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Interactive comment on "Thermal acclimation of leaf photosynthetic traits in an evergreen woodland, consistent with the co-ordination hypothesis" *by* Henrique Fürstenau Togashi et al.

Anonymous Referee #3

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Review of 'Thermal acclimation of leaf photosynthetic traits in an evergreen woodland, consistent with the co-ordination hypothesis 'by Fuersteau Togashi and co-authors

This study analyses gas exchange data taking at two seasons in a semi-arid evergreen woodland in Australia to test the presence of thermal acclimation of photosynthetic capacity, leaf dark respiration and Ci:Ca using optimality principles.

The paper is overall well written and clear. I have few comments & questions that follow in order of relevance.

-What is the role of phenology / specifically leaf age here, there is a need to discuss this either in the introduction and or discussion, i.e. there might be confounding phe-

nological and thermal acclimation effects in the presented results. What is the life time of a leaf in this semi-arid evergreen woodland?

-Related to the above, the manuscript provides an explanation of changes in N:P ratios from cold to warm season in Fig 8 however it does not explain how these changes happened, how did leaf N and P changed and how this might be related to leaf age? It would be good to add a plot showing individual values of leaf N and Leaf P in the cold and warm season.

-Equation 1 is used to estimate Vcmax and Jmax at 25C. During the warm period (unclear time of day A-Ci curves where taken) Vmax at T could be either in the optimum or beyond the optimum temperatures, thus it is possible that the peaked temperature response might be more appropriate. If this was the case, how is this likely to affect the results? Also, how does the choice of Ha (Medlyn et al 2002) value affects the results. According to Hikoska et al (2006) there is a relationship between activation energy of Vcmax and growth temperature.

-Similar comments apply to the use of equation A2 to determine the slope of Vcmax and temperature presented in Table 1 under the kinetic approach. Is the slope sensitive to the choice of Ha but most important are the slope values robust when estimated with the peaked temperature response for Vcmax and Jmax.

-Leaf dark respiration measurements were taken after only 5 minutes of leaves being in the dark. Protocol for Rd estimates is at least 30 min in the dark (Atkin et al 2000; Atkin et al 1998) as it takes about 15-20 minutes for post-illumination respiration to stabilize with time increasing with decreasing temperature. How does this affect your measurements of Rdark and acclimation results?

-On the implications for modelling section it would be very relevant to apply the Kattge & Knorr (2007) formulations and compare to your data set and predictions by the optimization approach used in this study. Is the data from this study consistent with the Vcmax25 prediction derived by Scafaro et al (2017)

-Either in the introduction or in the methodology, it would be good to include a graphic explaining the change in temperature responses to illustrate what acclimation is, i.e. temperature response shifts forward and therefore values at 25 C decline, you could illustrate also where in the curve are the leaf temperature values are during the cold and warm season.

-It would be useful to include a figure of the mean diurnal cycle of air temperature during the warm and cold seasons but also provide an idea of when the A-CI curves were taken and under which RH, VPD conditions. If RH & VPD conditions differ, what are the implications

Minor comments P10, L 25 Can you clarify in the text why the acclimated slope of Jmax to leaf temperature was estimated as the acclimated slope of Vcmax minus the difference of the kinetic slopes of Vcmax and Jmax (this might also be affected by peaked temperature response)

P3 L2 –can elaborate here and explain homeostasis

P6 L22 Is this Tleaf measured by the Licor or an independent measurement? If yes would be good to mention it in the methods section

P7 L26-29 These values were not really shown as it was all logged transformed, would be nice to show the data. The sentences comparing values to dessert plants and mesic perennial species could be more specific and include typical values for those vegetation types otherwise is all very generic and less informative.

P8 L6 but 'lower allocation of N to Rubisco' has not been demonstrated here

P8 L9, need to mention the role of leaf age /phenology, maybe here good to show N values change and use this to support some of the sentences on this paragraph

References Atkin et al (2000) Plant Physiology, 122, 915–924.

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