Note: *The comments of the reviewer are italicized*, the responses are in regular font, and **revisions in the paper are bold.**
Revised manuscript: Sharma_2022_Revised_Full.pdf
Tracked changes: Sharma_2022_Tracked_Version.pdf

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Please implement all suggested changes as you suggested them in the author response letters and provide a revised manuscript. You also need to include how your analysis differs from Zscheischler et al. 2014 in the methods and discussion section, i.e. integrate your responses to CC1.

Response:
While the reply to the CC1 (https://doi.org/10.5194/bg-2022-178-AC3) elaborates on the differences between this study and the paper (Zscheischler et al. 2014) of the CC1. We have included the major differences in our methodology and results that are contrary to Zscheischler et al. 2014, please see tracked changes lines 124-129 and 241-244 or the text below:

Revised manuscript (lines 123-127) or Tracked changes (lines 123-129):

Attribution analysis was performed in recent studies of large connected manifolds of spatio-temporal continuous extremes in the carbon cycle (Sharma et al., 2022b; Zscheischler et al., 2014; Flach et al., 2020) by comparing the medians or mean state of climate driver(s) during or preceding a carbon cycle extreme with climate extreme for the same spatio-temporal region or grid cells affected during carbon cycle extremes. This method may not capture the variability at smaller regional to grid cell scales.

Revised manuscript (lines 237-240) or Tracked changes (lines 242-245):

This is contrary to the results of Zscheischler et al. (2014), who found a strengthening of positive (net ecosystem production, NEP) extremes over time using CMIP5 ESMs. However, the ratio of negative to positive carbon cycle extremes in our study lie within the multi-model spread of the relative strength of NEP 240 extremes in CMIP5 ESMs (Zscheischler et al., 2014).

AC1 - your response to comment "Line 233: I agree with the mechanism but am unsure whether CESM2 has corresponding root structure." Please include this explanation in the method section to ensure major model functionalities and process representation are described.

Based on your and reviewer's recommendations, we have included the following changes in our revised version. Revised manuscript (lines 164-171) or Tracked changes (lines 167-176):

We expect that CESM2 could simulate the impact of variability of climate drivers on ecosystem processes because the Community Land Model version 5 (CLM5 (Lawrence et al., 2018)), the land model component of CESM2, simulates water exchange across the root structure that varies with soil depth and plant functional type. The soil water flux is dependent on hydraulic conductivity and hydraulic potential among various soil layers via Darcy's Law. Due to the differences in hydraulic properties of soil layers, their soil water content varies by soil depth. The root-soil conductivity depends on evaporative demand and varies by soil layer and is calculated based on soil potential and soil properties, via Brooks-Corey theory. The rooting depth parameterizations were improved in CLM5 with a deepened rooting profile for broadleaf evergreen and broadleaf deciduous tropical trees (Lawrence et al., 2019).

AC2 - your response to comment refering to "line 312: enhancing stomatal closure and ecosystem respiration": this is a contradiction. It is possible that plants' response to increased CO2 offer is a partial closing of the stomata, leading to sink saturation, but at the same time, this REDUCES respiration, i.e. the opposite." Please correct the wording to make clear you mean heterotrophic respiration.

Based on your and reviewer's recommendations, we have included the following changes in our revised version. Revised manuscript (lines 332-334) or Tracked changes (lines 338-339):

Rising daily temperatures hinder net carbon uptake by enhancing stomatal closure, under conditions of water stress, and increasing heterotrophic respiration (Figure S9).

The earlier feedback from the reviewers and community can be found under the Discussions on the manuscript page. Below are the links to the earlier replies:

- Reply to AC1: https://doi.org/10.5194/bg-2022-178-AC1
- Reply to AC1: https://doi.org/10.5194/bg-2022-178-AC2
- Reply to CC1: https://doi.org/10.5194/bg-2022-178-AC3