

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

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The manuscript has been thoroughly revised, both in terms of content and structure to met the concerns of both reviewers, and we believe that it now presents a comprehensive discussion on recent progress and challenges of stable carbon and oxygen isotope research across different scales.

Indeed, this manuscript does not intent to review the tremendous amount of published literature on isotope applications which, as correctly pointed out by both referees, is unfeasible within a single paper but would comprise a book volume. The aim of this work is to highlight most pertinent progress and developments in carbon and oxygen isotope research which have markedly advanced the field during the last ten years. Moreover, we discuss how these new findings and methodological advances have in

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turn opened new research frontiers but also raised new challenges and limitation of current approaches. This objective has now been clearly pointed out in the abstract, introduction and outlook. The manuscript sections have been reorganized into the following parts: the leaf (2.1), plant (2.2), community (2.3), ecosystem (2.4), continental (2.6), and global scale (2.7), temporal (historical) isotopic archives (2.5), and new technological developments (3). The conclusions have been replaced by an outlook (4) on main advances and expected future development in these different areas.

Moreover, the manuscript has been fully restructured:

Every section comprises a short introductory paragraph, briefly presenting the foundation on which the work in the last decade was based, referring to pertinent reviews and a few pioneering works. It is followed by clearly structured section (“progress and challenges”) assessing point-by-point major research progress and new achievements as well as new challenges and limitations of current approaches focusing on the last 10 years.

Specific responses to referees comments:

All unclear statements as pointed out by referee 1 have been deleted, the sections were restructured or combined and headings adapted as suggested.

Each section was revised to gain a better balance of the cited literature; however it must be pointed out that within this fast growing field it is beyond the scope of this manuscript to list all recent experimental evidence at each scale, but rather to discuss recent achievements or challenges exemplified by a few selected examples.

The focus on the dual isotope approach (referee 2) has been deleted in all, but the relevant sections.

All figures other than figure 1 have been removed, as they obviously required a more detailed explanatory description which would have added to lengthy text and distract from the main objective.

We hope that this thorough revision satisfactorily met the concerns of the reviewers as we believe that this new version is much improved in terms of objectives, clarity, readability and content. We hope that the reviewers now find a similar interest in the presented overview on recent progress and challenges of the application of stable isotope approaches across scales.

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