

Interactive comment on “Linking carbon and water cycles using stable isotopes across scales: progress and challenges” by C. Werner et al.

Anonymous Referee #1

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this manuscript seems in part like a review, in places seems like a research update and sometimes like meeting summary for the 2010 meeting in Switzerland. It's touted as an update for the power of dual isotope approaches but scarcely talks about dual isotope approaches (only one figure has more than one isotope). This manuscript tries to do too much, each subsection could and should be a chapter of a book. Also, many aspects of the manuscript lack attention to detail and I am sorry to say that most of the manuscript is not salvageable.

In general each section give a cursory treatment of very complex subject matter. one paragraph cannot cover d18O discrimination during CO₂ uptake. Generally the 18O side of this research update or review is inadequate and should be entirely dropped. Statements like this, "Thus, 18O of CO₂ will prove a valuable tracer as we try to under-

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stand why stomata open in the dark and how rates of nocturnal stomatal conductance vary over the night and from day-to-day." Make little sense on their own. How on earth will studying the $d_{18}O$ of CO_2 give us insight to the adaptive significance (the 'why') of nocturnal conductance in plants? The leaf-water enrichment section contains the utterly odd statement, "current models of leaf water enrichment have not markedly evolved since the work of Dongmann et al. (1974) or Farris and Strain (1978)."

The carbon and water cycles of terrestrial systems section (2.4) apparently covers this whole field of study in five paragraphs when each cycle deserves it's own review. Furthermore, this section doesn't even cover water cycles as the section heading would suggest.

section 2.5.1 covers 'isotopic archives in trees and herbaceous vegetation' in five paragraphs and two of them deal with animal-based reconstructions.

The Non vascular plant section discusses vascular plants.

the treatment of short-term biochemical-level fractionations for ^{13}C and phloem matter is reasonably strong and is salvageable as an expanded mini-review. However, the paper includes somewhat controversial data that seem to have never seen peer review and that are incorrectly interpreted (Figure 2), in my opinion. I have absolutely no doubt that instantaneous c_i/c_a will not always match integrated c_i/c_a (or ^{13}C) in the field and there are many reasons for this (mixing integrative timescales, for one). I strongly urge the Authors, if they intend to go forward with this manuscript, to drop most of the poorly detailed material and focus on one strong subject area.

Interactive comment on Biogeosciences Discuss., 8, 2659, 2011.

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