". For example, if you looked just at June 1-3, the values and diurnal cycles look similar to June 23-24. Or June 4-6 look similar to May 17-19. In other words, the classification into 3 broad categories feels coarse and likely biases the results. Additionally, the single day sampled during "intermittent water deficit" has a diurnal cycle very similar to that sampled during "water deficit". Lines 295-300. The range of values should be reported for all 3 water sources for all three dates to determine if there is overlap. Lines 342-344, Lines 360-361. This is a bit overstated based on the data presented. Lines 385-387. This may be true, but I am not convinced that you can conclude that these are anisohydric. There are many isohydric species that have -6 water potentials.

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