



Forest clear-cutting effects on greenhouse gas dynamics in riparian buffer zones



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Clearcutting increases groundwater carbon gas concentrations



Klaus et al. 2018 (*Biogeosciences*)

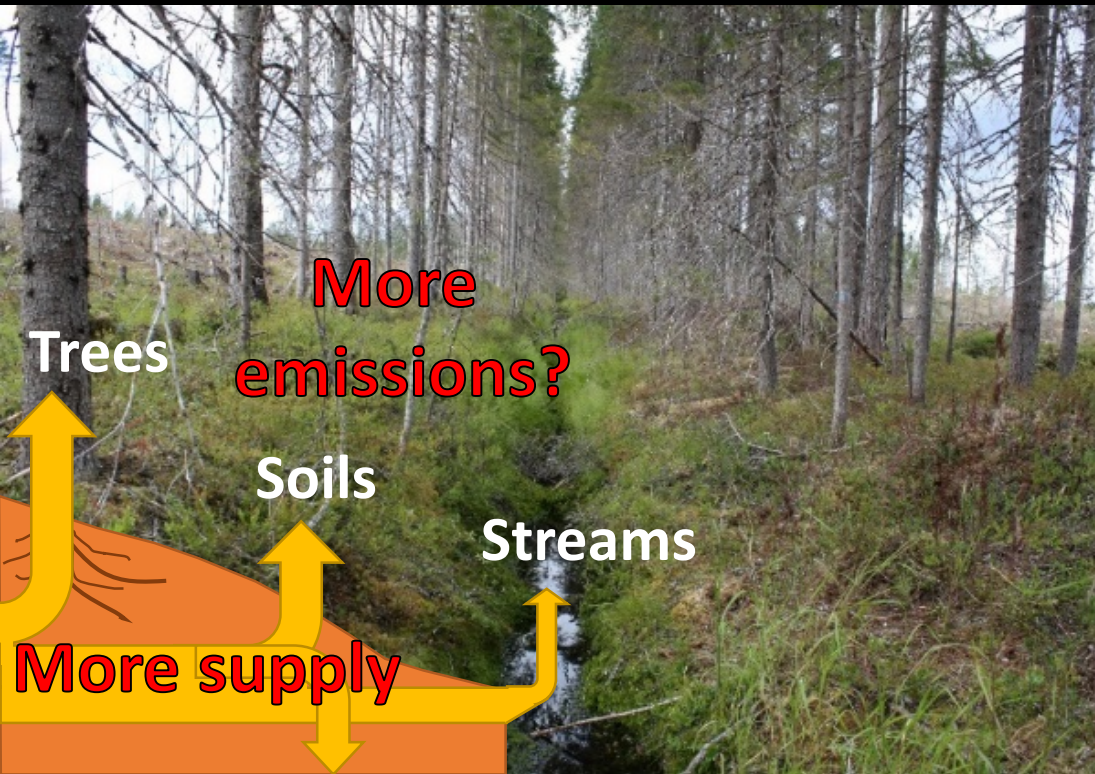
Fate of clear-cut carbon leakage is unclear



No change in stream emissions despite increased supply after clear-cutting

Klaus et al. 2018 (*Biogeosciences*)

Hypothesis



Greenhouse gases leaking from clear-cuts are emitted or taken up in riparian buffer zone

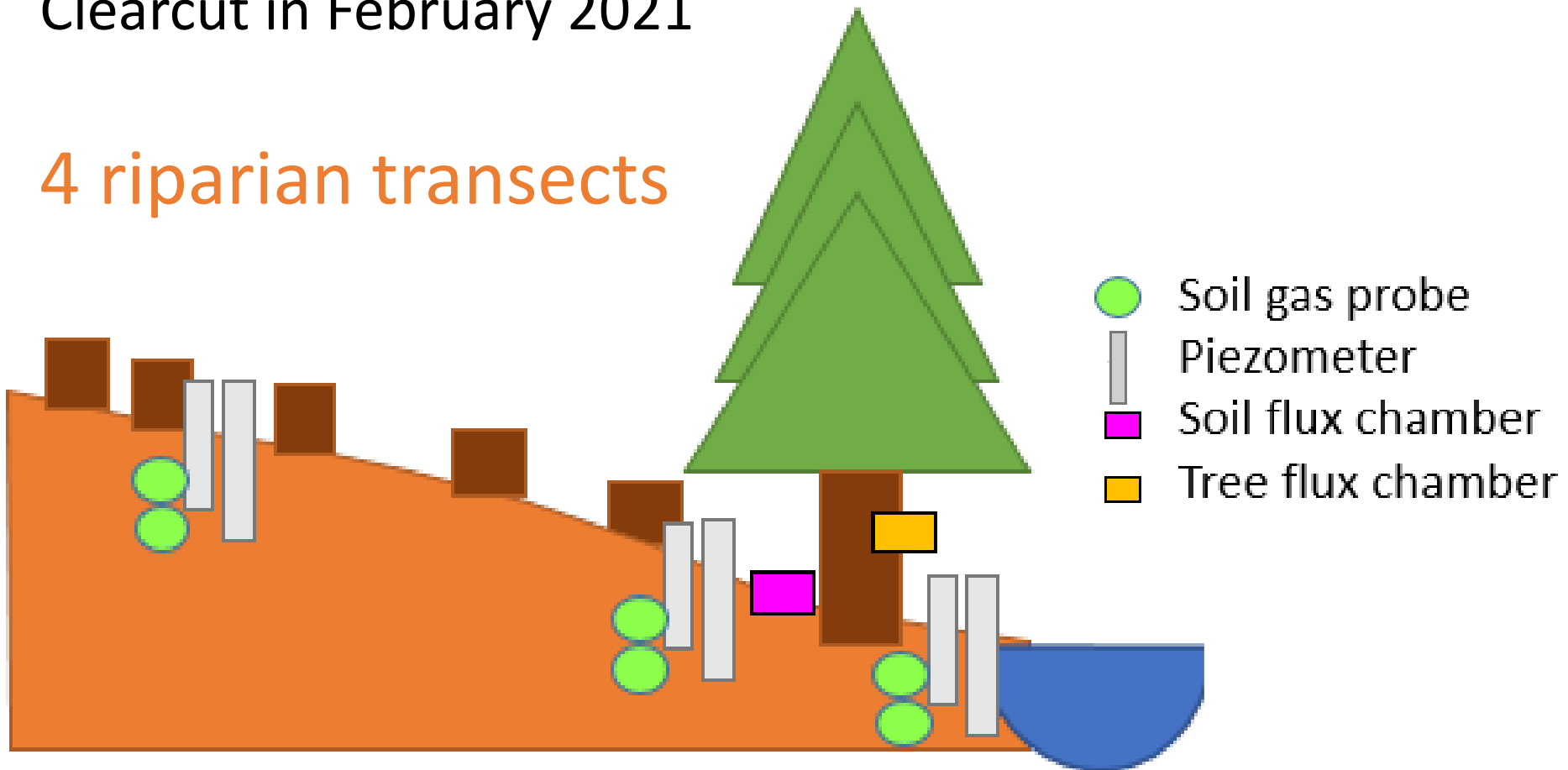
Clearcut / buffer zone experiment

Before/After-Control/Impact design

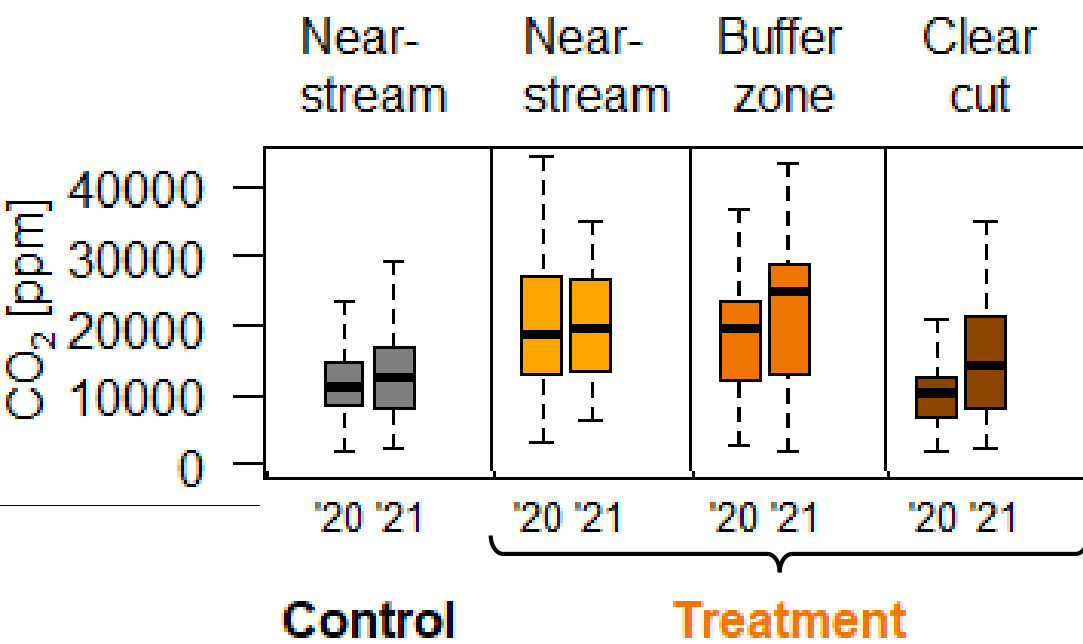
Monthly sampling (May-October 2020 + 2021)

Clearcut in February 2021

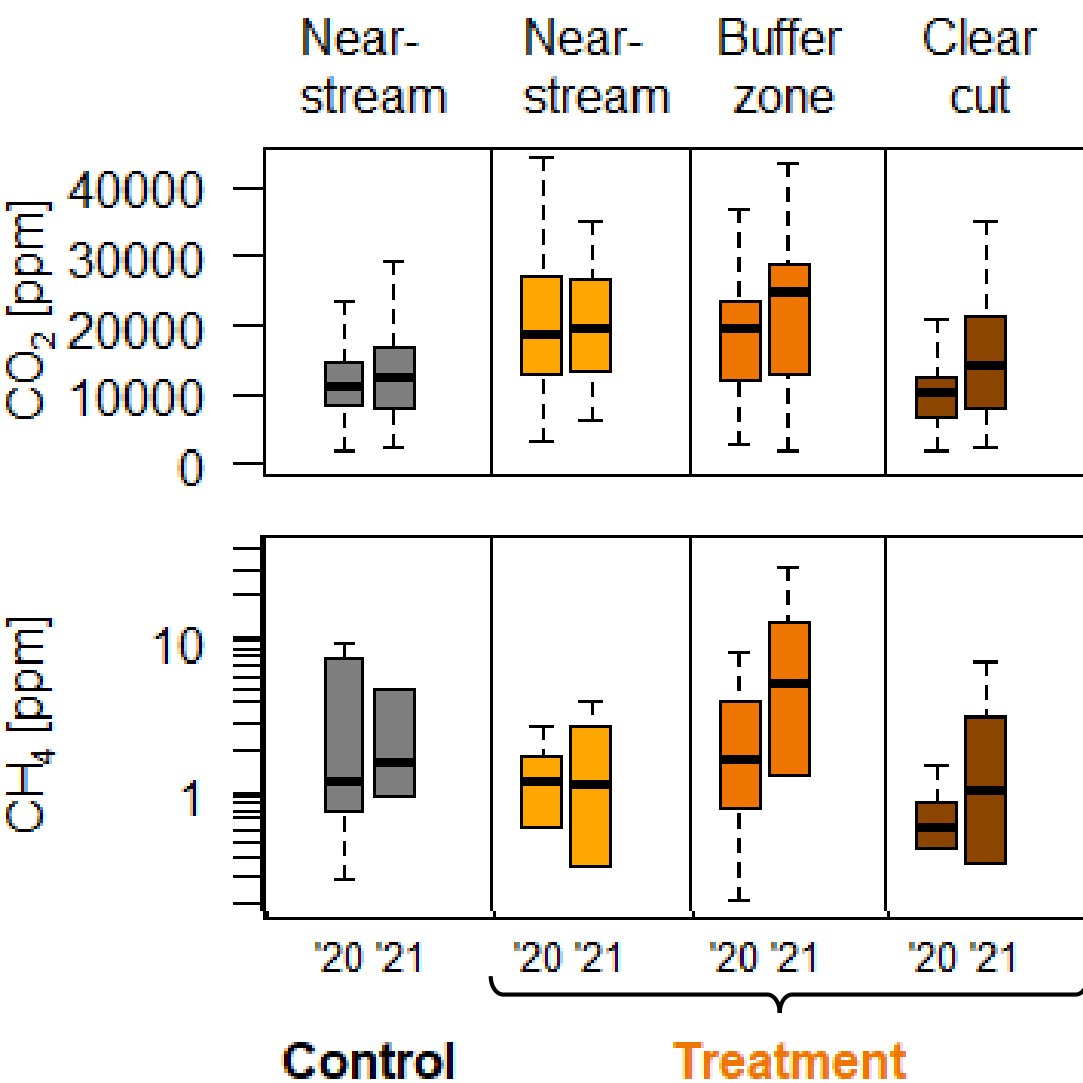
4 riparian transects



Soil gas



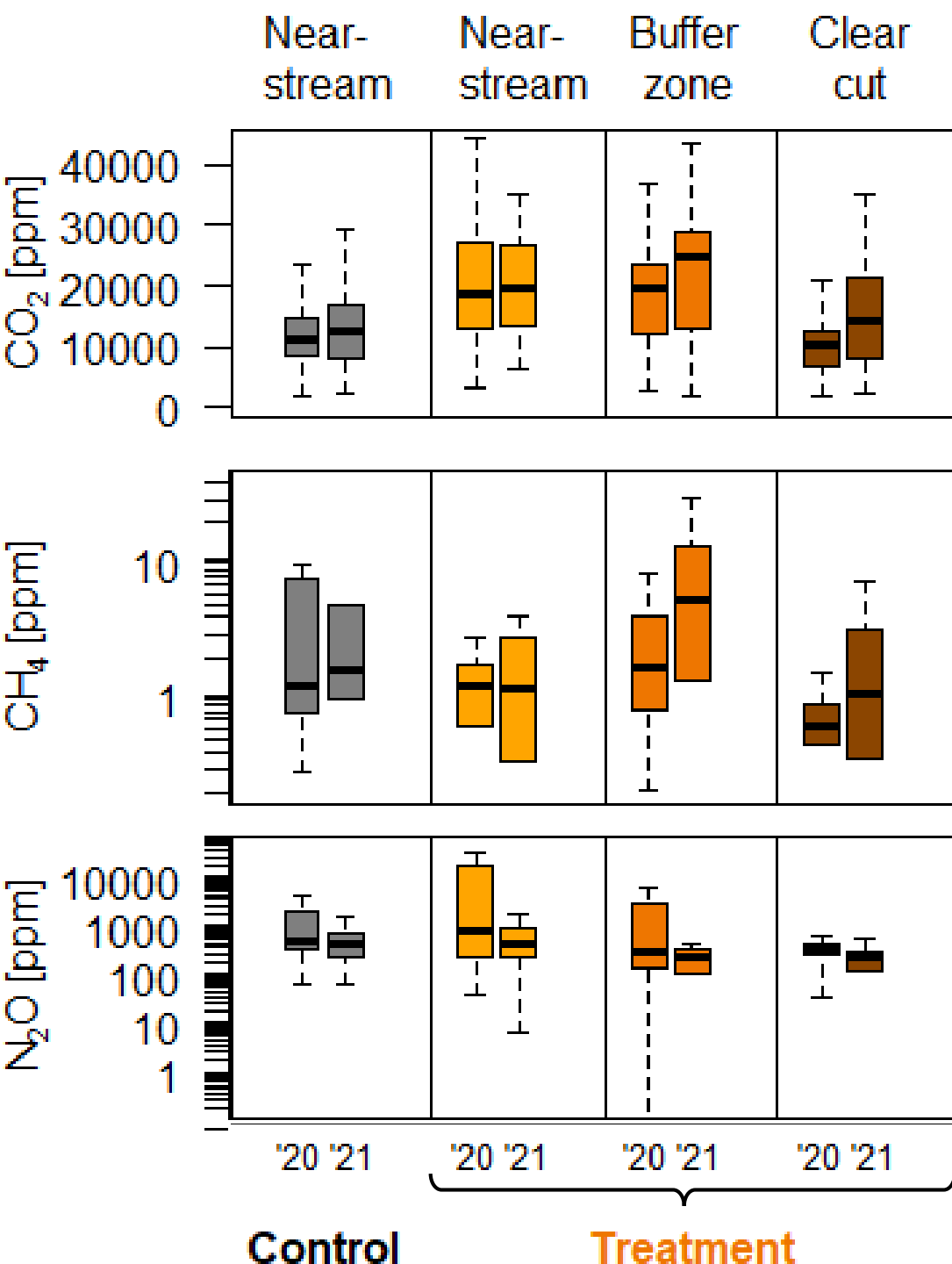
Soil gas



forest logging
increased CO₂ and CH₄
on clearcuts and
in bufferzone

no effect near-stream

Soil gas

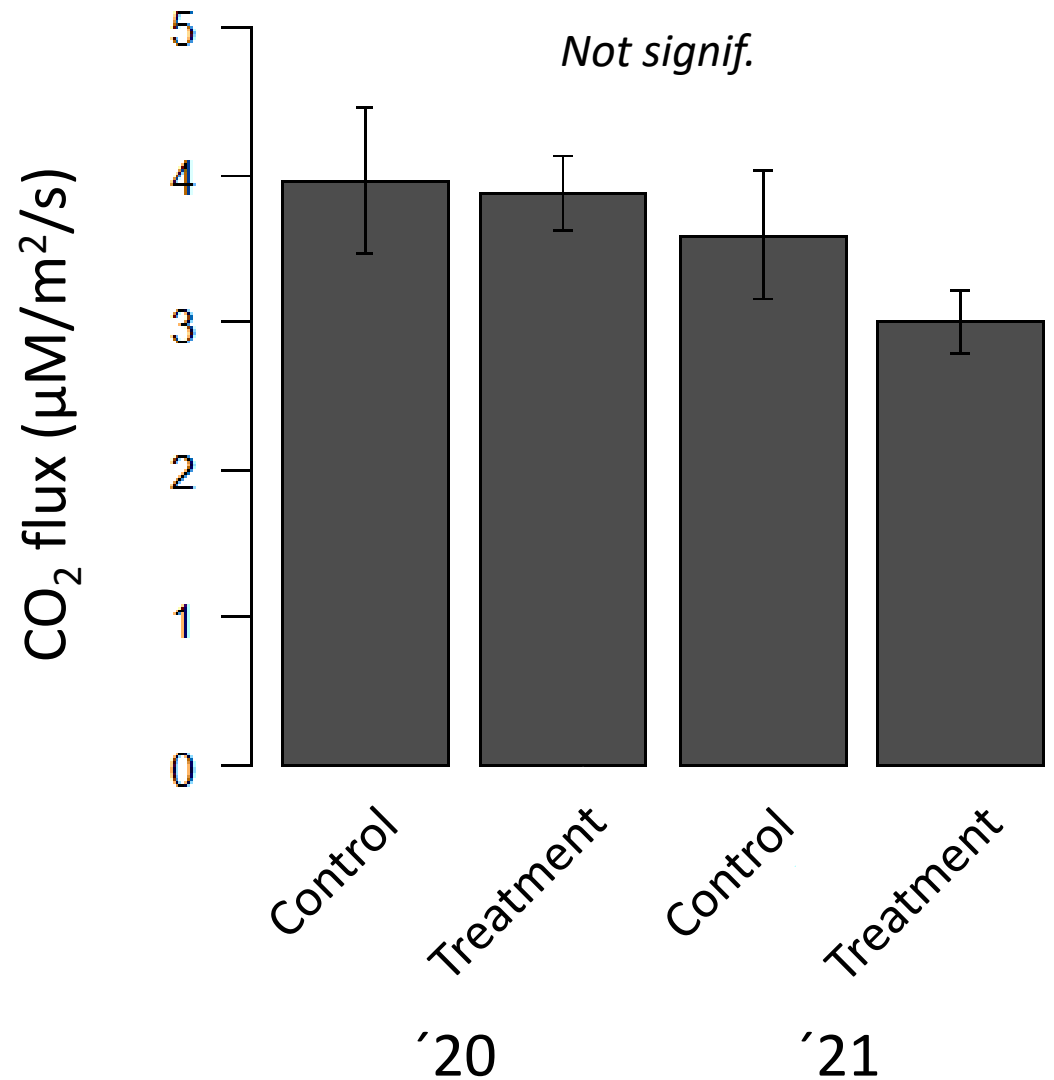


forest logging
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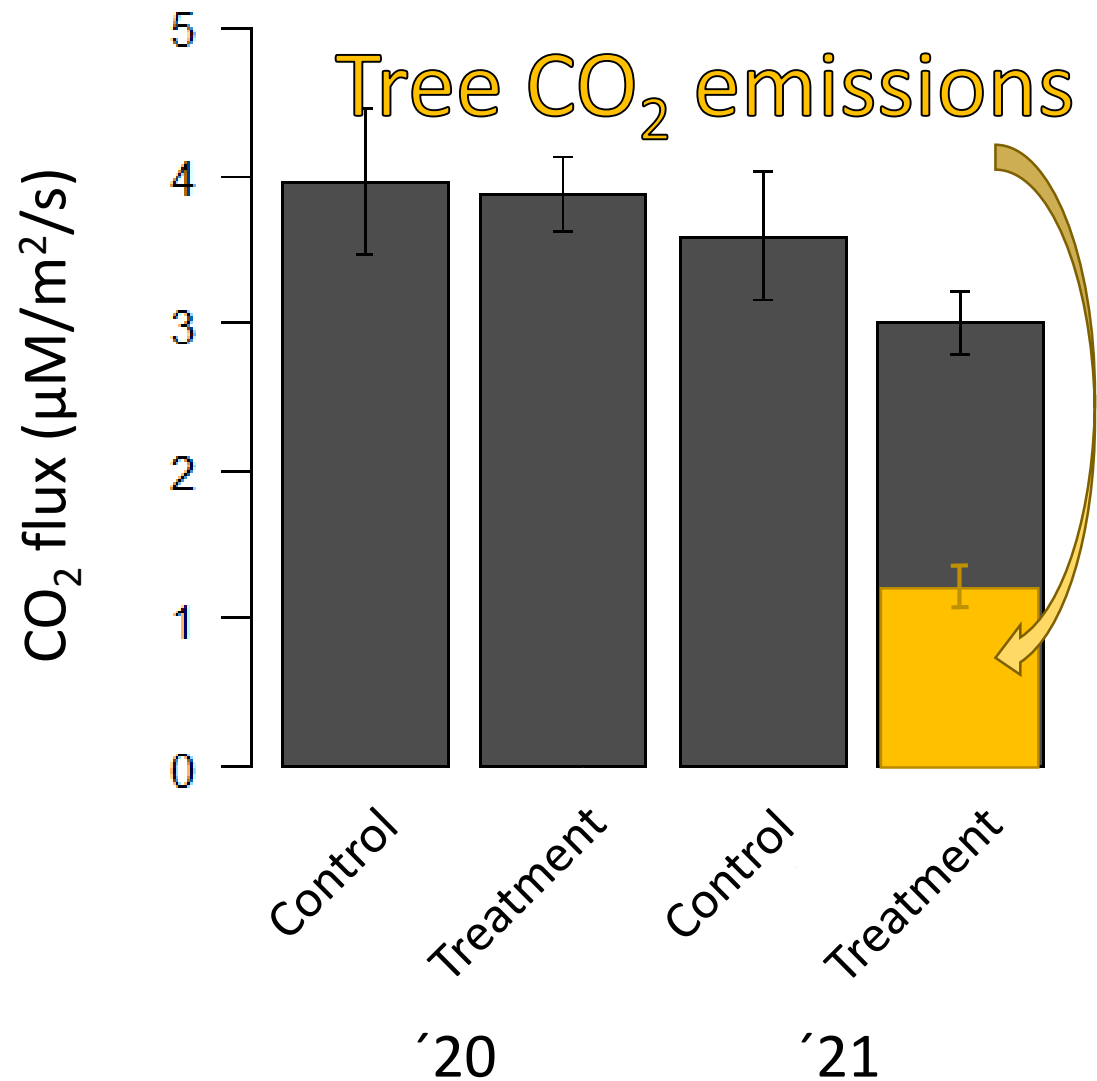
no effect near-stream

no effect on N₂O

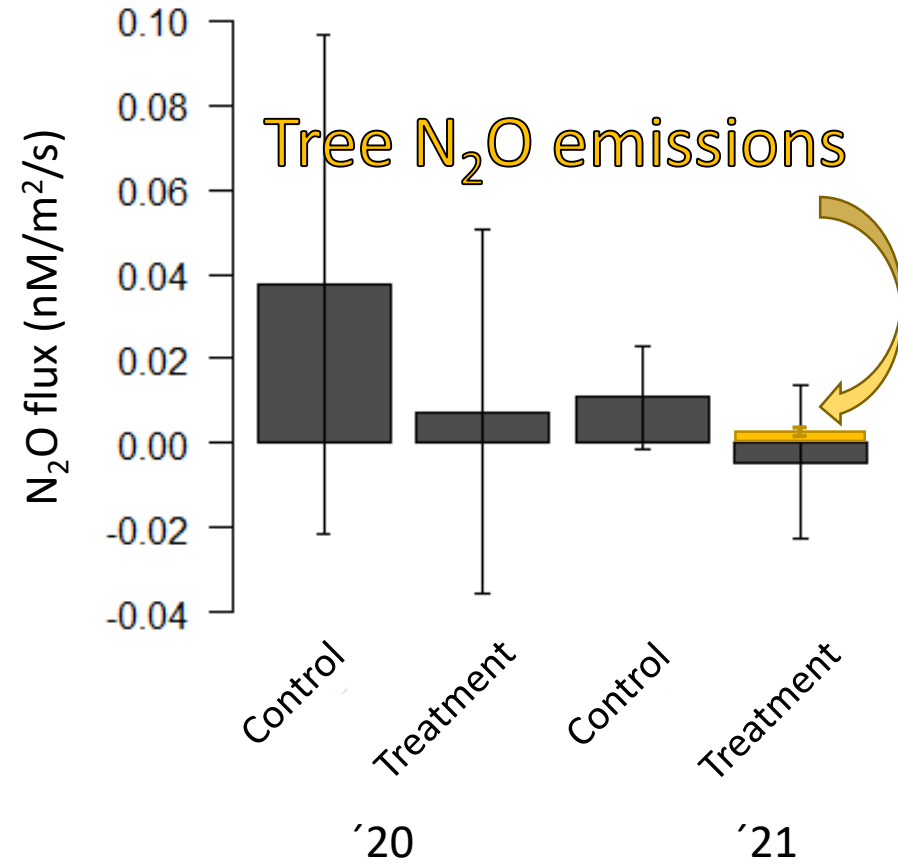
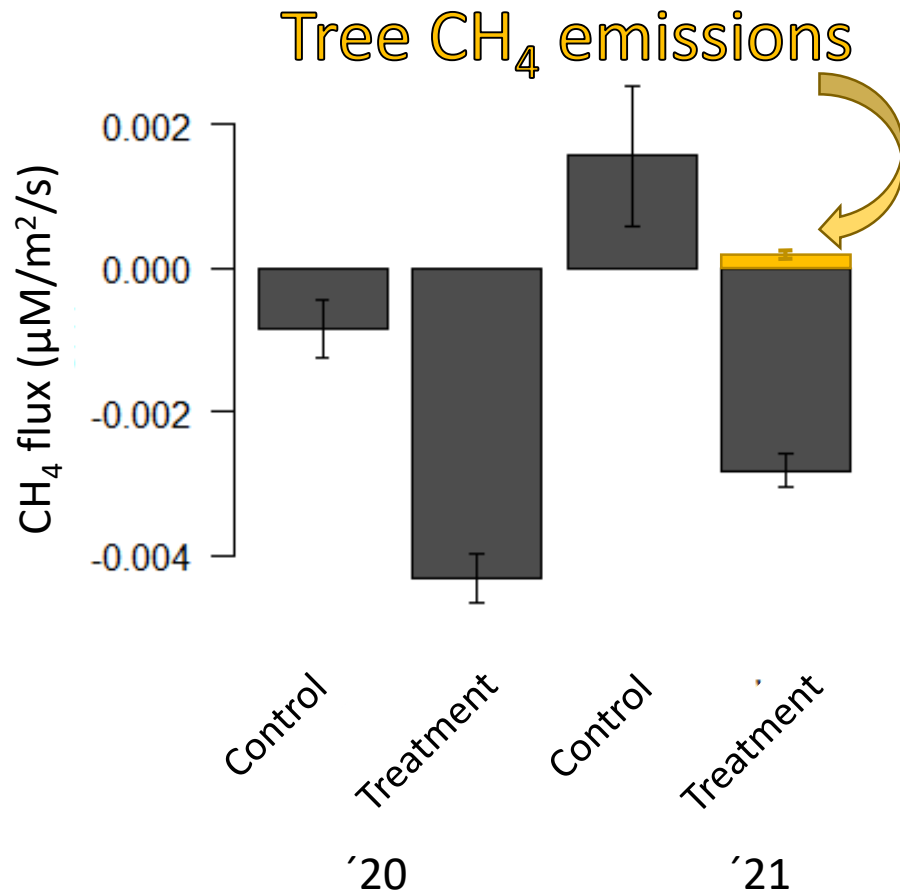
No change in Soil CO₂ flux



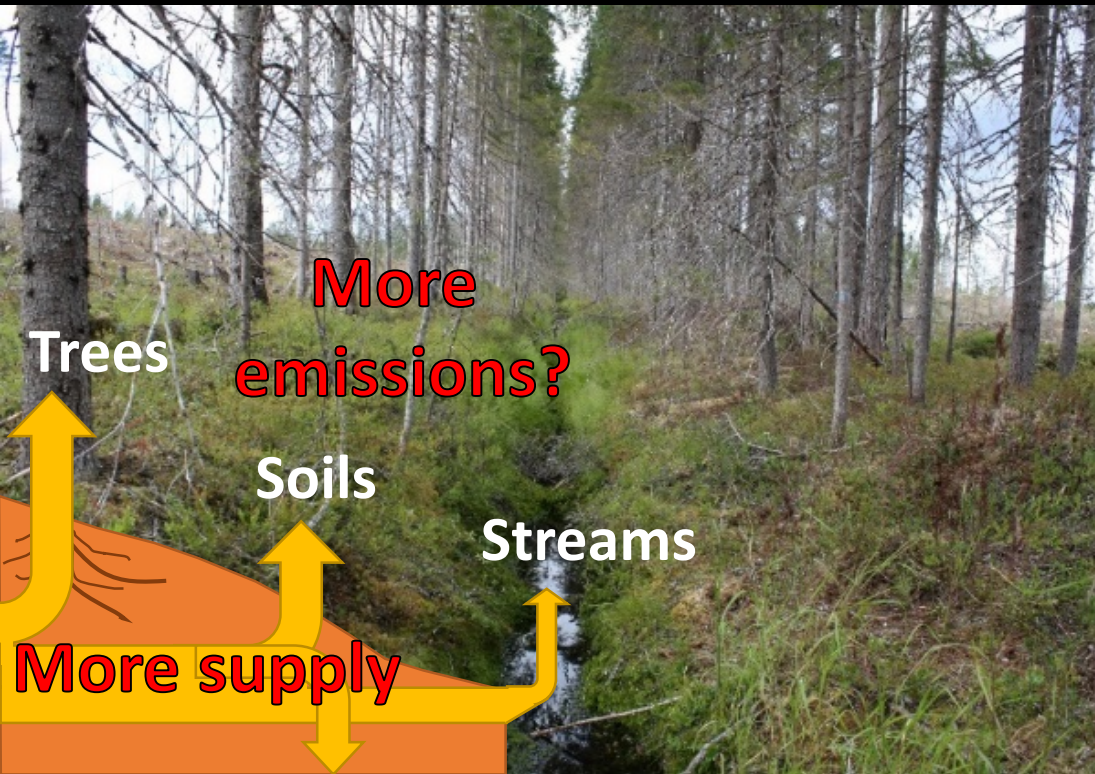
No change in Soil CO₂ flux



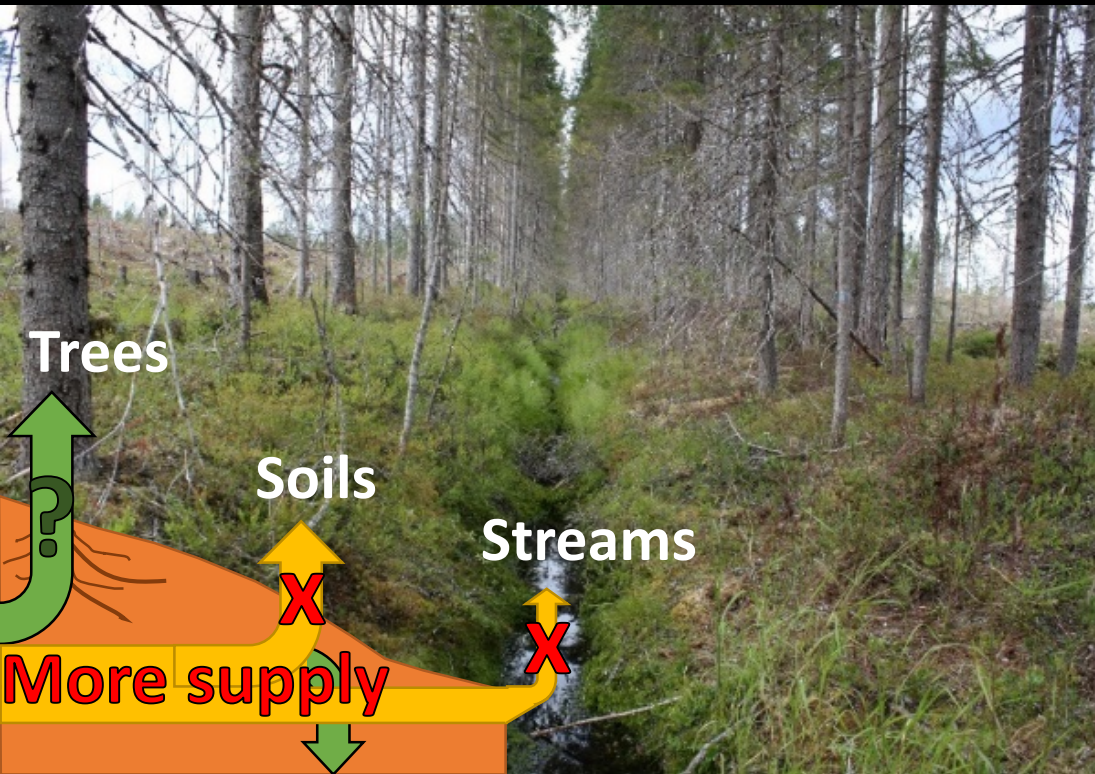
No change in Soil CH₄ / N₂O flux



Conclusions



Conclusions



Clearcut-induced increases in groundwater $\text{CO}_2 + \text{CH}_4$...

... buffered in riparian zone through soil uptake or tree emissions

No clearcut effect on N_2O dynamics

Thanks

Field assistance

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Margareta Elfving

Logistics / equipment

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Viktor Sjöblom

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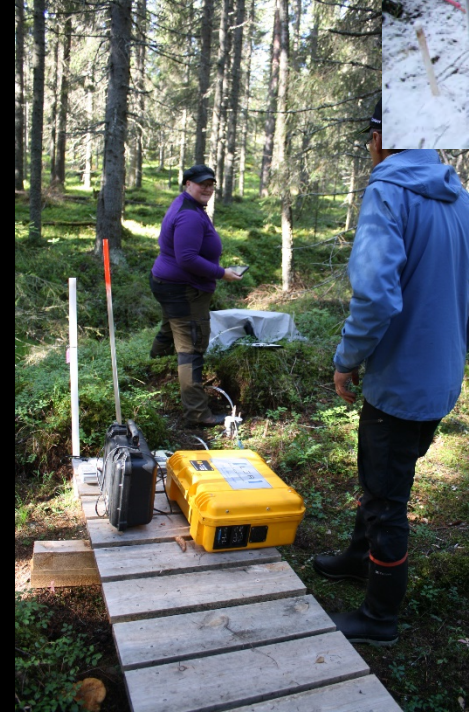
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Jan Karlsson

SITES Svartberget



Skogssällskapet



CARL TRYGGERS
STIFTELSE
FÖR VETENSKAPLIG FORSKNING



STIFTELSEN EXTENSUS

Supplementary slides

Boreal landscape carbon cycling

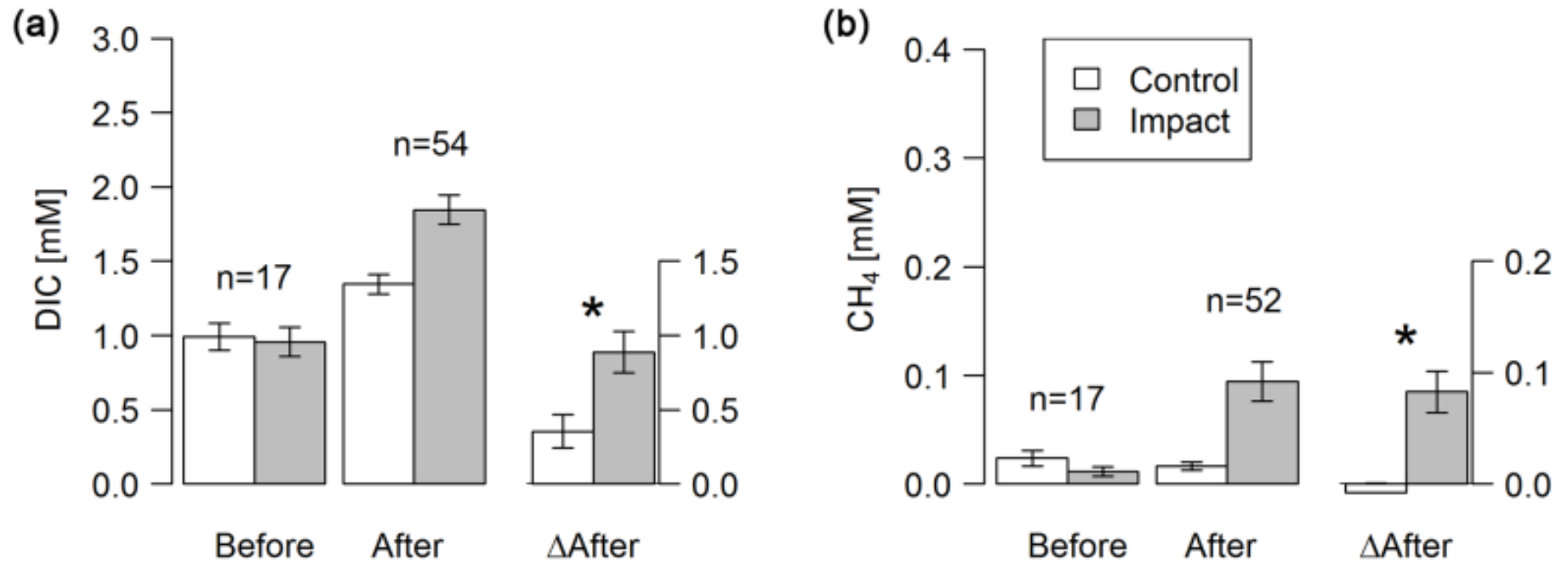
Values in $\text{g C m}^{-2} \text{yr}^{-1}$

Wallin et al. 2013 (GCB)
Goulden et al. 2011 (GCB)
Schelker et al. 2012 (JGR)

Öquist et al. 2014 (ES&T Letters)

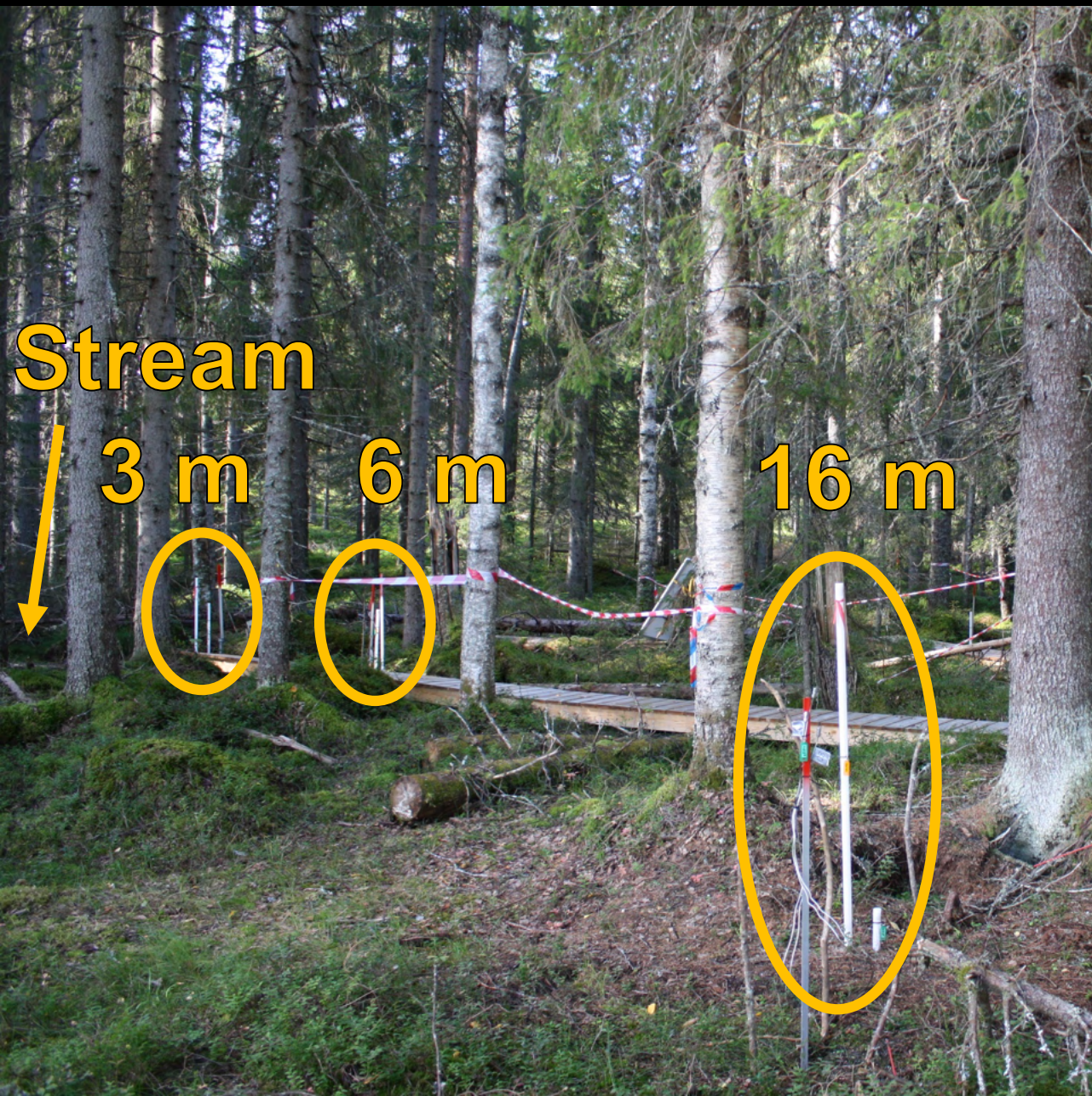


Groundwater carbon increases after clear-cutting

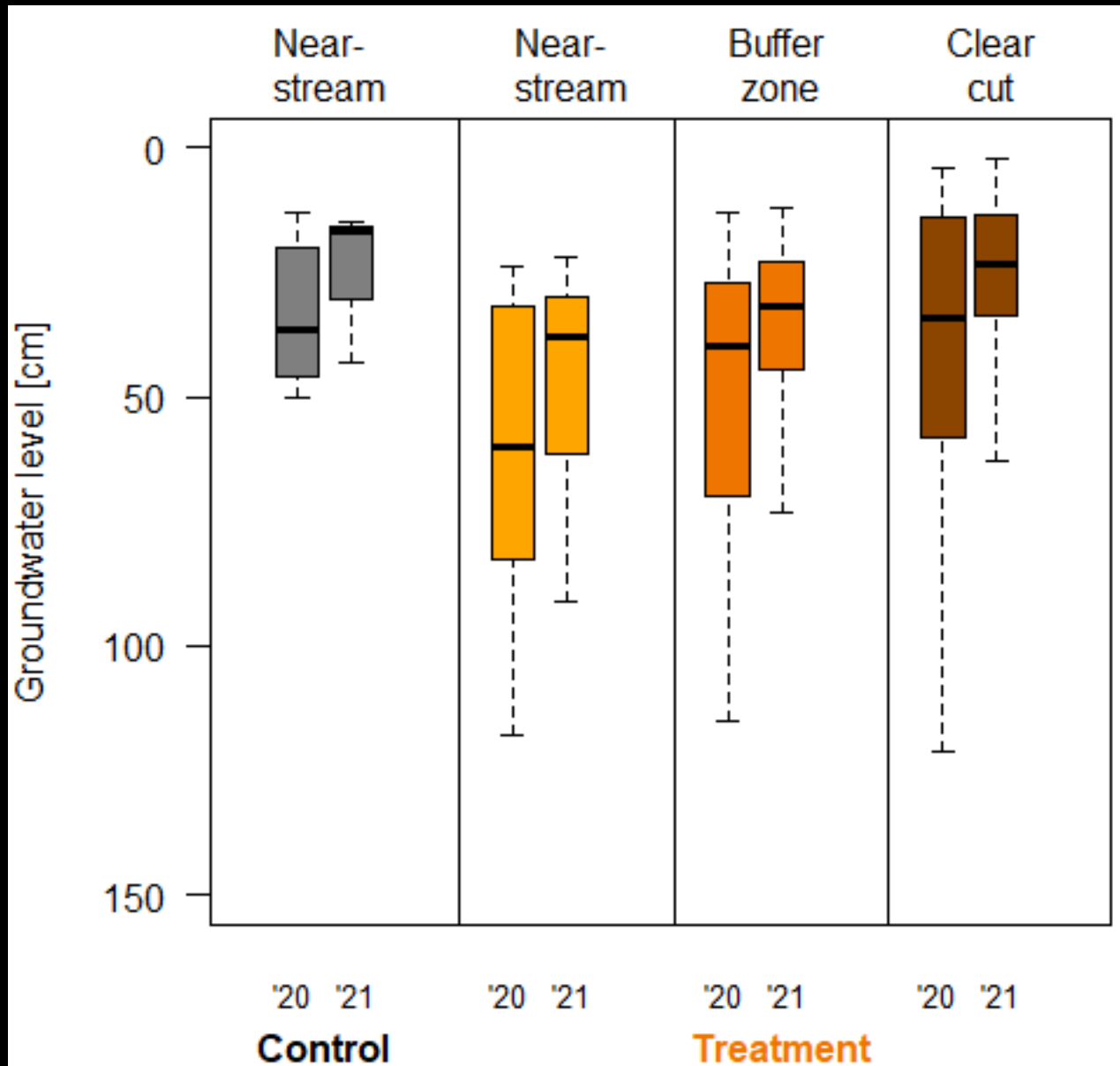


Klaus et al. 2018 (*Biogeosciences*)

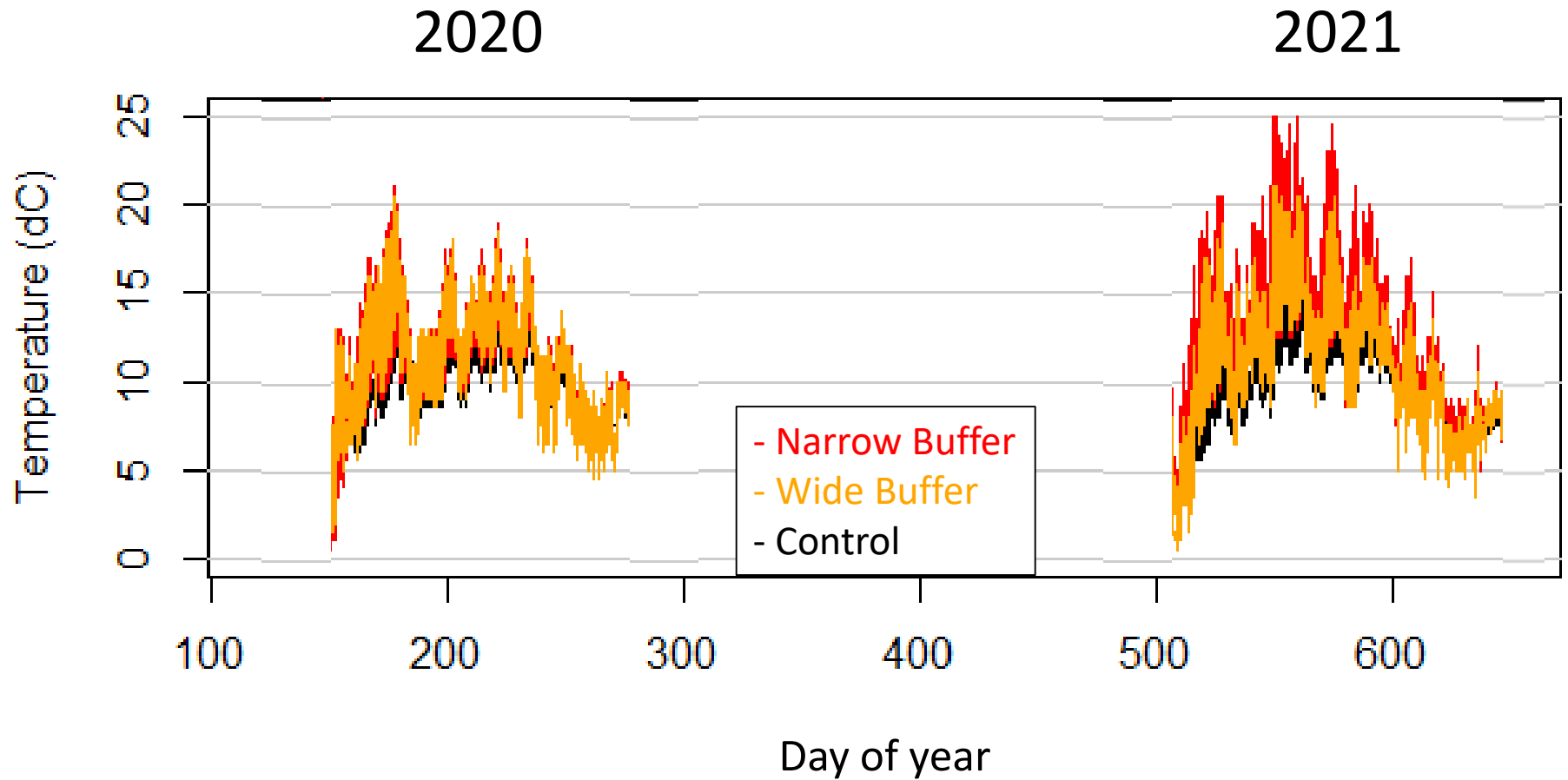
Well / gas probe transects



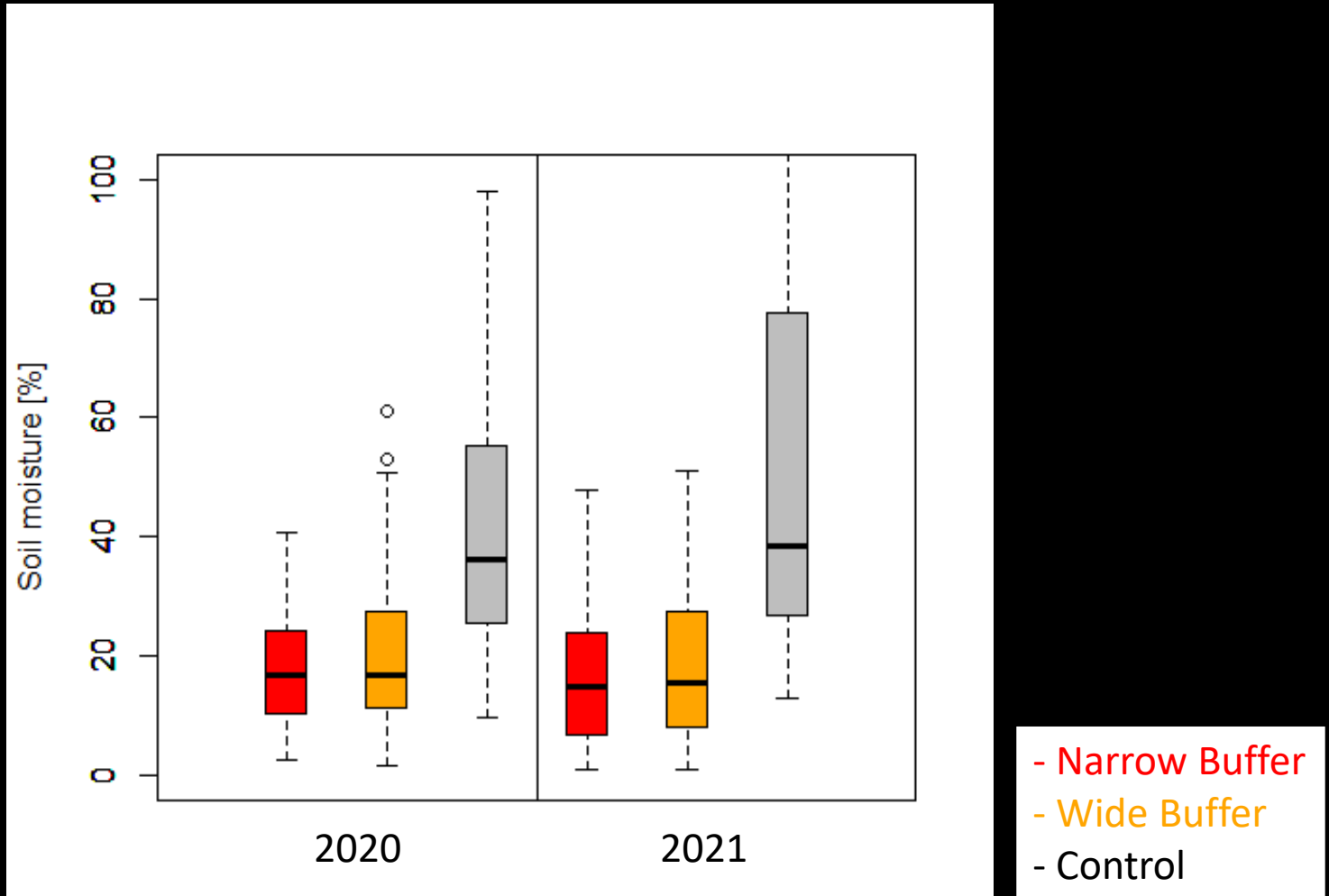
Clearcut reduced droughts

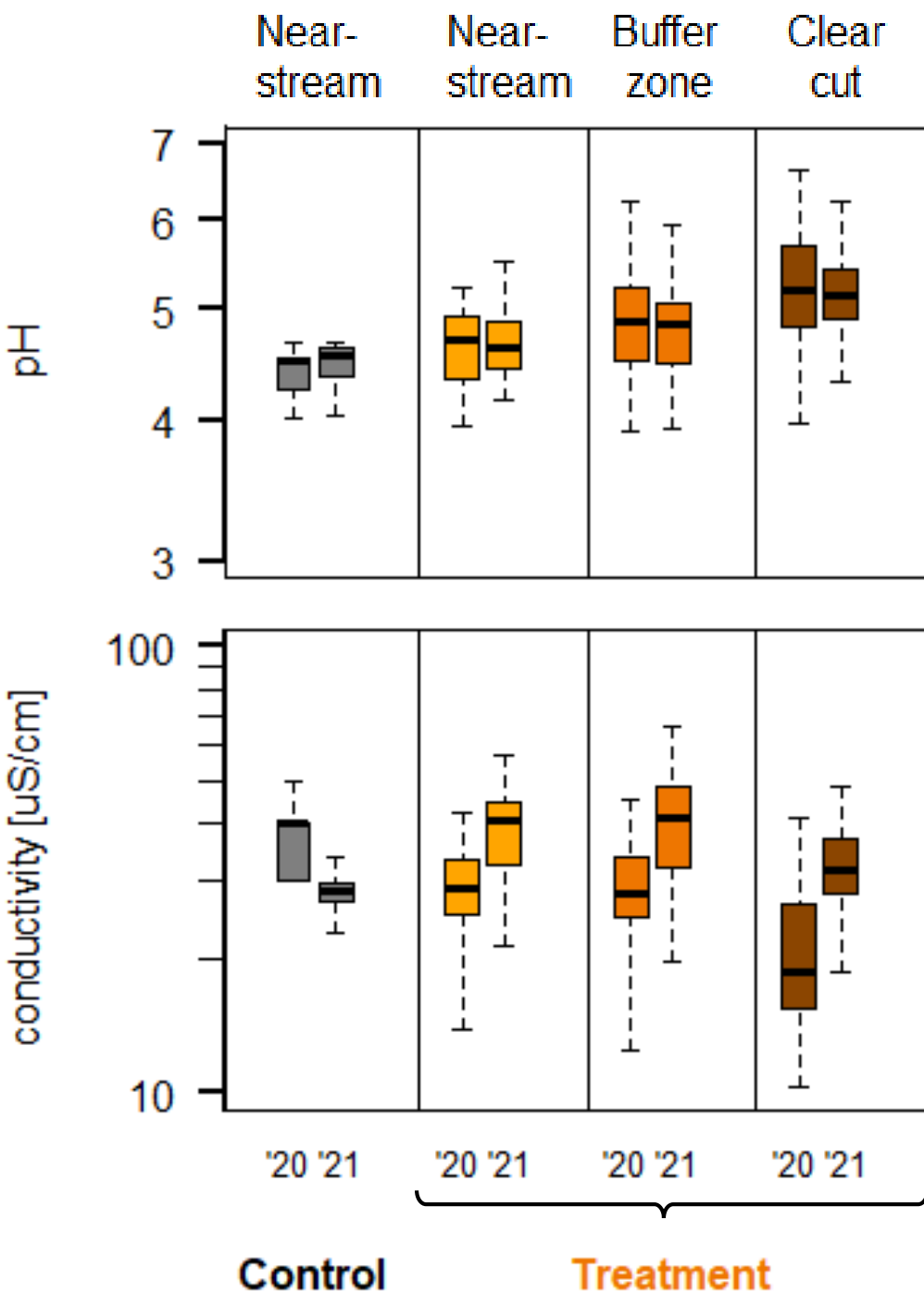


Clearcut increased soil temperatures (5 cm depth)



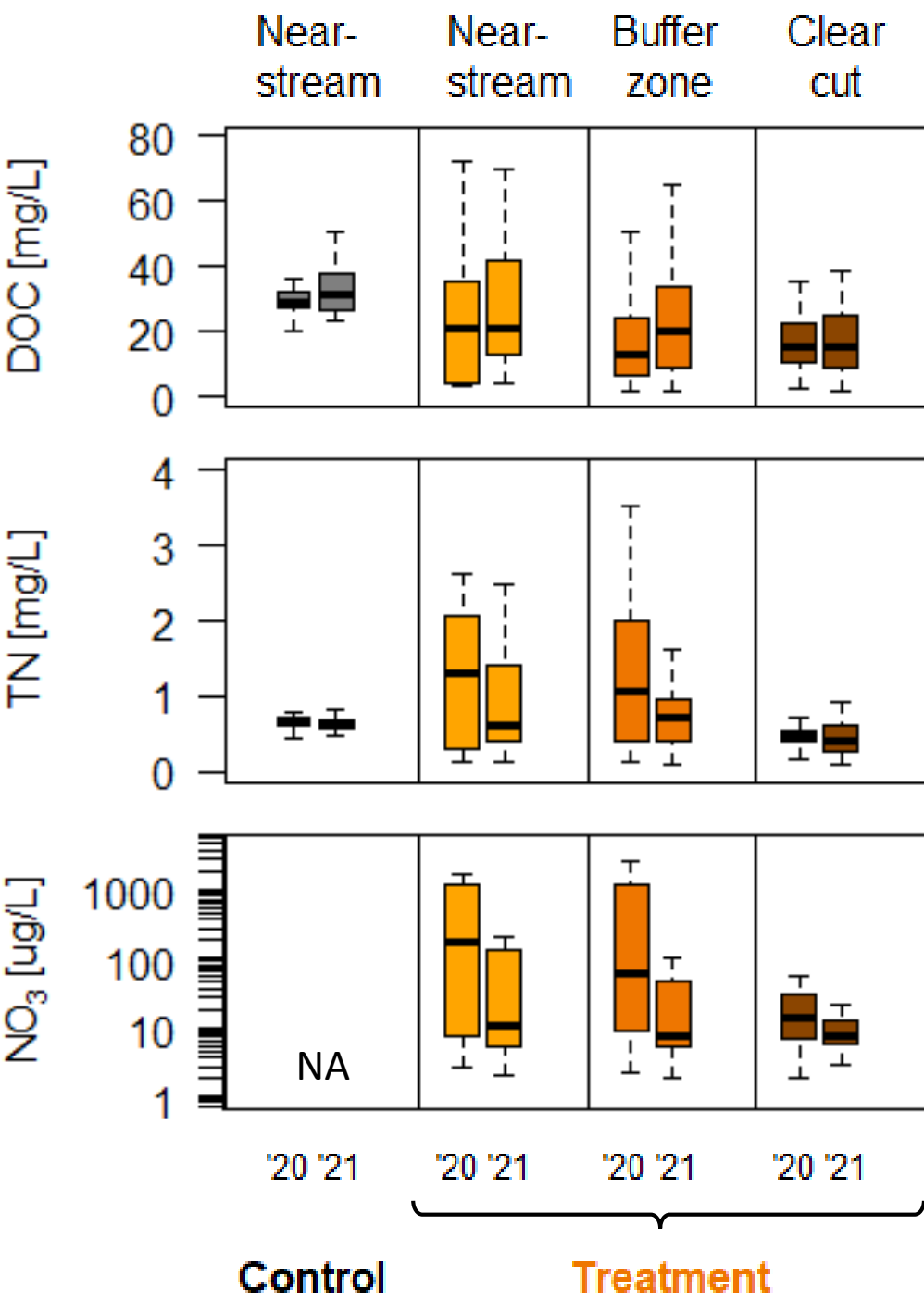
No clear-cut effect on soil moisture (5 cm depth)





No change in pH

Increase in electrical conductivity



High variability in DOC, TN and NO3