We thank the reviewer for this constructive comment. We have addressed it in the following way:

1. Reporting the more detailed landuse fraction in the text (lines 316-318):

"*Within the pervious fraction, the actual land use composition differs across catchments: Petit Glâne and Arbogne are cropland-dominated (80% and 66% of pervious area), the Broye subcatchment is mixed (54% cropland, 43% permanent meadow), and the Flon is dominated by permanent meadows and pastures (80% of pervious area).* "

2. On the validity of larger scale, uniform SOC increases:

We acknowledge that the uniform SOC increase is a simplification, and likely overestimates the sequestration potential at catchment scale, particularly for the Flon where permanent meadows dominate. We emphasise, however, that our goal is not to predict a likely SOC trajectory but to quantify hydrological sensitivity to a given SOC change. The large scale of the scenarios is hypothetical, so we cannot give direct evidence. However, our scenario assumptions are well aligned with recent policy agendas both at international and national level (4 per mille initiative, Der Bundesrat 2023 [link]). At the regional level, the canton of Vaud — in which approximately half of the Broye catchment is located — committed to incentivizing measures to increase SOC content in agricultural soils (Climate Adaptation Plan, Canton de Vaud 2020). While these initiatives focus primarily on cropland, there is also evidence that management changes can increase SOC in permanent grasslands and pastures (Keel et al., 2024; Volk et al., 2025; Poeplau et al., 2021; Guillaume et al., 2022b), even though the potential for SOC increases is certainly smaller in Swiss conditions. The exact potential remains uncertain due to lack of data. Given that grasslands cover a substantial fraction of our catchments, excluding them from the scenario would be an equally arbitrary choice. We will integrate the beforementioned points in the text in lines 562-571:

"*The aim of this study was to explore sensitivities of catchment-scale hydrological processes to increases in SOC. Thereby, our scenario assumptions are aligned with targets set by recent policy agendas promoting large-scale SOC increases in the region such as the Climate Adaptation Plan 2020 by the Canton of Vaud (Canton de Vaud 2020) and the national Climate Strategy for Agriculture and Food 2050 (*BLW, BLV & BAFU 2026*). We acknowledge that the uniform SOC increase is a simplification, and likely overestimates the sequestration potential at catchment scale, particularly for the Flon, where meadows and pastures dominate, which are assumed to have smaller potentials for SOC increases than arable soils. However, evidence exists that also permanent grasslands and pastures sites hold potentials for SOC increases through management adaptation (Poeplau 2021, Guillaume et al. 2022, Keel et al. 2024, Volk et al. 2025). Overall, it is known that the limits to potentials for SOC increases depend on pedoclimatic and management drivers. Their quantification, however, remains challenging (e.g.* Begill et al. 2023*)".*

We will also integrate this information in the section on large scale SOC increases in our Introduction, lines 56-60:

"*Beyond these effects, increment of SOC offers a co-benefit of contributing to negative CO$_2$ emissions through carbon sequestration, particularly in the subsoil, a process encouraged by international initiatives such as the "4 per mille" initiative (Minasny et al. 2017, Button et al. 2022), as well as national and cantonal policies in Switzerland (Canton de Vaud 2020, Bundesrat 2023). While in this context, mostly cropland is targeted, management-driven SOC gains have also been documented in permanent grasslands such as meadows and pastures, although their potential to increase SOC content is less well constrained yet (Poeplau 2021, Guillaume et al. 2022, Keel et al. 2024, Volk et al. 2025). Assuming that such adaptive management to increase SOC is scaled up and applied on a larger area, it raises the question of how these field-level interventions affect catchment-scale hydrological processes.*"

New references:

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Guillaume, T., Makowski, D., Libohova, Z., Elfouki, S., Fontana, M., Leifeld, J., Bragazza, L., & Sinaj, S. (2022). Carbon storage in agricultural topsoils and subsoils is promoted by including temporary grasslands into the crop rotation. *Geoderma*, *422*. https://doi.org/10.1016/j.geoderma.2022.115937

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Keel, S., Ammann, C., Bretscher, D., Gross, T., Guillaume, T., Huguenin-Elie, O., Moll-Mielewczik, J., Nemecek, T., Roesch, A., Volk, M., Wüst-Galley, C., Leifeld, J. (2024). Dauergrünlandböden der Schweiz: Quelle oder Senke von Kohlendioxid? *Agroscope Science*, *189*. https://doi.org/10.34776/as189g

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BLW, BLV & BAFU (2026). *Klimastrategie Landwirtschaft und Ernährung 2050. Verminderung von Treibhausgasemissionen und Anpassung an die Folgen des Klimawandels für ein nachhaltiges Schweizer Ernährungssystem 1. Teil: Grundsätze, Ziele und Stossrichtungen*.