We thank the two referees Irina Melnikowa and Ben Sanderson, and the editor Kirsten Zickfeld for reviewing the revised version of our manuscript and for their comments and corrections, which we have implemented as outlined below (comment in blue font, our responses in black font).

Comments from Irina Melnikowa

L131: "rising atmospheric CO2" – consider rephrasing to “changing CO2”.

This has been done.

L102: "emission-driven CMIP6 scenarios"; L106: "emission-driven simulations"; L108: "emission-driven over concentration-driven multi-model ensembles"; L589: "emission-driven ESMs" – please check that the terminology is used consistently throughout the manuscript and that each usage is appropriate.

We have replaced “emission-driven CMIP6 scenarios” by “emission-driven simulation of CMIP6 scenarios”. We have kept the “multi-model ensembles” because this term is necessary in this context. We double checked the terminology and believe it is appropriate now.

Please consider defining the terms "efficiency of CDR" / "carbon removal efficiency of CDR" when it is first introduced.

We have added a definition at the first occurrence as follows: “Both, the efficiency of CDR (defined as CO_2 removed per unit of resources employed) as well as…”

L199: "Activity-driven CDR (Fig. 1b) rather simulates"; L204: "activity-driven CDR simulation"; L208: "activity-driven CDR implementation"; L452: "activity-driven representation of CDR simulation" – please check whether these expressions can be made more consistent.

For better consistency, we replaced “activity-driven CDR simulation” and "activity-driven CDR implementation" by “activity-driven representation of CDR”. We also corrected "activity-driven representation of CDR simulation" to : "activity-driven representation of CDR", such that usage is consistent across the manuscript now.

Figure 2: Consider adding panel labels (a) and (b) for consistency with Figure 1.

This has been done.

L446, L456: Net Atmospheric Removal (NAR) – this abbreviation has already been defined, so there is no need to define it again.

We have removed the second occurrence, but we have left the first one at the beginning of the section, because we believe it is good to remind the reader.

L457: "effects and feedbacks" – consider using simply "effects" (or "feedbacks"), unless you intend to distinguish between the two.

We actually intend to distinguish between the two. There are biogeophysical "effects" of CDR that then might cause "feedbacks" on climate physics or the carbon cycle. Therefore, we would prefer to leave this sentence as it is.

L509: exclusive economic zones (EEZs) – already defined earlier.

Thank you, we have removed the spelled-out version "exclusive economic zones"

L650: "negative net" → "net negative"?

We have reworded the sentence in question as follows: "Hence, ESMs will use the net removal fluxes estimated by IAMs for various CDR methods and prescribe these fluxes in their emission-driven scenario simulations."

Comments from editor:

l. 27: several references to "deep" mitigation scenarios remain in the manuscript.

We have removed most occurrences of "deep" mitigation. We have left it where it is necessary because the sentence refers to scenarios with very strong mitigation ("bioenergy crop cultivation typically expands strongly in deep mitigation scenarios") and where it refers to the concrete scenario that we are using in our example, which indeed qualifies as a deep mitigation scenario.

l. 137: Explain that these feedbacks operate in reverse under negative CO2 emissions (e.g. Chimuka et al., 2021).

We modified the sentence in question as follows: "Hence, due to the buffering nature of carbon cycle feedbacks that operate in reverse under negative emissions (Asaadi et al., 2024; Chimuka et al., 2023), the net atmospheric reduction of CO_2 in CDR scenarios will always be less than the gross amount of CO_2 that has been removed."

l. 154-155: Clarify what is meant by "a CDR intervention has been stopped". E.g. in the case of A/R, does this refer to no further A/R, or a saturation of CO2 uptake from A/R?

We have clarified this by adding the sentence “This is particularly true for A/R or ocean-based CDR, where it may take decades to centuries until the carbon reservoirs approach a new equilibrium.”

l. 140-145: Mention that biogeophysical effects feed back onto the carbon cycle (Guo et al., 2025; MacIsaac et al., 2026).

We have done this by adding “…, which also entails feedbacks onto the carbon cycle (Guo et al., 2025; MacIsaac et al., 2026).”

l. 515: Do you mean “…such that they could NOT be removed in the baseline simulations”? Sentence unclear.

Yes, thank you for spotting this. Sentence has been corrected by adding “not”.

l. 630: Clarify what is meant by “land-atmosphere only simulations”. Are these offline simulations?

l. 631: Change “might be better suited” to “Are better suited”. From the literature it is clear that concentration-driven simulations are needed to isolate biogeophysical from biogeochemical effects of CDR (e.g. Boysen et al., 2014).

We modified this sentence as follows: “For example, concentration-prescribed land-atmosphere-only simulations (i.e. with prescribed sea-surface temperature) or land-only simulations (with prescribed atmospheric forcing) are better suited…”