

Interactive comment on “Towards a global understanding of vegetation–climate dynamics at multiple time scales” by Nora Linscheid et al.

Anonymous Referee #2

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This is a nice analysis, although the significance for ecosystems and climate is not stated clearly anywhere in simple language. In contrast to other comments, this is not the first such analysis (see for example Braswell et al 1997 and Martinez and Gilabert 2009) as well as substantial other work on time scales using related data such as CO₂ (Vukicevic et al 1997). This analysis, while acknowledging earlier work, doesn't build very much on insights from earlier work though it uses longer and more robust time series. Specifically, Katul's analysis (2001, I think) that showed that ecosystems may rectify short-term forcing onto longer time scales suggests a more sophisticated time series analysis, including lagged correlations, as shown by Braswell et al (1997) in Science, analyzing these same NDVI data, globally, though with respect to T only. Other prior work, using fluxes rather than NDVI also supports some of the author's assertions,

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for example “Therefore, short-term and long-term processes can be obscured by the dominant influence of the annual cycle” was shown rather dramatically by Braswell et al 2005. Both the Katul and Braswell (97) suggest that climate variation in prior years can influence the response in a current year, through carry over via carbon pools, water storage and nutrient cycles and so an approach only considering very short lags may incorrectly characterize climate sensitivity or “co-oscillation”. Katul’s argument, that slower dynamics in the response of eg soil moisture, leaf area, may rectify forcing onto longer time scales, preserving entropy by distributing it to longer time scales and potentially producing complex response, is not addressed in this analysis, though the work is mentioned. Since others using these data, and flux data, which may reflect similar underlying coupled mechanisms, it seems that this analysis is at least incomplete, or the authors have not explained why they think time-scale crossing correlations aren’t affecting their results. My concerns may be addressed with some additional discussion of lagged dynamics, or they could motivate additional analysis.

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