

Interactive comment on “Thermal-based modeling of coupled carbon, water and energy fluxes using nominal light use efficiencies constrained by leaf chlorophyll observations” by M. A. Schull et al.

Anonymous Referee #2

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General Comments:

This study offers two important advances on the traditional LUE model. One is the integration of carbon and water vapor fluxes in a single model, and this combined approach could be very useful. The second is the parameterization of a variable LUE based on chlorophyll content. The paper demonstrates the benefit of a variable LUE over that of an assumed fixed LUE.

The study is well-grounded in a history of similar modeling with the TSEB approach, and takes advantage of a good dataset from the Mead site. The work appears sound and the paper is generally well-written.

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Specific Comments:

One topic possibly worth discussing would be the functional role of [chl] in influencing LUE. As is, chlorophyll appears as a model “black box” with little explanation of mechanism (even if the mechanism seems obvious). How does this finding relate to a growing body of literature relating seasonally changing pigment ratios (chl:carotenoid ratios) and LUE? SA brief explanation of the functional role of pigments seems warranted. For example, are pigments drivers of the LUE response, or are they the end result (e.g. via low N and subsequent senescence)? A bit more discussion of potential mechanism, even if minimal and speculative, could be useful in linking to other LUE model approaches. Since there is lots of recent literature on pigment ratios in the context of LUE, some linkage to that literature might be a useful starting point.

Technical Corrections:

A couple difficult sentences needing attention on p. 14136:

The sentence starting on line 15 seems to be missing something. For example, “, and seasonally...” would be clearer if it were revised slightly (“and that works seasonally...”)

In the sentence starting on line 20: insert “and” before “therefore”

On p. 14147, the term “canopy assimilation of NEE” seems redundant. NEE (or canopy assimilation) alone tells the story here.

Interactive comment on Biogeosciences Discuss., 11, 14133, 2014.

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