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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Using soil water isotopes to infer the influence of contrasting urban green space on ecohydrological partitioning" *by* Lena-Marie Kuhlemann et al.

Anonymous Referee #1

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This manuscript presents evapotranspiration, soil moisture, isotopic variations, and travel time estimates from isotopic variations in the soil beneath grassland, shrubs, and trees in plots in Berlin during a drought. These are all valid analyses. However, my main concern with this paper is that for some reason the authors motivate this work by discussing green infrastructure, mitigation of flood risk, urban growth, urban water demand, urban soil compaction, and the urban water cycle. All of these topics are quite peripherally related to the actual study that was conducted. The study that was conducted happens to be studying vegetated plots that are located in an urban area, but otherwise there is not evidence that the plots are affected by any of the urban processes that are discussed in the introduction. The plots are not irrigated, which makes

the discussion of urban water demand seem off-topic. (This should be stated clearly up front – only in the discussion is it explicitly stated that the plots do not receive irrigation. The reader should know this immediately). The plots are not used to manage stormwater, which makes the green infrastructure and flood risk mitigation discussion seem off topic. The plots are not obviously affected by urban soil compaction. There are no interactions with urban infrastructure mentioned. It is not clear why the urban ecohydrology study framing is being used since it is not clear what urban process is actually being studied here. There is an incredible amount of data being presented but the motivation is comparatively lacking. Secondly, the discussion section has some text that is unsupported by the work presented. There is no evidence to suggest that irrigation is needed to support the trees that are currently not irrigated (L390-392). Making this sort of unsupported statement can have large water use implications, so this type of statement on increasing or beginning irrigation should be made carefully. Do the researchers believe that the trees will die if not irrigated? There was no data on the tree water stress to support this belief in this manuscript. The goal of urban irrigation is not to maximize ET or plant growth or plant yield but to keep species alive that humans want alive (e.g., urban lawns are irrigated to a level much below well-watered conditions for maximal ET by most residential irrigators because they irrigate based on visual plant stress (DeOreo 2016 – Residential End Use Study)). If the trees are not dying under currently non-irrigated conditions, then what reason is there to suggest that they should be irrigated to maintain them? This is also discussed in L414. Major Comments: L100: State clearly and up front that the vegetation is not irrigated in SUEO. L1: The first sentence of the abstract raises questions and is confusing. Does 'green infrastructure' here refer to urban vegetation? Green infrastructure in other contexts is used to mean green stormwater infrastructure which in many cities is not heavily irrigated and therefore is not a major challenge to balancing domestic and industrial water demand. Also, are many urban areas having challenges in balancing domestic and industrial water demands, or rather in having a limited resource of water for all urban water use (both domestic (does this refer to residential indoor + outdoor or just

residential indoor – I am not familiar with this terminology) and industrial). L300 and throughout: Why is unorm used as a proxy for transpiration? L330 and L349: The authors are comparing their findings to other work looking at urban landscapes with isotopes. However, it doesn't makes sense to me to make these comparisons because the other studies they compare to are irrigated – this seems fundamentally different since the irrigation introduces a different isotopic source and signature into the system and is completing altering the inputs to the soil-vegetation system. It would make more sense to me to compare the results from this study to other studies (non-urban or urban) that look at non-irrigated grassland vs. shrub vs. tree comparisons. L376-378: Why would observations of more natural vegetation water demands be used to inform strategies for irrigation needs in the future? If the vegetation is natural in this study, why have the entire motivation be pointing to urbanization? L377-378: It is inappropriately general to state this so broadly – that these are characteristics of 'urban trees'. This finding is not generalizable to this degree – these findings are currently specific to both the specific location and to the species studied (tree species have quite different ET from each other and relationships to water availability). Minor Comments: L202-203: This is not evident from the plot. A marking at '0' or the absolute value of unorm would help. L212: 'Slightly higher' seems to overstate the difference of only 2 mm – I would interpret this to mean they are effectively the same. What kind of error bars would these values have? Figure 2: The x-axis should have marks for every month. Table 3: Clarify what sampling time period refers to. L224: The widest range for O, not for H. L225: Clarify what across the entire soil profile refers to. L311: What type of memory effects? Storage? Stomata? Vegetation?

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