

Interactive comment on “Water availability limits tree productivity, carbon stocks, and carbon residence time in mature forests across the western United States” by Logan T. Berner et al.

Anonymous Referee #4

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General comments: This is a thorough, straightforward study using both field and satellite measurements to estimate forest productivity and carbon cycling along a spatial moisture index across the western US. The goals of the study were outlined well, and made use of two datasets that if assimilated properly, can reveal ecological trends and relationships that cross spatial scales. The results revealed, unsurprisingly, that as moisture index increased, so did both productivity and biomass; however this study is one of the more thorough I have seen in both its spatial and methodological scale. The results suggest that climatic moisture availability is perhaps the most fundamental environmental control of forests in the Western US, and that the forest communities are extremely sensitive to this across large spatial scales.

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I feel this study is well conceived and publishable, but needs more explanation of methods, particularly with regards to data assimilation and validation. You mention in section 2.3 that you ‘minimize[d] uncertainty’ by using two different data types (field and remotely sensed), but you present no evidence of this. Also, though you present the Spearman coefficient in Table 2, I would have liked to see some cross-domain validation between data types; that is, a simple statistical comparison of how each median variable (NPP, BIO, CRT) value compares between field and satellite data.

Specific comments: L52: Mention of ecosystem services seems unnecessary

L69: Suggest substituting ‘risk’ with ‘frequency’ or ‘occurrence’

L101: CRT should be defined before acronym is introduced.

L154: This sentence is very unclear. I don’t understand what ‘ensemble average’ is referring to, nor what the ‘previous work’ revealed.

L196: Should it be climate ‘data’ sets?

L196: Some context should be given for CMI values. What is the typical range? What constitutes extreme values on either end?

L229: Make sure use of ‘Spearman’ or ‘Spearman’s’ is consistent

L447: Changing natural disturbance regimes should be mentioned in the climate change implications section, given that you discuss it earlier in the context of carbon residence time.

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