

Interactive comment on “Impacts of droughts on carbon sequestration by China’s terrestrial ecosystems from 2000 to 2011” by Y. B. Liu et al.

Anonymous Referee #1

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General:

This is an interesting paper that addresses an important issue of the carbon-water relationship under the climate change condition from 2000 to 2011. The study is supported by sound principles describing the carbon and water cycles. It is also a large undertaking that involves a large amount of model simulations and processing of spatially explicit vegetation, meteorological and soil data at a high spatial resolution for a large country and a decadal period. The choice of the drought index SPI is appropriate for its simplicity, temporal flexibility and spatial consistency. The analyses are meticulously carried out.

Overall, the paper is well written with clear expression. The table and figures are of high quality. The conclusions are reasonable and relevant. The topic is suitable to the

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scope of this journal.

The paper is publishable after taking the following issues into consideration.

1. The paper is heavily based on the simulation of the BEPS model. Therefore, some information on the performance of BEPS, e.g., validations, is needed. Such information can be based on this study or be cited from literatures.

2. Although the authors discussed water-carbon relationship here and there, and also near the end of the paper (pages 17483-17484), in-depth, explicit, and systematic discussion would be desirable. How does water affect carbon sequestration, especially on each component in the carbon cycle (Equations 1-3) explicitly? How do GPP, Rm, Rg, and Rh change with severity of drought? The authors claimed that one of novelties of this study is that the net exchange of carbon (NEP), instead of GPP or NPP, is examined. Therefore, more discussion on Rh and comparisons with earlier studies would be useful. In the end, it is an enhanced understanding of the processes involved and their underlying mechanisms that matters.

3. The impacts of droughts on carbon sequestration by vegetation type need to be analyzed, in combination with the associated meteorological and soil conditions, so that a broad range of readers can be benefited as they may not be familiar with the vegetation compositions in the regions classified in this paper.

Specific:

P 17470, L 7: Change “categories” to “severities”.

P 17470, L 11: Delete “typical”.

P 17473, L 5: Change “for whole country” to “in the entire country”.

P 17474, L 12-13: Change “borrowed” to “adopted”.

P 17476, L 9-11: How is incoming radiation estimated? Please give more details or some references.

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P 17477: The authors may mention that Equations (6) and (7) can be calculated for each grid.

P 17479, L 11: Change “departure” to “anomaly”. Do the same for Figure 5.

P 17484, L 11: Is BEPS only driven by remote sensing data in this study?

P 17485, L 8-9: The authors can mention that the indirect effects of fires, diseases, and insects are partially presented in the LAI data.

Fig. 3 and 4. Change “categories” to “severities” in the caption.

Fig. 5. Change “departure” to “anomaly” in the caption and figure y-axis label.

Fig. 6. Provide unit of NEP in the caption.

Fig. 7. Provide unit of NEP, GPP, and RE in the caption and y-axis label. Explain shadows (grey bars).

Fig. 6, 7 and 8 may be enlarged.

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