

# Deforestation in the Congo basin induces sustained lateral carbon export

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## Background

The expansion of slash and burn agriculture severely threatens primary forests in the Congo Basin. As the dominant mode of deforestation in this region, it is expected to affect soil nutrient stocks and availability, as well as lateral carbon losses (Drake *et al.*, 2024).

## Objective

Quantify the impact of agricultural conversion on lateral carbon export in tropical catchments of the Congo Basin by comparing concentrations and lateral export of DIC, DOC, CO<sub>2</sub>, and CH<sub>4</sub> between forest and agricultural systems.

## Site-specific discharge

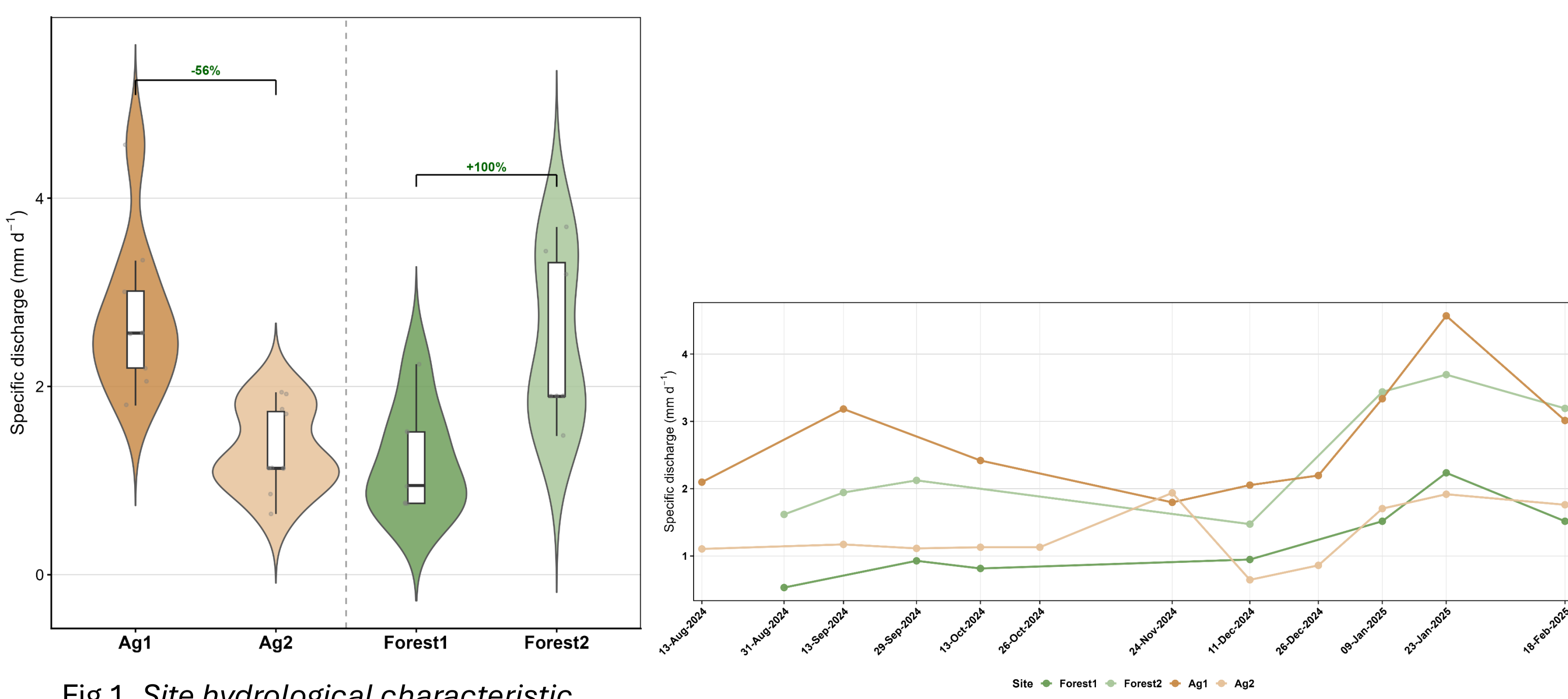


Fig 1. Site hydrological characteristic

## Methodology

Four catchments had been selected, two of which drain forested landscapes and two drain agricultural landscapes in the Yangambi region, Democratic Republic of the Congo.

Bi-weekly water sampling for chemical analysis. Based on these samples collected from July 2024 to February 2025.

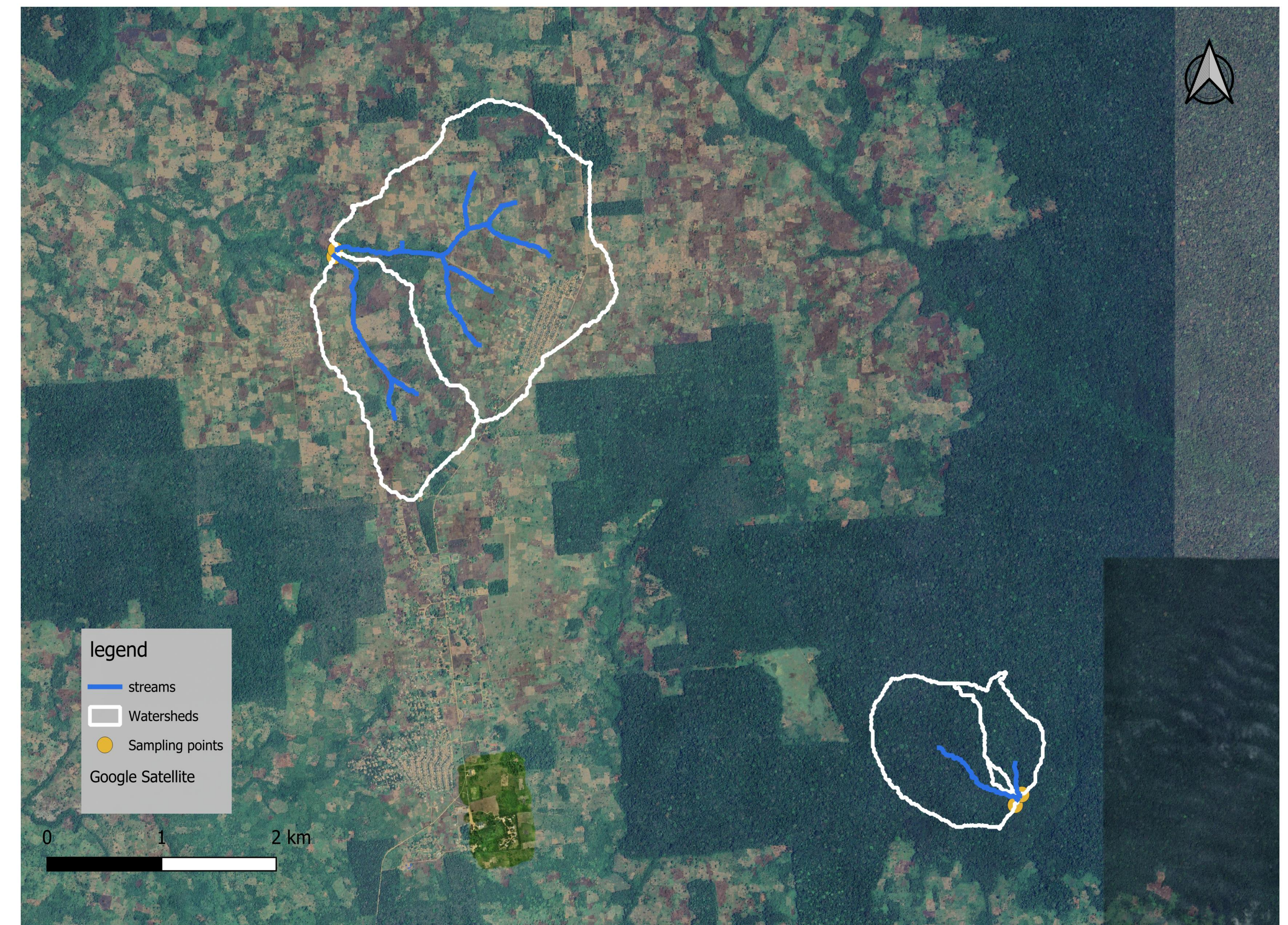


Fig 2. Study area

## Results

### Lateral carbon export by land use

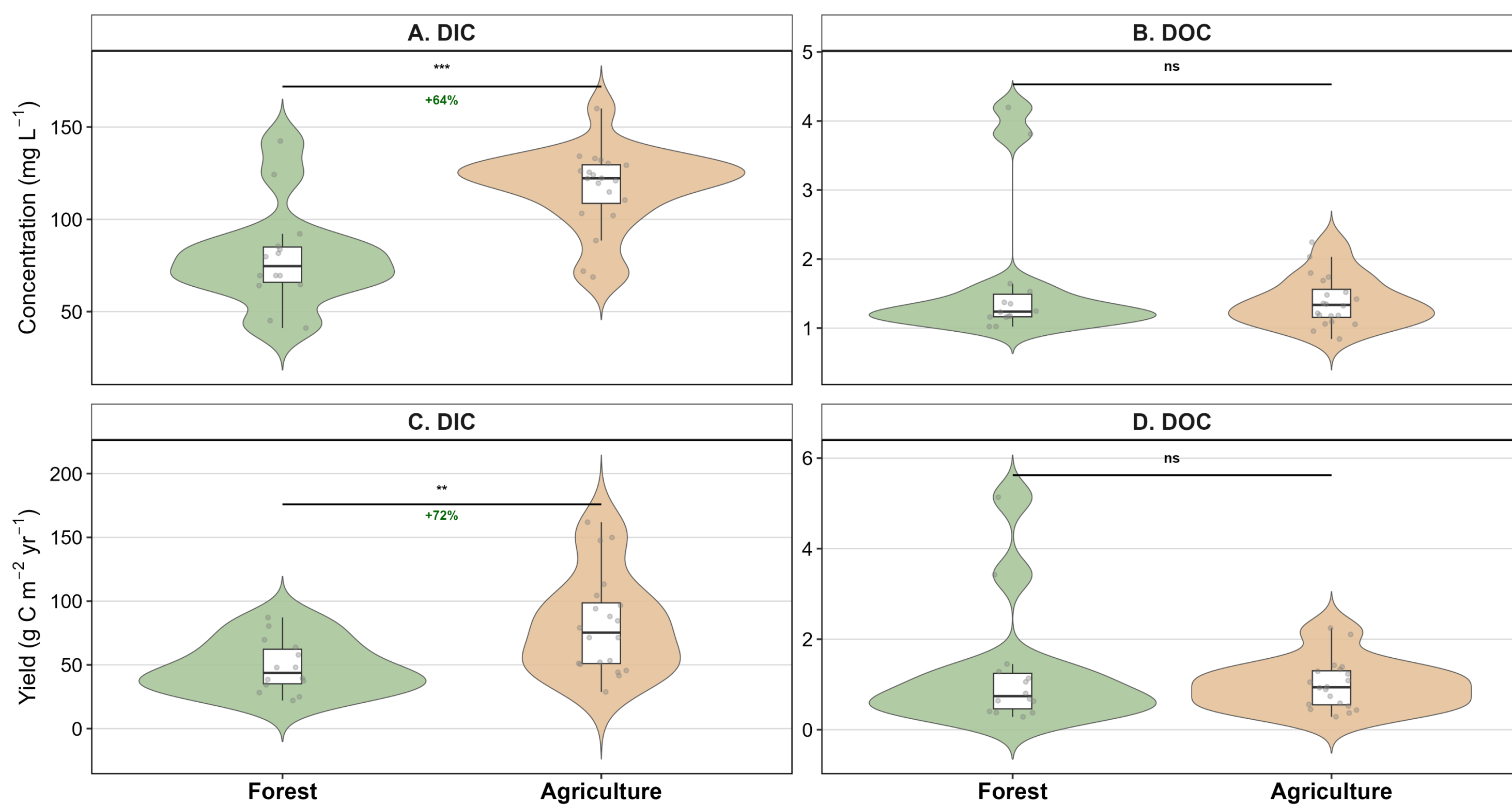


Fig 3. Land use effect on dissolved organic and inorganic concentration and yield

### Greenhouse gas concentrations by land use

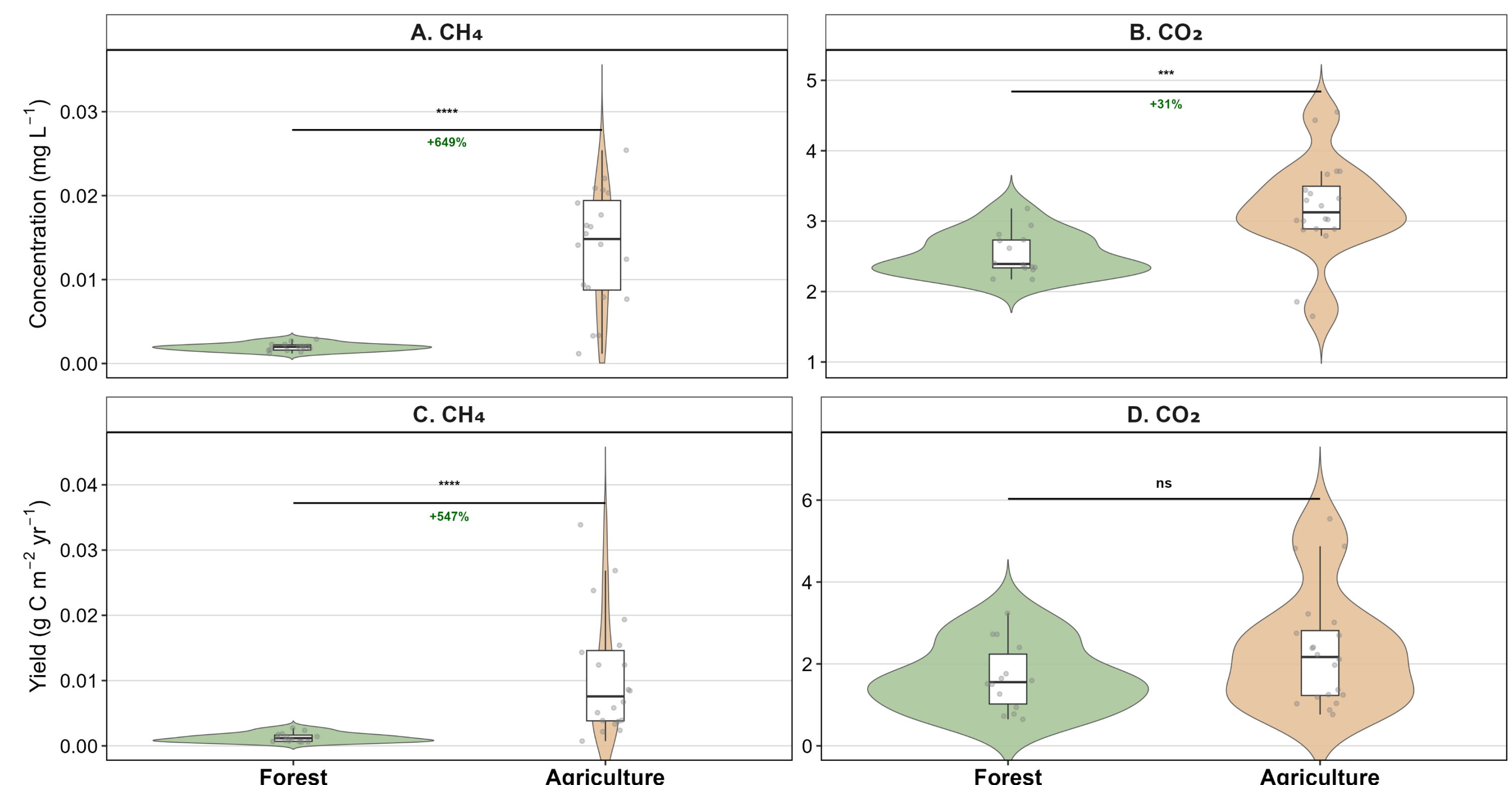


Fig 4. Land use effect on methane and carbon dioxide concentration and yield

### carbon species concentrations per site

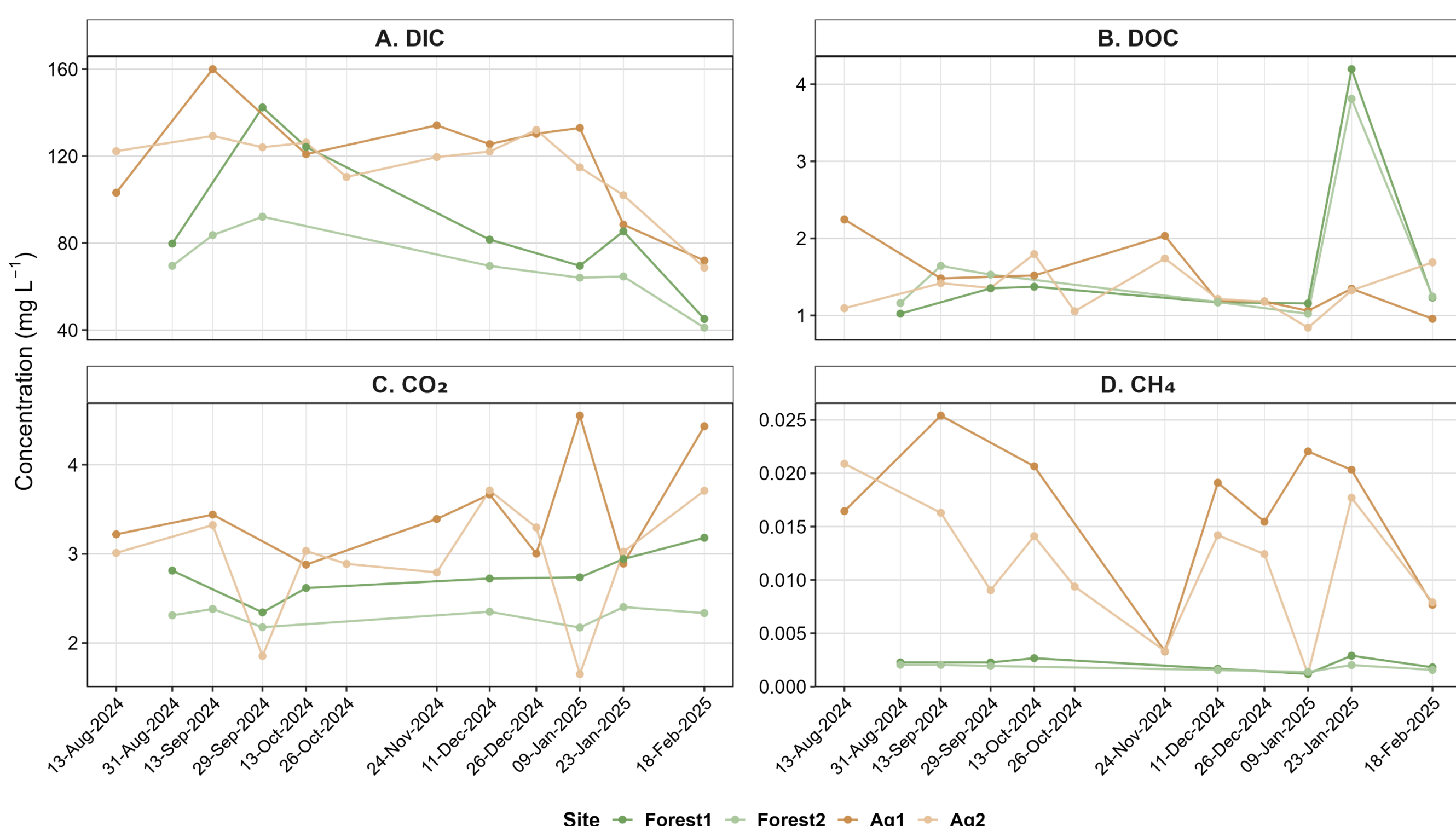


Fig 5. Carbon species variability over 7 months

### Reference

Drake, T. W., Baumgartner, S., Barthel, M., Bauters, M., Alebadwa, S., Akoko, N. B., et al. (2024). Agricultural land-use increases carbon yields in lowland streams of the Congo Basin. *Journal of Geophysical Research: Biogeosciences*, 129, e2023JG007751. <https://doi.org/10.1029/2023JG007751>

## Key messages

Lateral export patterns revealed a significant increase in DIC yield (+72%) under agricultural land use, while DOC export remained unchanged, indicating no major shift in dissolved organic carbon transport.

At the same time, streams draining agricultural catchments showed a strong enrichment in dissolved greenhouse gases, with substantially higher CH<sub>4</sub> (+547–649%) and moderately higher CO<sub>2</sub> (+31%) concentrations,

This may reflect higher carbon turnover rates in agricultural streams, possibly linked to enhanced microbial metabolism under altered environmental conditions

## Conclusion

Our data show that deforestation can induce carbon losses, not only via biomass export and burning during land conversion, but also via sustained soil carbon losses long after conversion events took place.

