

Interactive comment on “Thermal adaptation of net ecosystem exchange” by W. Yuan et al.

W. Yuan et al.

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General comment: Yuan et al.'s manuscript on “Thermal adaptation of net ecosystem exchange” is a very interesting comparison of two derived thermal properties of NEE calculated for 72 sites across a broad geographic range. The two properties are T_b , the temperature at which a given site transitions from source to sink, and T_o , the optimal temperature for peak NEE. The authors found significant relationships between T_b and mean annual T , and between T_o and mean T during the growing season. They suggest these strong relationships are due to the intrinsic connections between vegetative primary production and ecosystem respiration. Even though the basic premise is not a new one, which both the authors and other reviewers have pointed out, this is still a very valuable contribution to the literature to examine these properties across such a large gradient of flux tower sites. In addition, although the findings that the derived thermal properties are different for deciduous and evergreen sites are not new, it is still

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a valuable exercise to see these differences hold up so nicely using a larger grouping of sites than has been used in previous analyses.

1. I do have several comments/questions. I agree with one of the reviewers that Figs 3 and 4 are redundant.

Thanks. We agree that we will remove the Fig.3.

2. It would be nice to see a bit more info on the criteria used to determine the 72 sites used in the analysis. There are obviously more sites in the FLUXNET database. Were all evergreen and deciduous forests available used?

We directly download the flux data from Ameriflux and CarbonEuropeIP database, and they are open to all users. Totally, we get about 100 sites from these two databases. The site selection criterion is whether there are enough measurements for characterizing the temperature curves of NEE, so all selected sites include at least two years measurements. Moreover, cropland sites were not included in this analysis due to strong human management. Eventually, 72 sites were included in this study. FLUXNET database contains about 78 sites with 356 site years of data for free fair-use, and it is close with the data used in this study (72 sites with 380 site years). Moreover, these sites cover almost all vegetation and climate types, and the conclusion can be considered as the universal scientific finding.

3. I think the comparison between the seven adjacent boreal stands is a useful one. These sites are < 50 km from one another and do differ substantially in community composition.

Thanks, we think so. This analysis showed that thermal environment is more important than successional stage in determining thermal optima. It also indicated that our conclusion about thermal adaptation of NEE is robust over the multiple sites. We will keep the discussion part on the impact of stand age on transferring temperature points.