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Interactive comment on “Species-specific trajectories of nitrogen isotopes in Indiana hardwood forests, USA” by K. K. McLauchlan and J. M. Craine

Anonymous Referee #1

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The manuscript “Species-specific trajectories of nitrogen isotopes in Indiana hardwood forests, USA” presents data on $\delta^{15}\text{N}$ trajectories in different tree species on a regional scale in the US. The data presented may give new insights into trajectories of wood ^{15}N over the past century, however the data needs to be checked for plausibility more thoroughly and data interpretation in my opinion lacks some points. First of all, the increased shift of $\delta^{15}\text{N}$ of *Quercus* (towards higher ^{15}N) and three other species (toward lower ^{15}N) after the 1980s could be an effect of increased influence of sapwood. The authors fail to show a graph for $\text{N}\%$ analog to Fig 2. In the discussion they mention, that sapwood has been shown to have higher $\text{N}\%$ than hardwood, however no indication is given as to the expected changes in ^{15}N . In the attempt to give an interpretation of

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the observed discrepancy between the trend in $\delta^{15}\text{N}$ for *Quercus* (increasing) and the other species (decreasing), the authors come up with some “parsimonious” (p8, l12) explanations which should be omitted since the authors themselves name reasons why these explanations probably are not valid. However, the authors fail to take into account possible trends in $\delta^{15}\text{N}$ in the soil profile. One explanation for the difference in $\delta^{15}\text{N}$ between *Quercus* and the other species (and the different trends) might be that the rooting zones within the soil profile might be different. Also the overall higher N% in *Quercus* was not really taken into account while trying to explain the mentioned differences. As the reported differences in amount, $\delta^{15}\text{N}$ and trend in $\delta^{15}\text{N}$ could give valuable insight into N nutrition of forests, it would be of great importance to find possible reasons for the observed pattern. However, the conclusion drawn in the abstract, that “no apparent net change in wood $\delta^{15}\text{N}$ over the past century at the stand level” means that increasing N deposition will not influence N availability in forests is really disappointing in its simplification. Could it not be possible (as mentioned in the discussion section) that there is a REASON behind the trends observed?

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