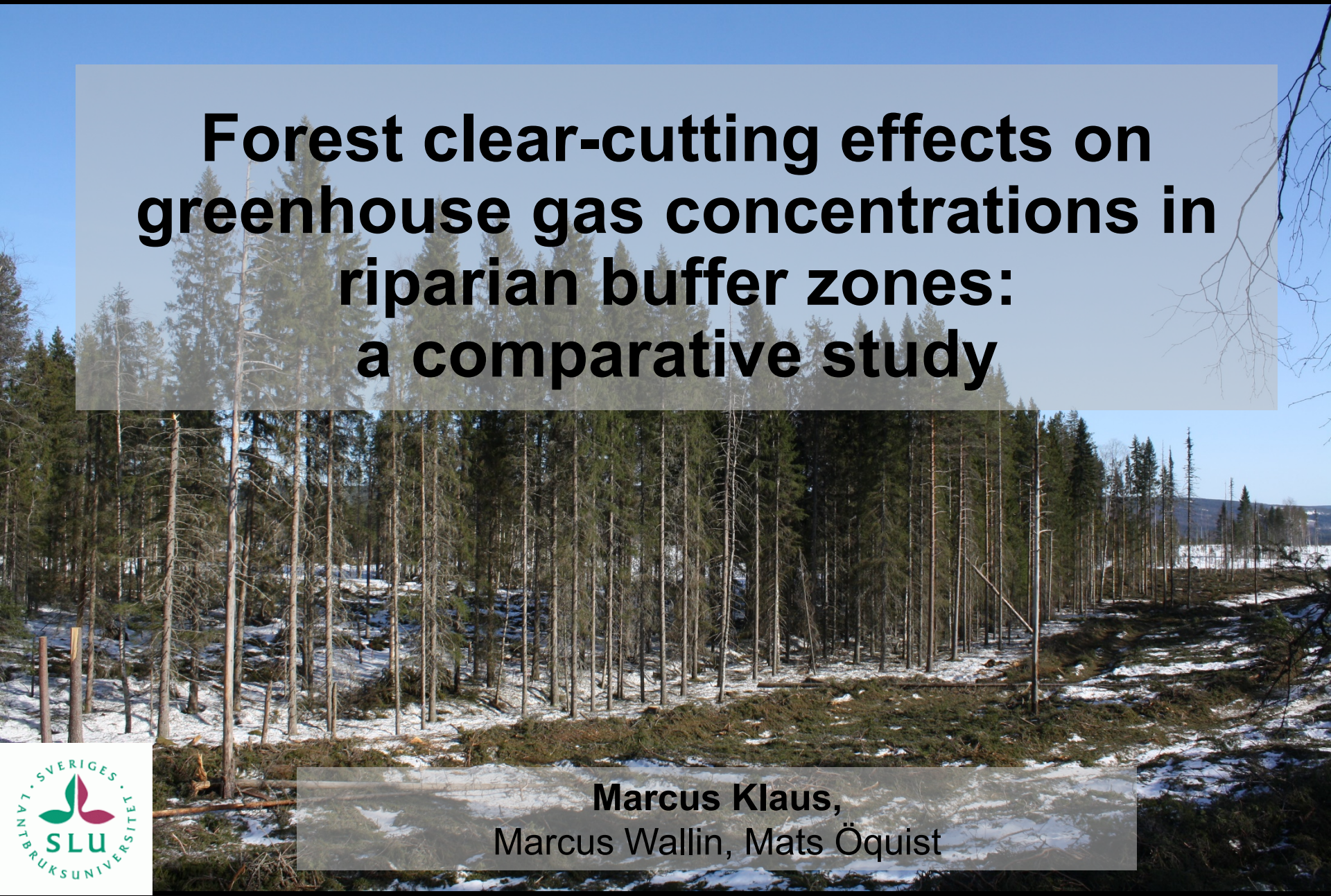
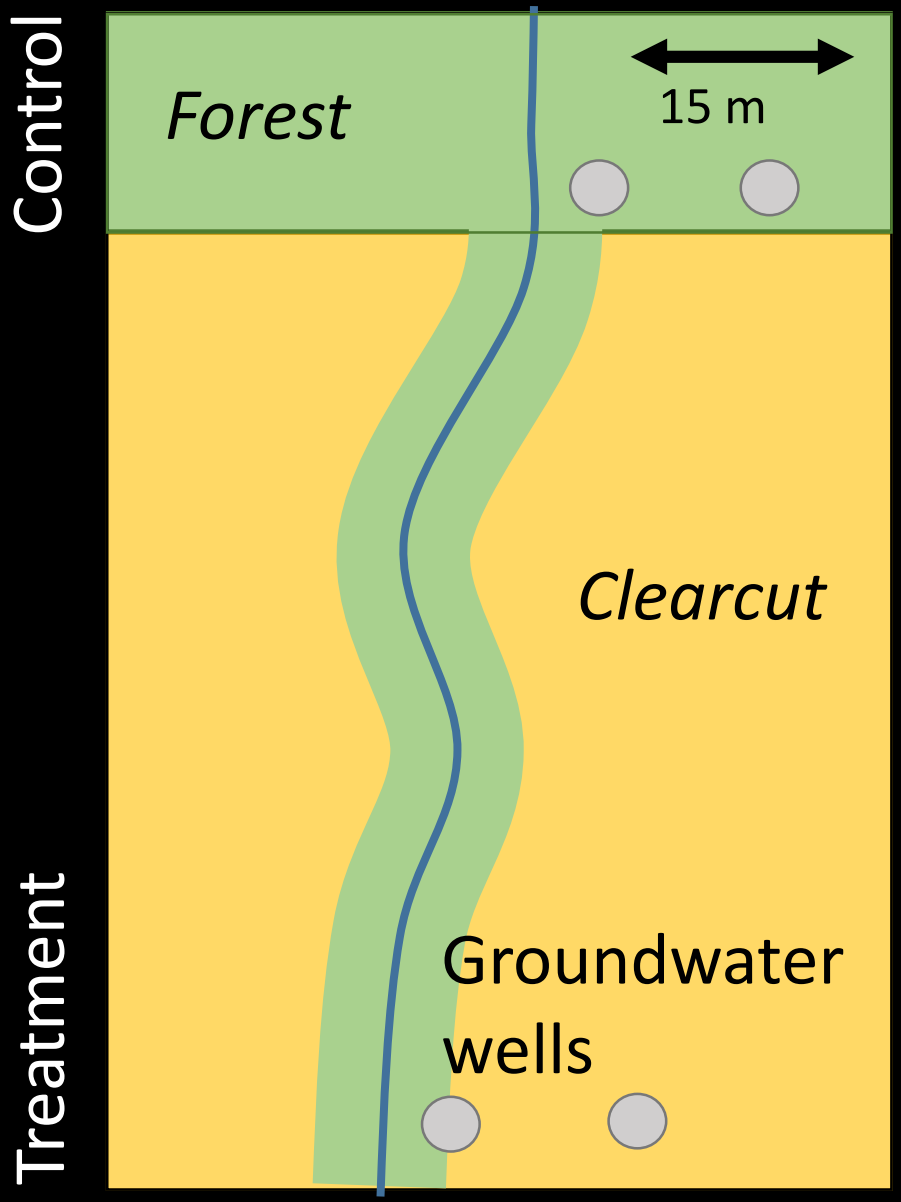
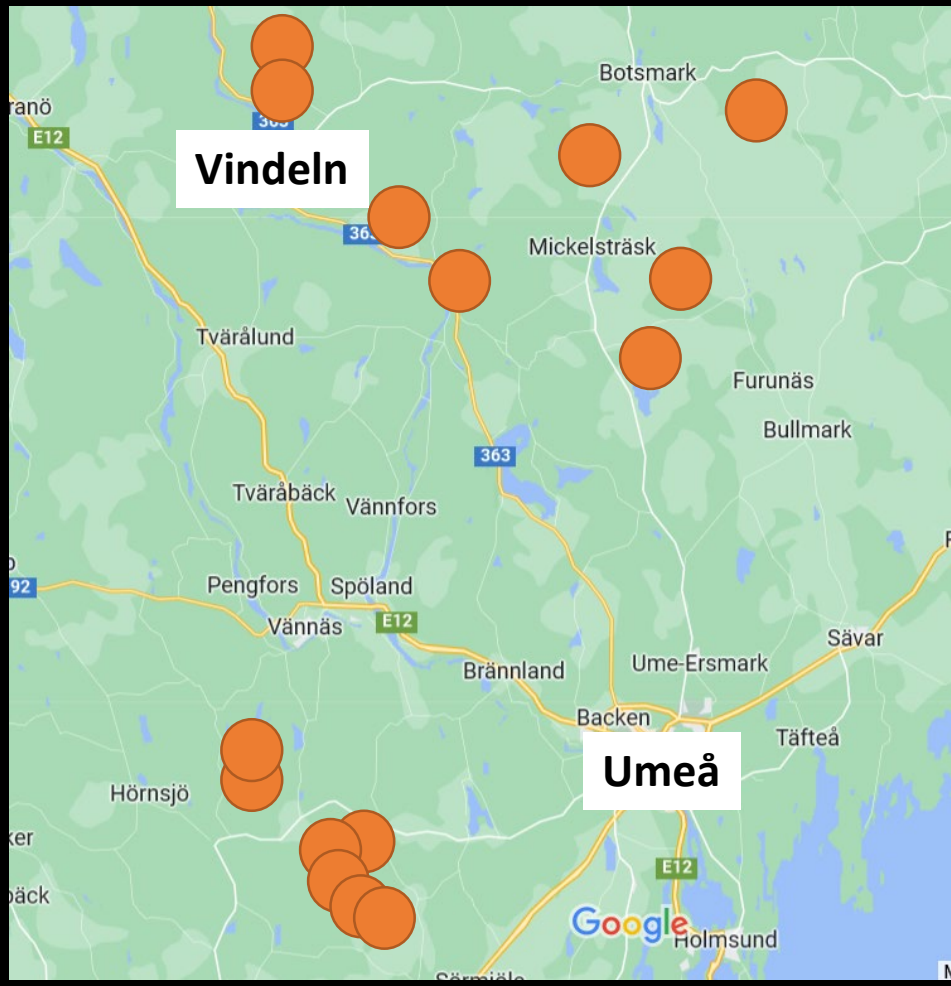
Forest clear-cutting effects on greenhouse gas concentrations in riparian buffer zones: a comparative study



Marcus Klaus,
Marcus Wallin, Mats Öquist

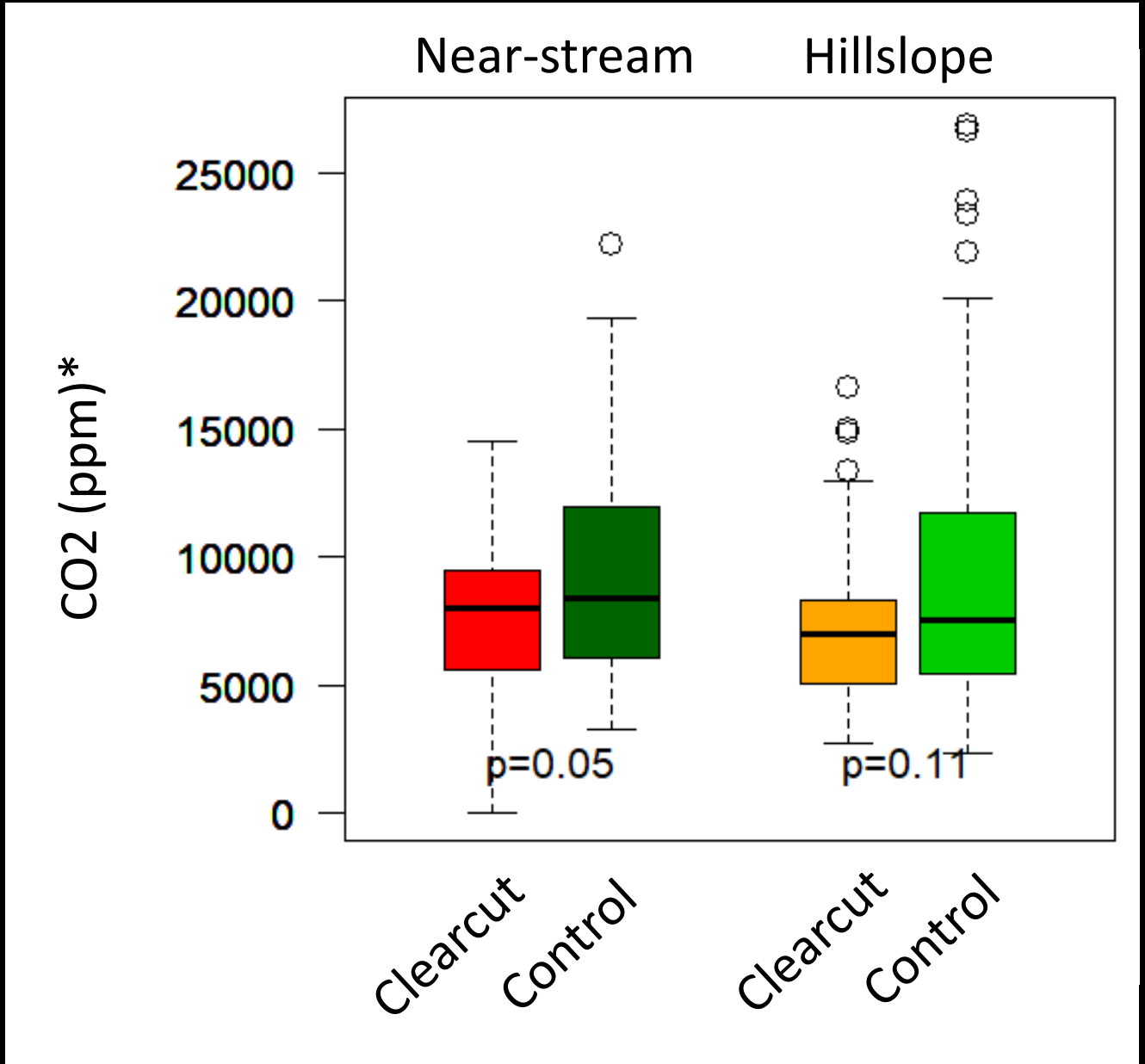
Study design





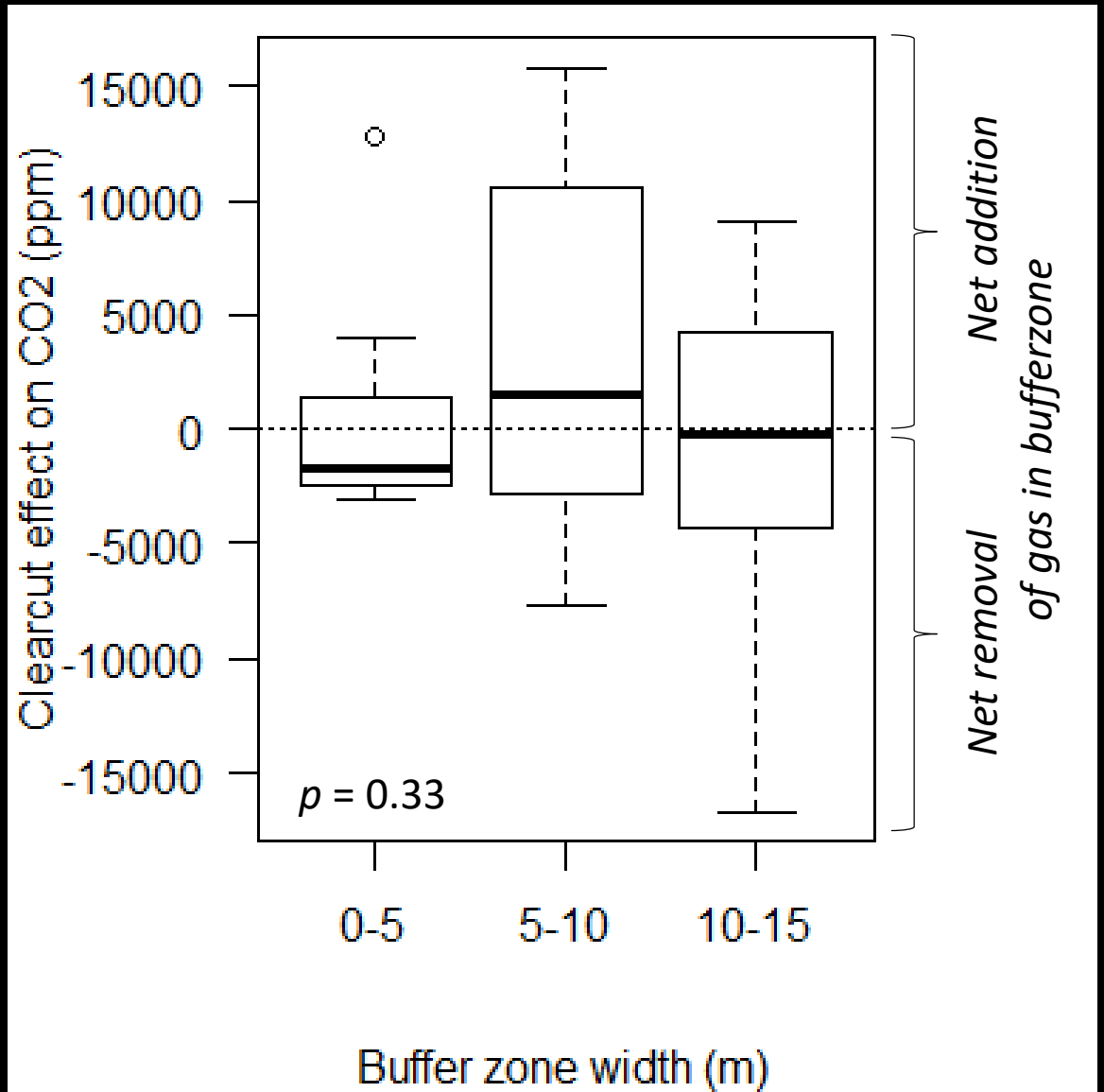
15 Clearcuts

No clearcut effect on CO2 concentrations



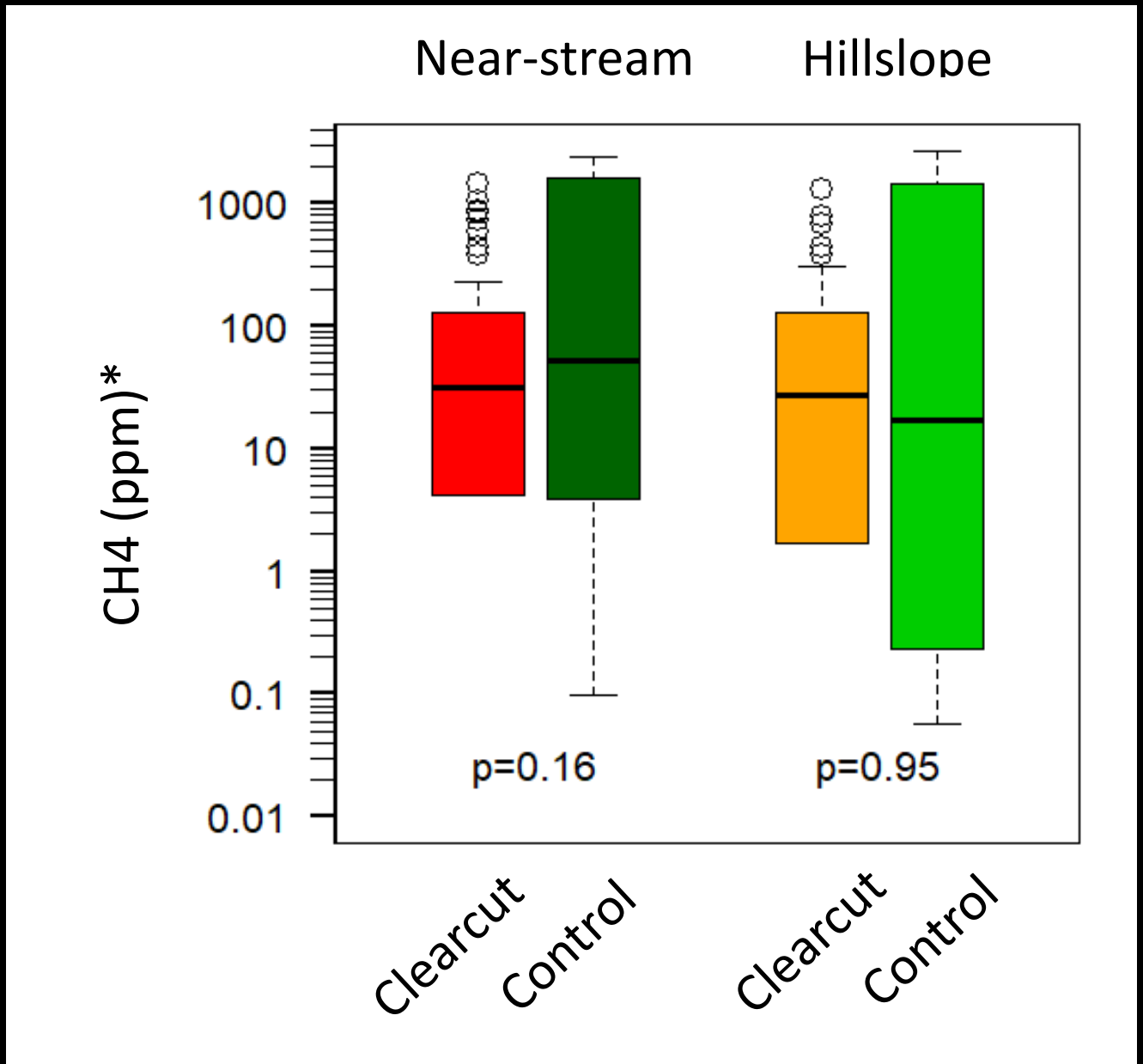
*vial headspace

Clearcut effect* on near-stream CO2 concentrations did not vary with buffer zone width



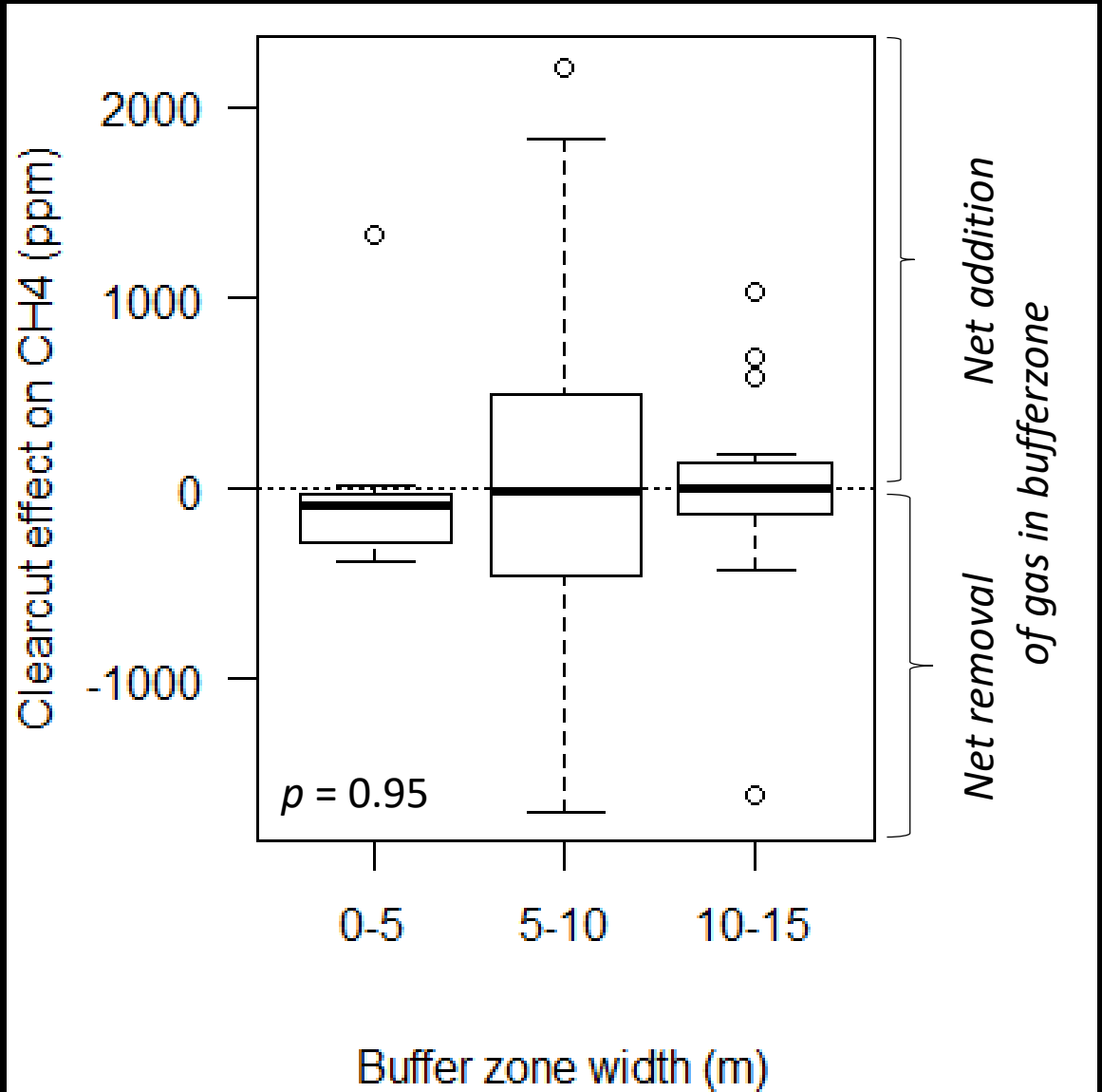
**Expressed as difference*
In the difference in CO2 between
Near-stream and far-stream site
Between the clearcut and
reference forest transect

No clearcut effect on CH4 concentrations

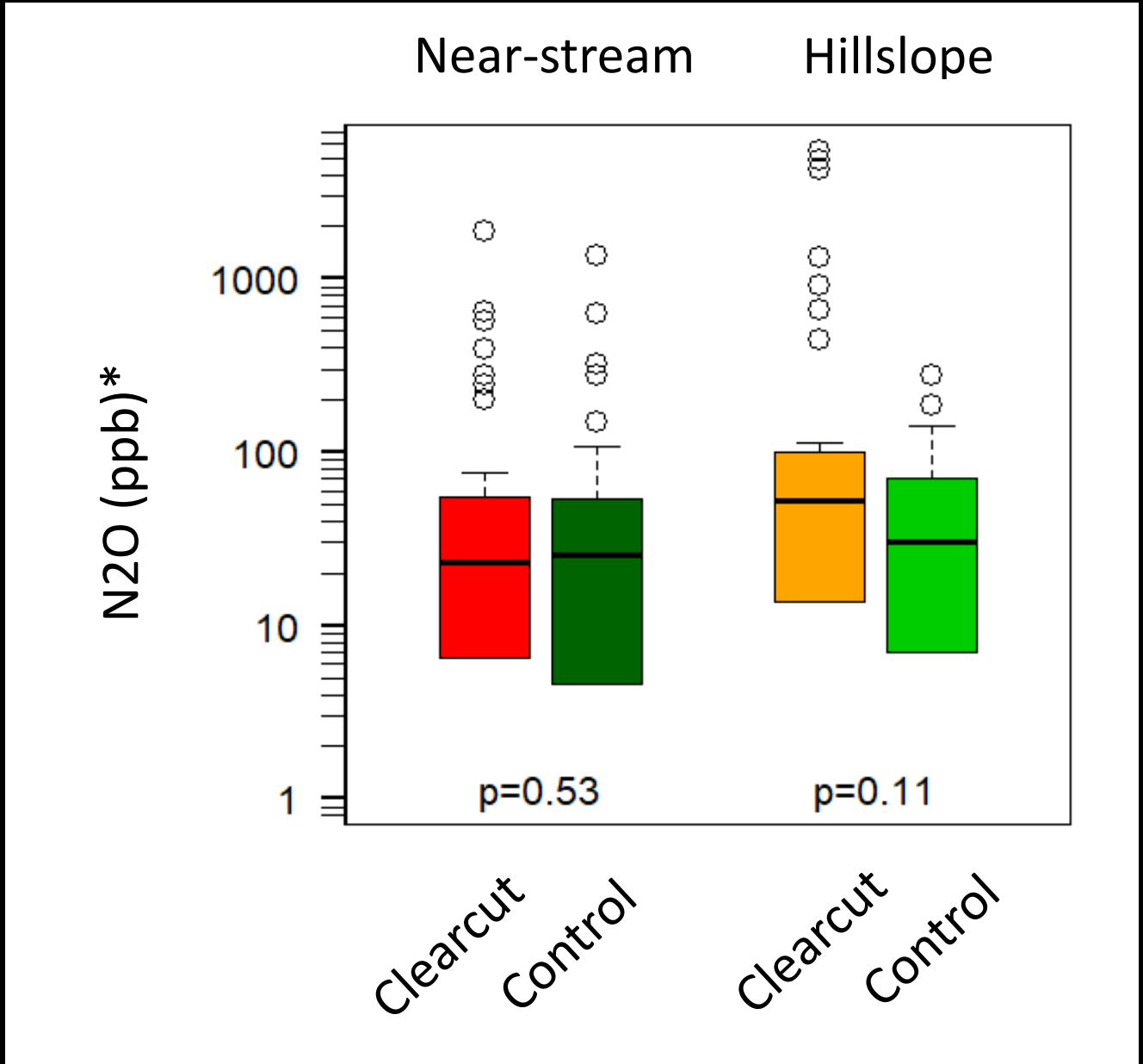


*vial headspace

Clearcut effect on near-stream CH4 concentrations did not vary with buffer zone width

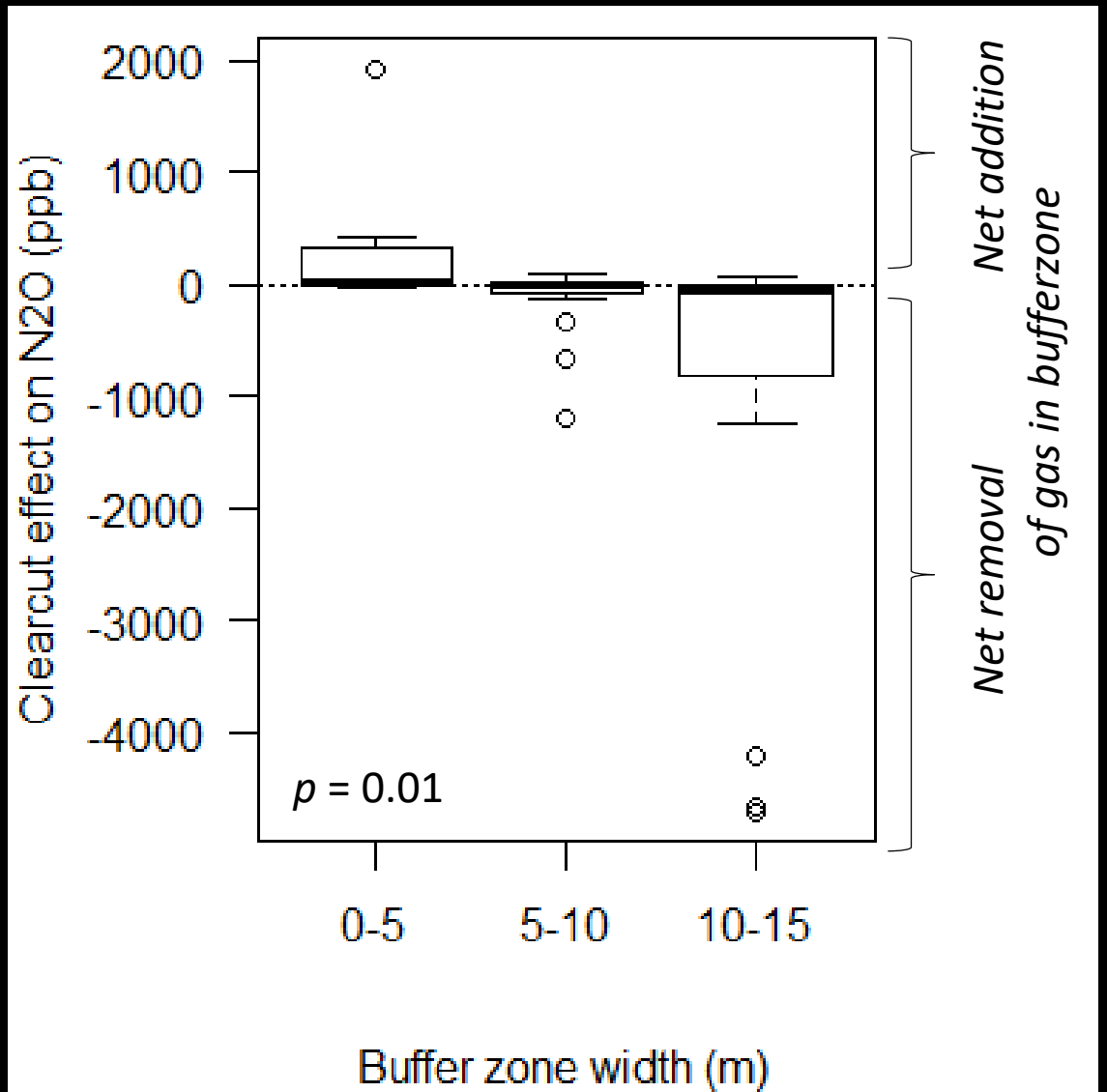


No clearcut effect on N2O concentrations



*vial headspace

Wider buffer zones remove more N2O leaking from clearcuts



Conclusions

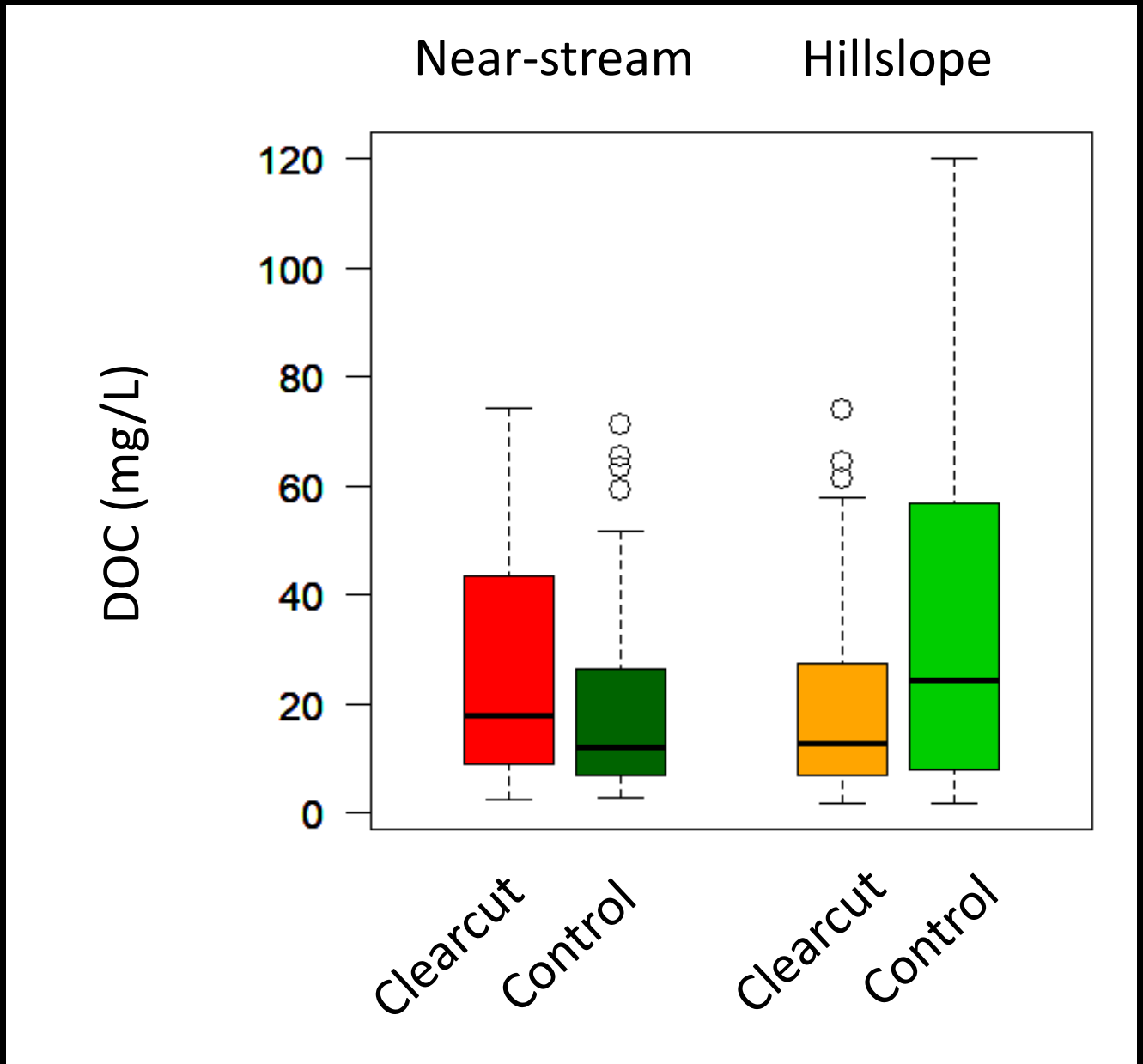
No landscape-scale effect of clearcutting on groundwater greenhouse gas concentrations

Riparian buffer zones did not affect carbon dioxide and methane leaking from clearcuts

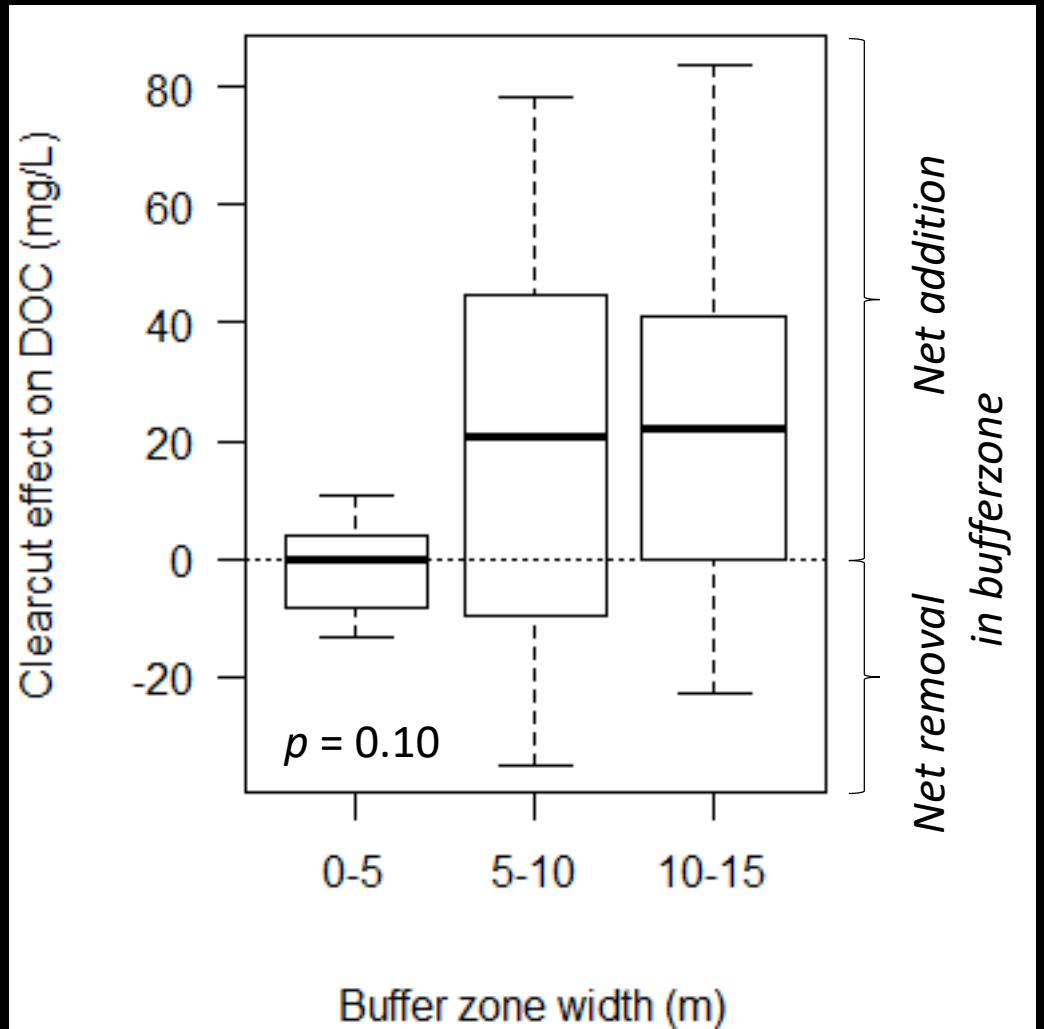
Wider buffer zones remove more N2O leaking from clearcuts than narrower buffer zones, likely because of NO3 uptake in trees (see supplementary slides)

Supplementary slides

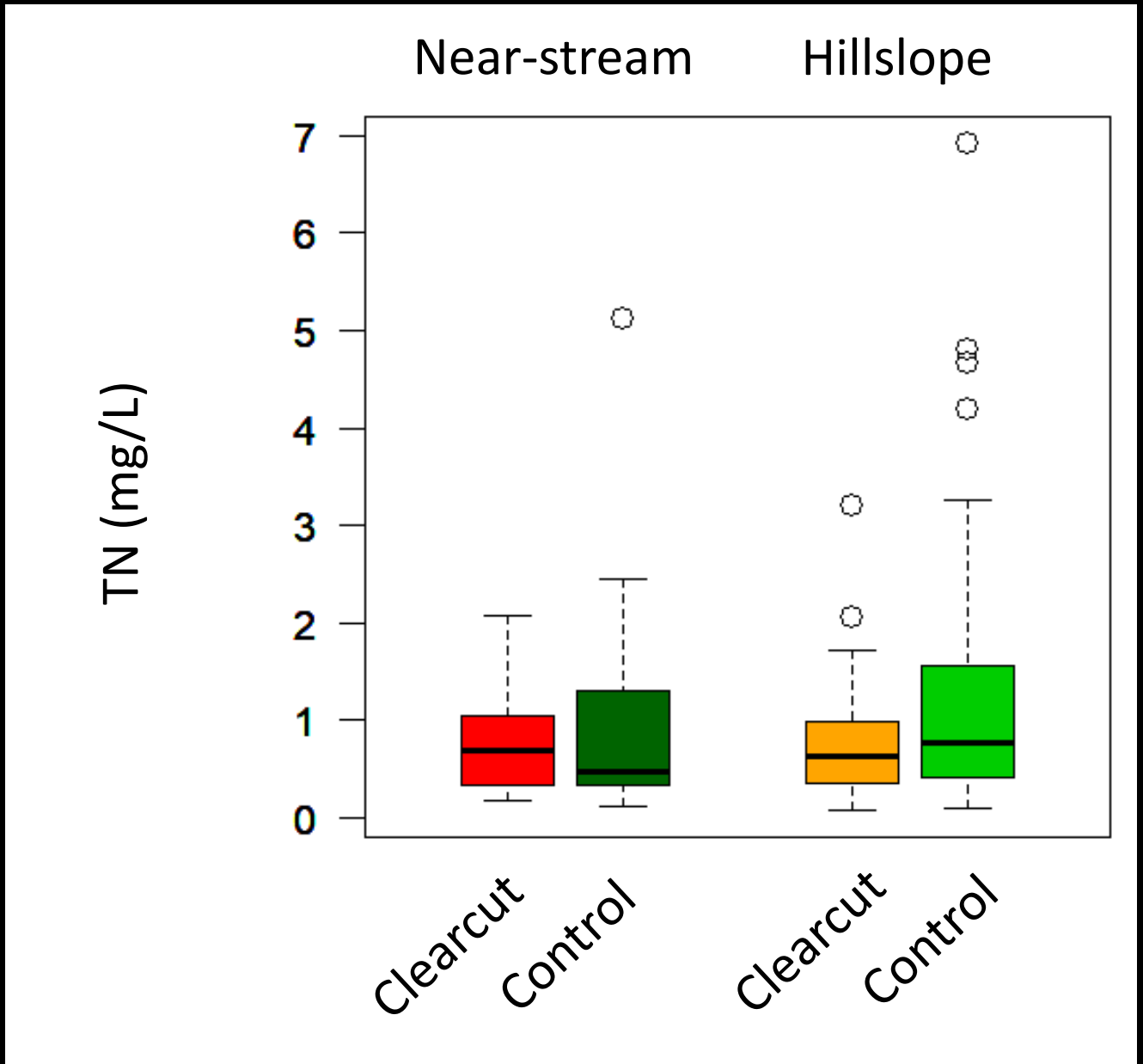
No clearcut effect on dissolved organic carbon (DOC) concentrations



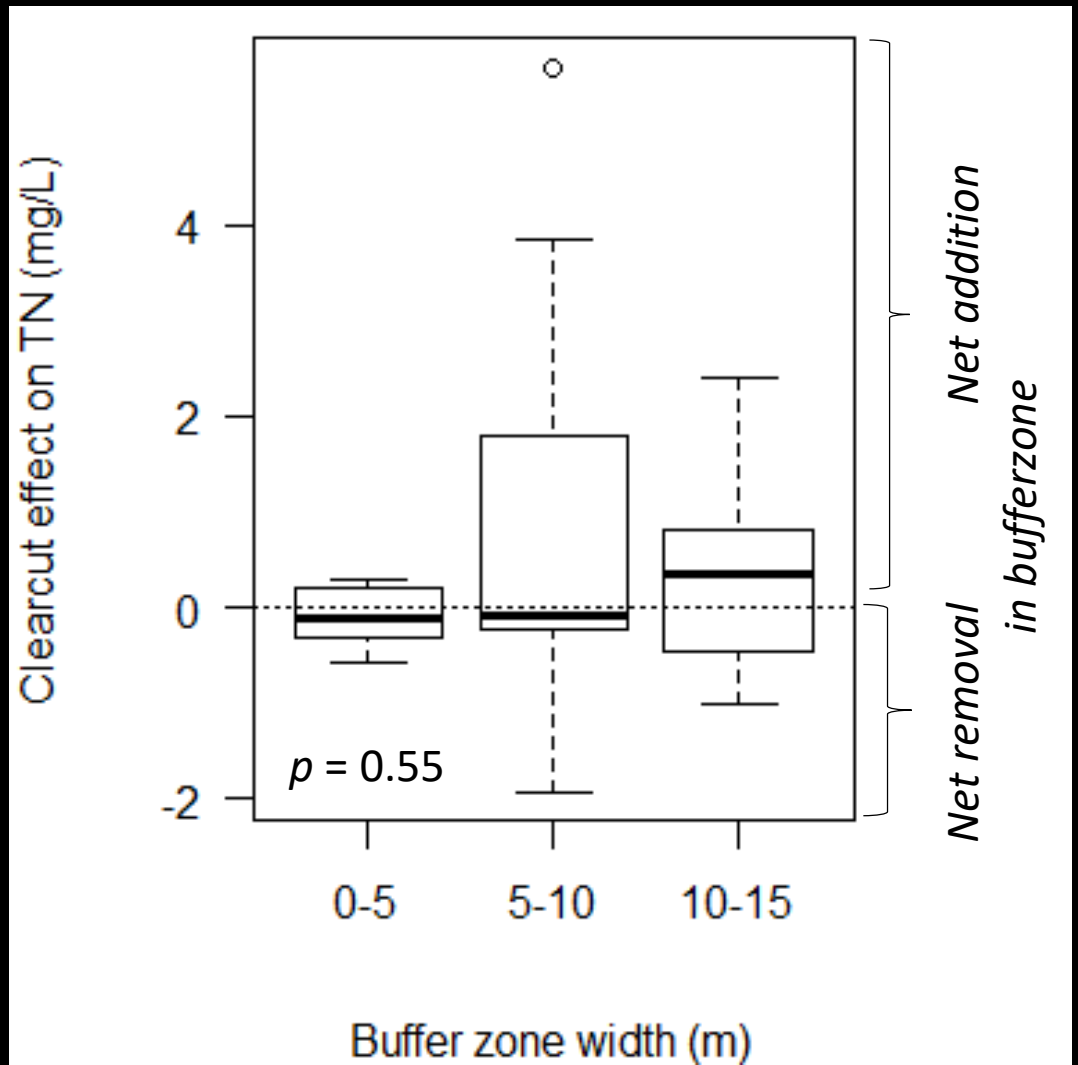
Clearcut effect on near-stream DOC concentrations did not vary with buffer zone width

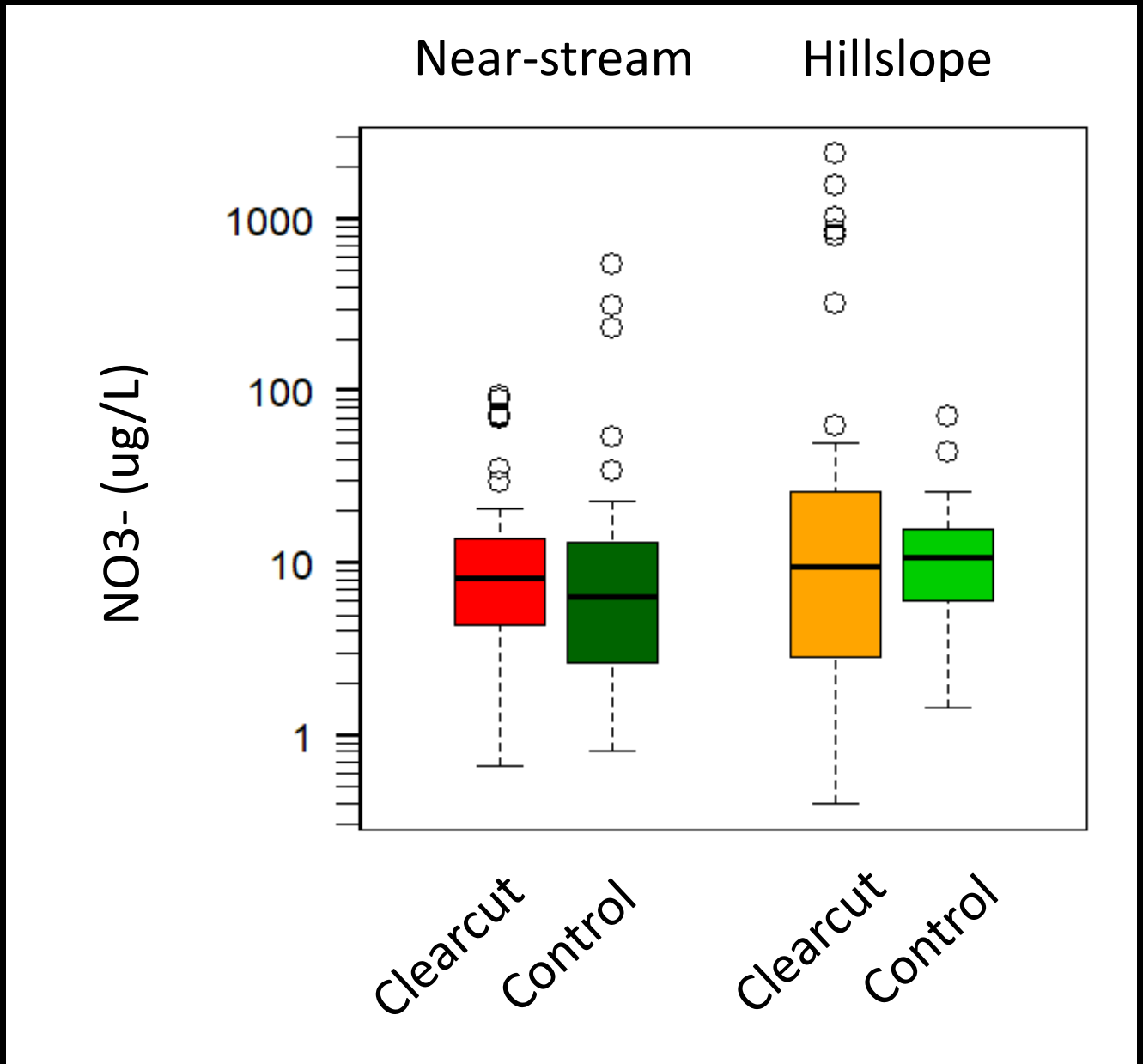


No clearcut effect on total nitrogen (TN) concentrations



Clearcut effect on near-stream TN concentrations did not vary with buffer zone width




Near-stream
Hillslope
NO3- (ug/L)
1000
100
10
1
Clearcut
Control
Clearcut
Control

Wider buffer zones remove more NO3 leaking from clearcuts