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Interactive comment on "Recent changes in the dominant environmental controls of net biome productivity" *by* Barbara Marcolla et al.

Anonymous Referee #1

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This paper investigated the global sensitivity of NBP to global radiation, temperature and soil water content from weekly to seasonal temporal scales(most at weekly scale) using one version of inversion NBP. What I concerned is the uncertainty of results because only one version of global NBP was used and the data had uncertainty at annual scale, particularly in weekly and monthly scale and the paper lacks the validation analysis, which make it unconvincing.

Generally, the abstract and introduction look good but the results and discussions are not good. The authors missed a lot of discussions and just simply describe the results. Throughout the manuscript, it should be more quantitative in nature.

Line 16-17, what datasets were used in this study?

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line 20, how many are the relative contributions of radiation, temperature and soil water content?

Line 21 are you mean that soil water content plays a key role in arid regions of the southern hemisphere both in carbon uptake and release periods?

Line 23, the importance of radiation as a driver is increasing at global scale? Line 23, over what time period?

Line 23-24, So how many are the contribution of the temporal changes in ecosystem sensitivity and the temporal variability of the driver itself, respectively?

The title focused on NBP, but the it looks you are working on net ecosystem CO2 exchange (line 16) throughout the abstract. It should be specified rather than say carbon fluxes vaguely. Same problems in Introduction, you mentioned NBP in your questions but talked about NEE in the whole introduction.

Line 53-59, But it is at the hourly and daily scales where climate variability is directly acting on ecosystems too.

Line 53, The sensitivity of what?

Line 60-70, this paragraph is abrupt. It should be in Method. However, the specific climate factors also should be introduced in introduction before describing your aims.

Line 80, how many observed sites were used in this products? Different versions of Jena CarboScope CO2 Inversion have different numbers of observations and it is important to the uncertainty of NBP. Why do you chose the version s85_v4.1 rather than others? You only used the one product and version. This is a bit dangerous, how much can we trust your results?

Line 92, it should be better to include level 3 and 4, especially in forests and savannas. Line 102 what is the threshold of VIF used? Line 115, This is very dangerous because the inversion NBP may have large uncertainty at weekly and monthly scale for each

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pix. So it is hard to convincing to define CUP and CRP.

Line 129, it is NBP, rather than net ecosystem CO2 exchange. Line 129, your abstract said the CO2 exchange over most of the land surface is controlled by temperature, but here you said it is radiation.

Figure 1, can you show the value for each drivers in the map rather than the dominant drivers simply? How can we know the positive or negative effect from this figure?

Line 136, summer drought decreases GPP but not increases TER. But radiation does not decrease GPP in the northernmost latitudes

Line 140, the reader don't know this number from this figure 1. I strongly recommend the author sperate the results and discussions because it is very unclear now. There are only two sentences in the some paragraphs of results. Line 142, As for radiation? Line 144, drier periods show higher uptake. Why? Line 153, so what? Line 158, the temperate zone is mostly radiation-driven. No, the temperate zone is mostly temperature-driven.

Line 161, but your results showed NBP is related to radiation and GPP is related to temperature. Line 164, are you taking about GPP, rather than NBP here? Line 165, The carbon release period of the Northern hemisphere is mostly driven by global radiation, which positively impacts on the NBP fluxes. So you mean carbon release period positively impacts on the NBP?

Line 170-172, how much is the positive or negative effect? Please add more quantitative descrbition. Figure 3, please show the frequency distribution curve. Line 173-176, are these differences between different drivers significant? Line 194, why? Line 199, why does an opposite positive trend of temperature sensitivity occur in North America? Line 200, which regions Line 206-208, these sentences should move to methods. Line 208, What clear pattern for radiation? Line 211-214, need to ref Figure 5 and 6, how about monthly and seasonal scale Line 238, you are not working on the weekly vari-

ation, rather than the inter-annual variability. Line 247, how bigger? I don't think you can compare them because you didn't normalize them together. Line 249 per se? Line 250, you need to compare this figure with greening map and see if it is true.

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