



Nitrogen uptake in temperate heath vegetation and soil microbes is influenced by elevated temperature, CO₂ and drought

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BIOGEMON 2009

Nitrogen uptake in temperate heath vegetation and soil microbes is influenced by elevated temperature, CO₂ and drought

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clima!te

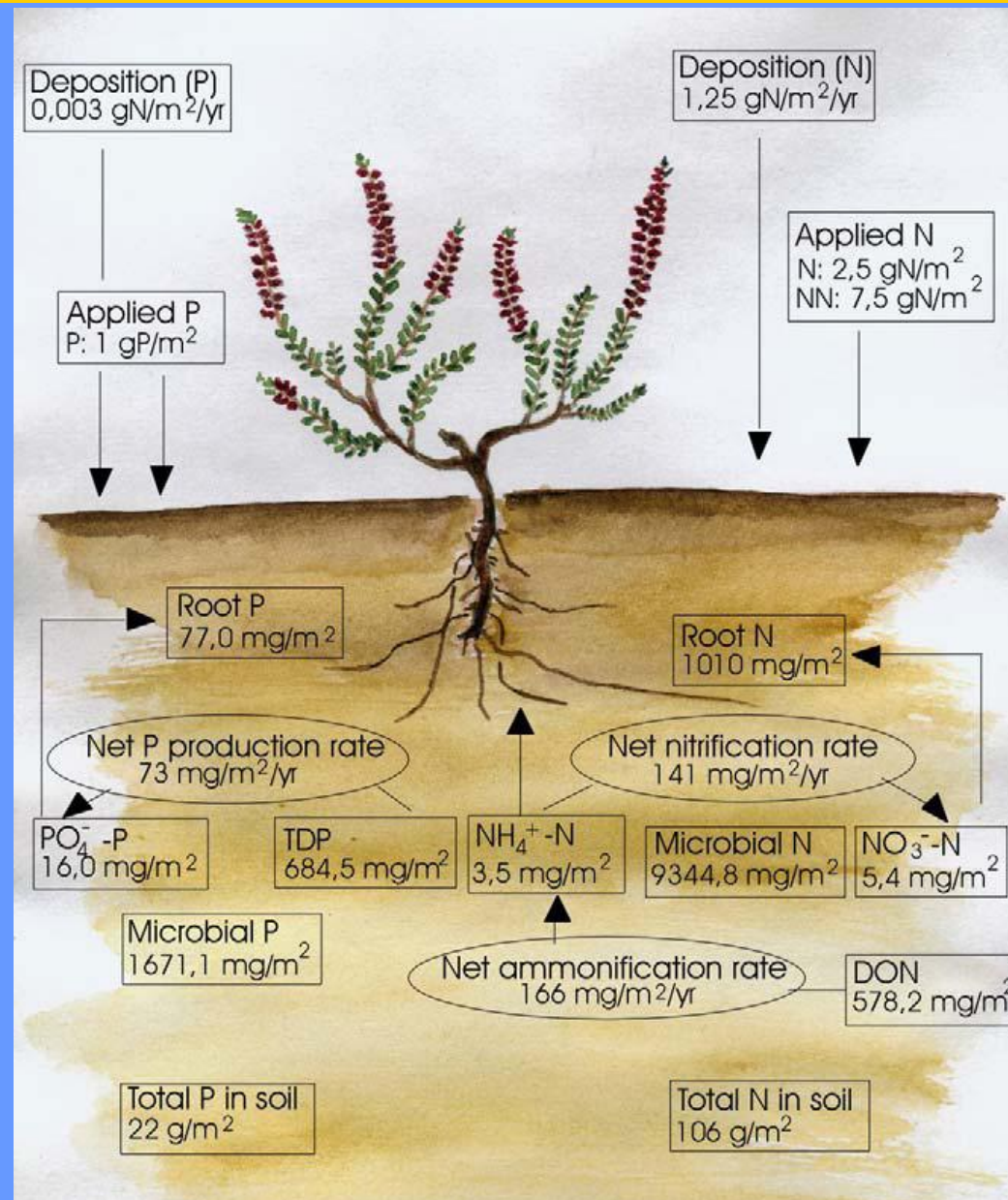




Micobes: no effect from fertilization

Roots increase in biomass with N and NNP

Applied Soil Ecology
(2009); vol 42 279 – 287
Nielsen, Andresen,
Michelsen, Schmidt and
Kongstad

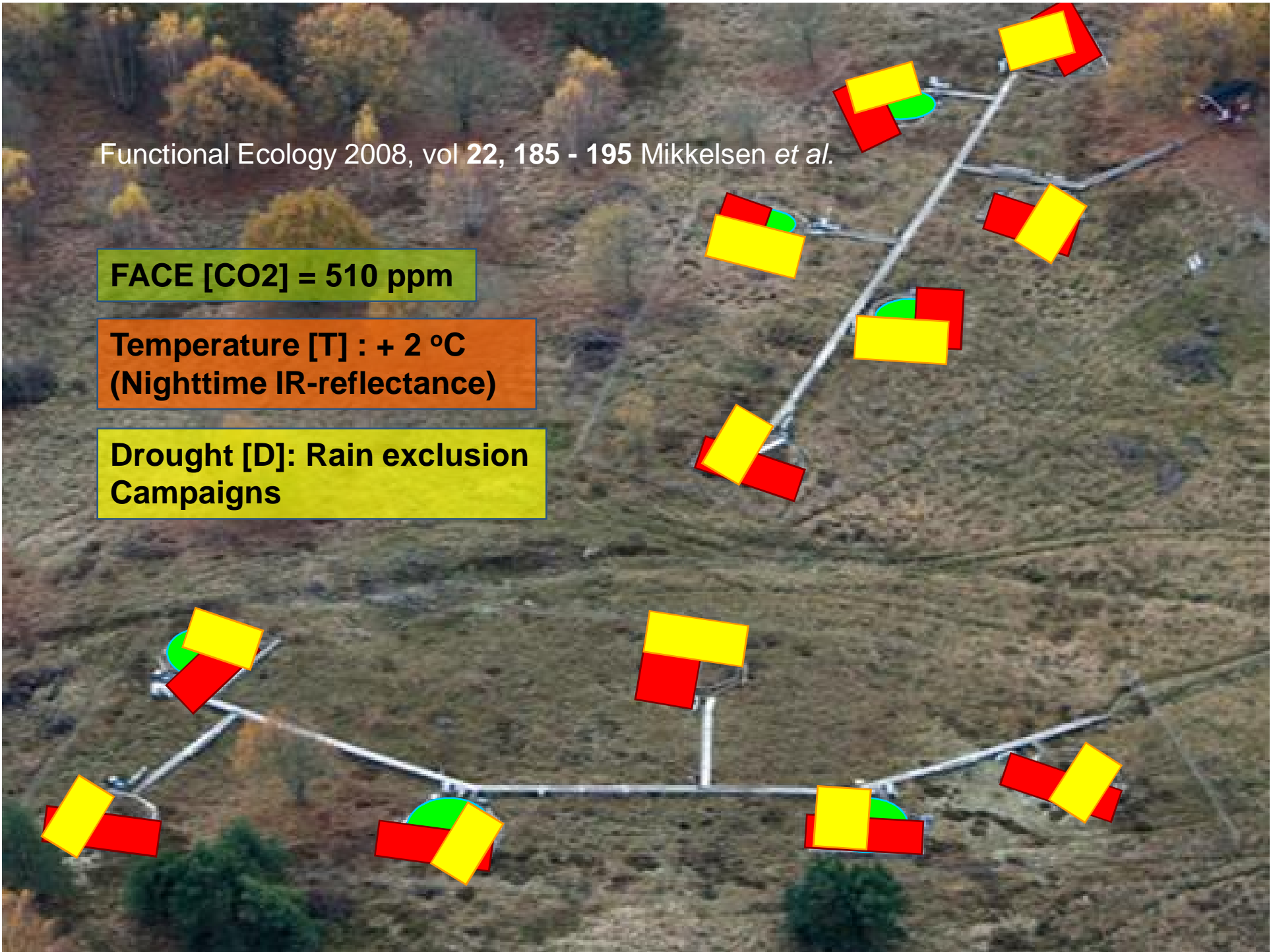


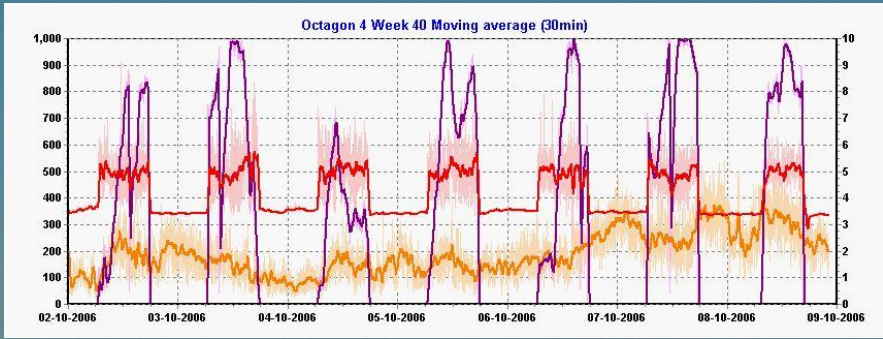
Functional Ecology 2008, vol 22, 185 - 195 Mikkelsen *et al.*

FACE [CO₂] = 510 ppm

Temperature [T] : + 2 °C
(Nighttime IR-reflectance)

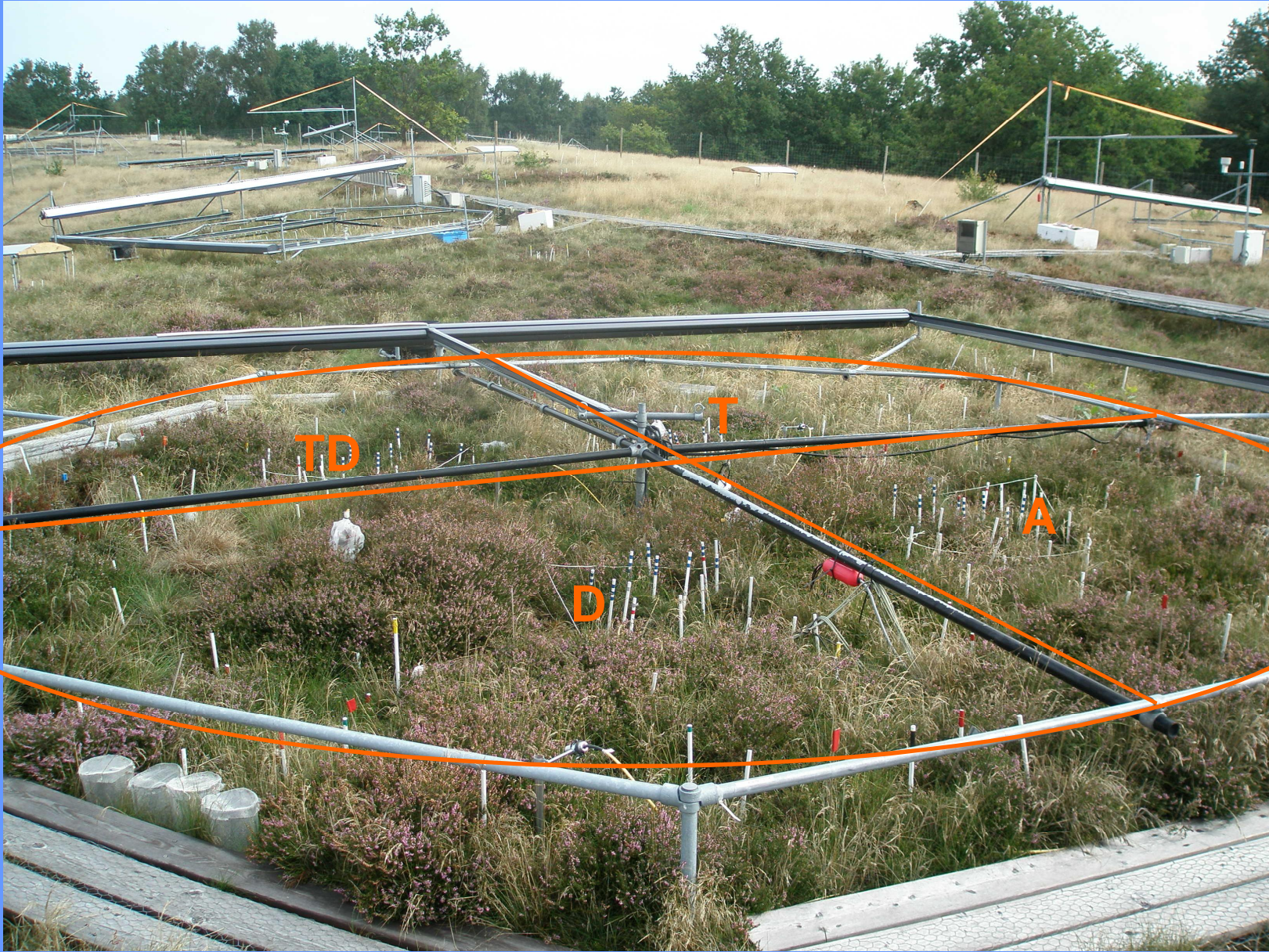
Drought [D]: Rain exclusion
Campaigns





Glycine ^{15}N $^{13}\text{C}_2$
addition



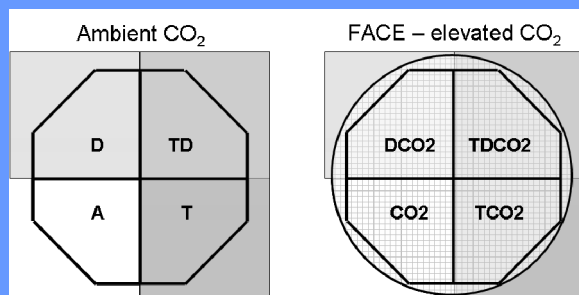




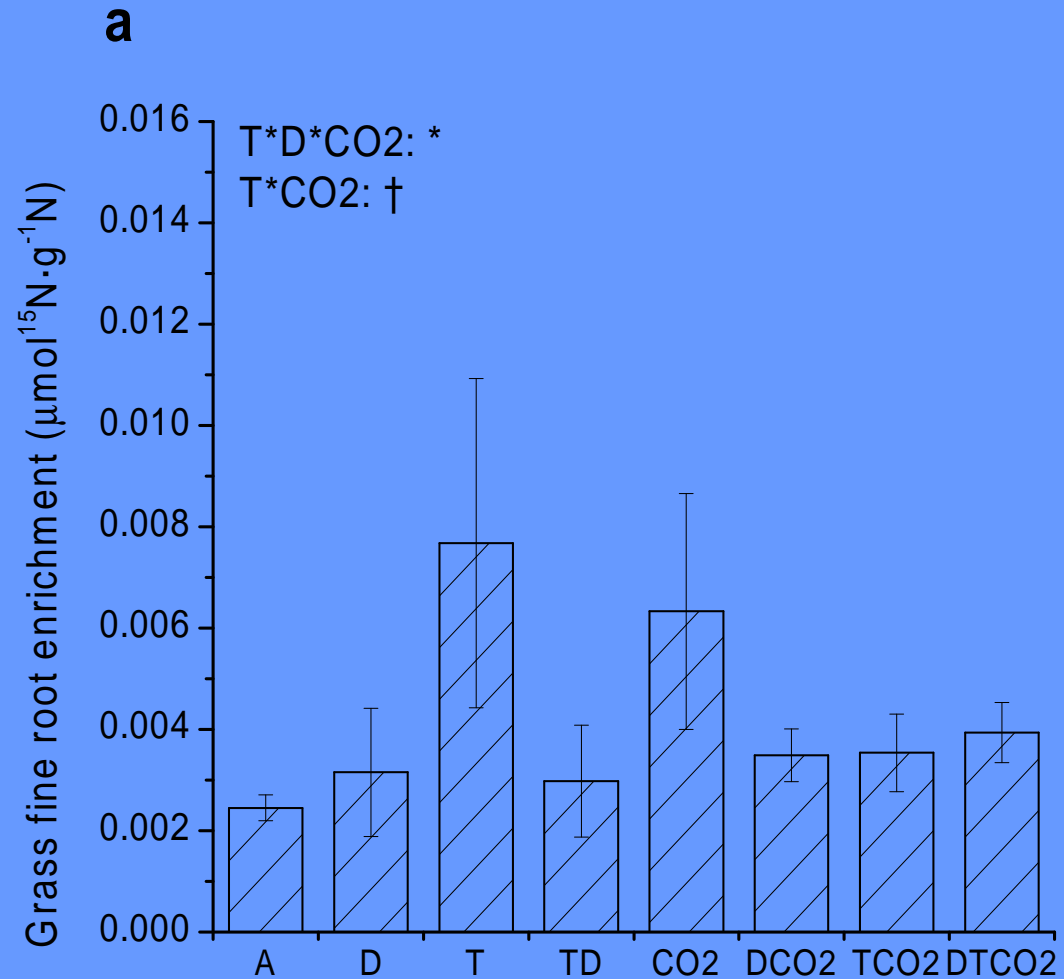
Immediate root ^{15}N uptake:

T ↑

CO₂ ↑

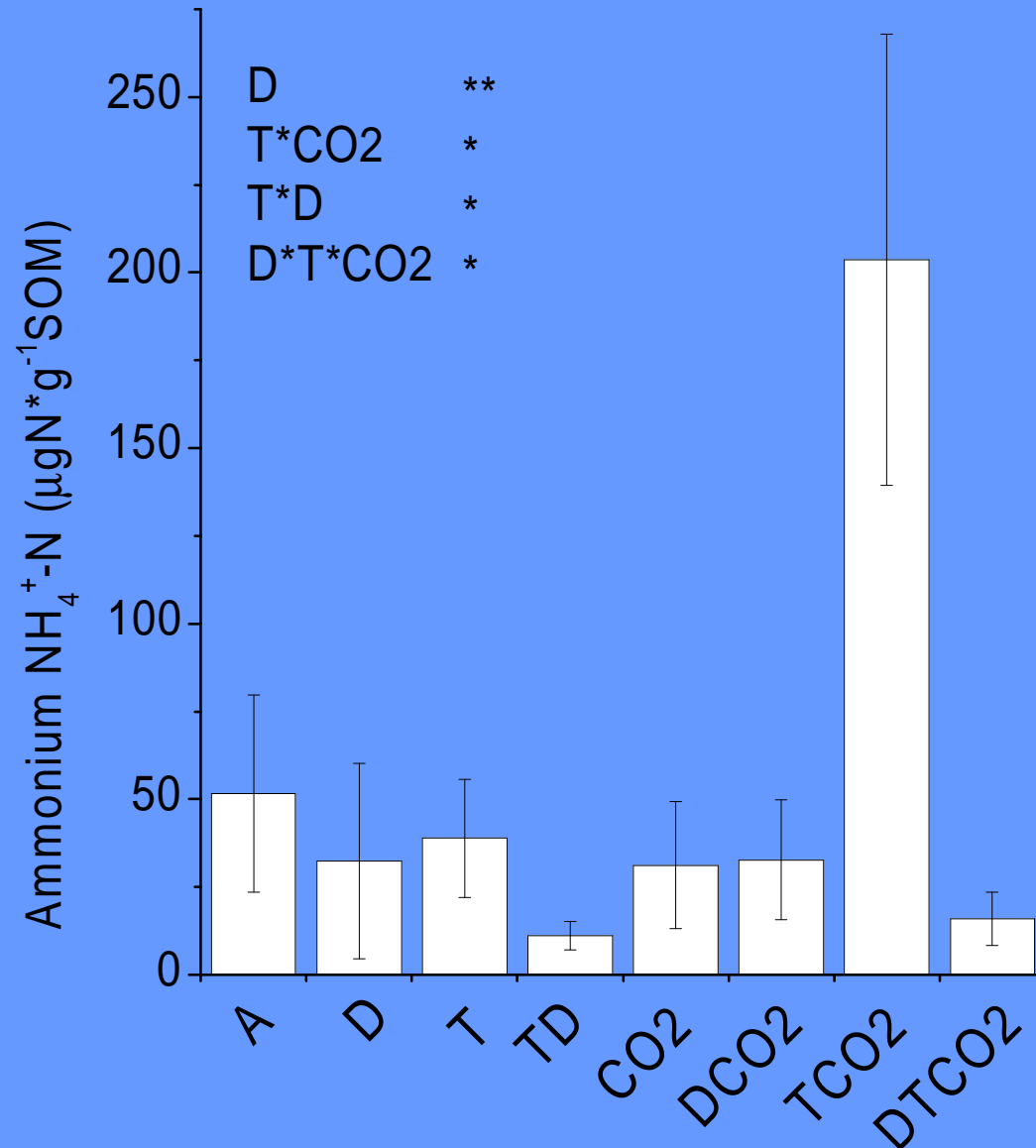
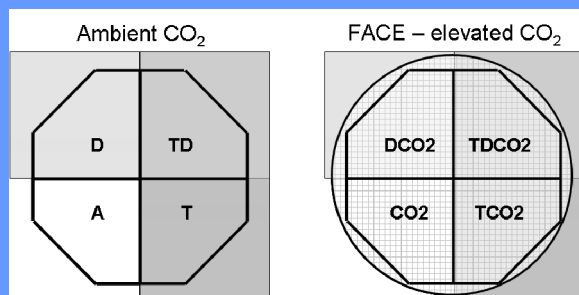


Submitted to Acta Oecologica (2009)
Andresen, Michelsen, Jonasson, Ambus,
Beier



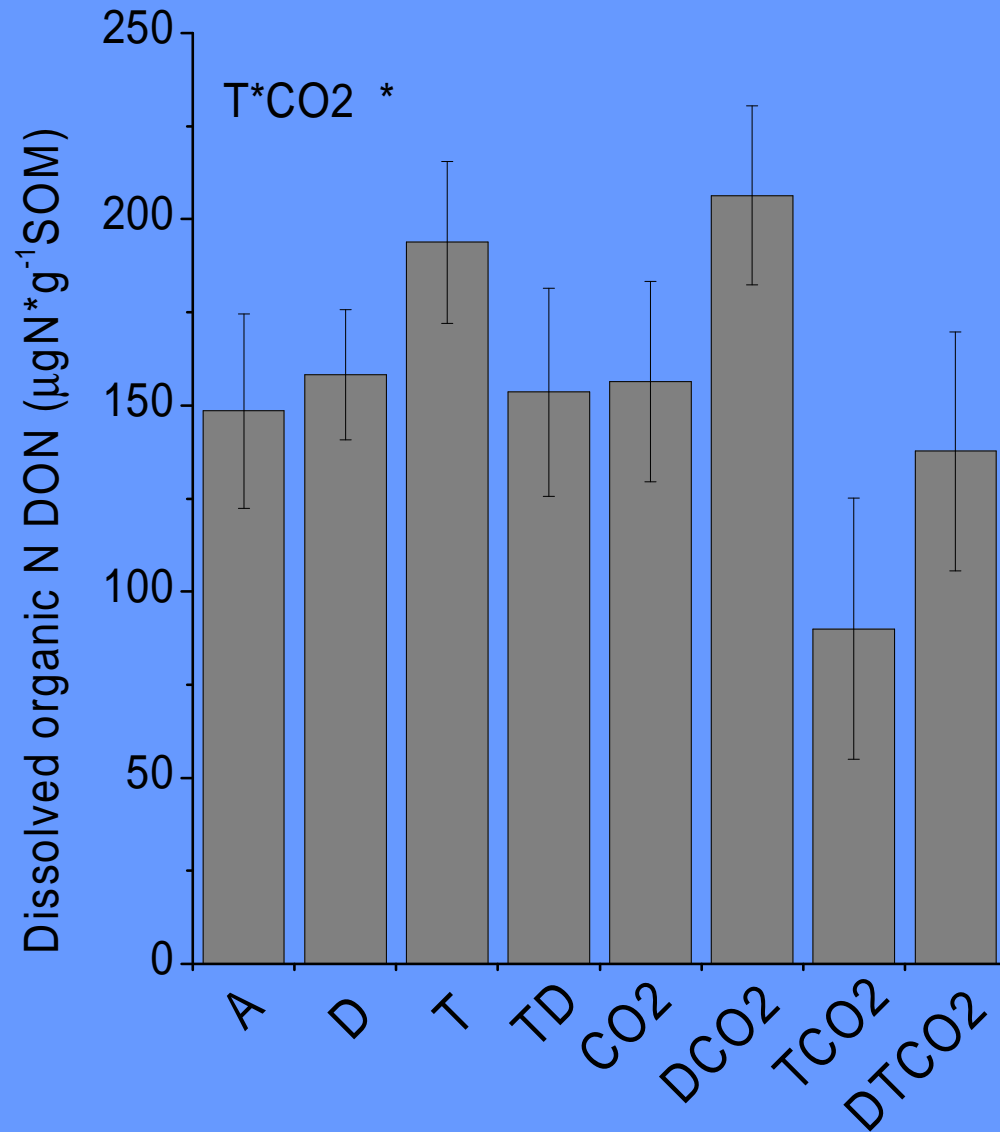
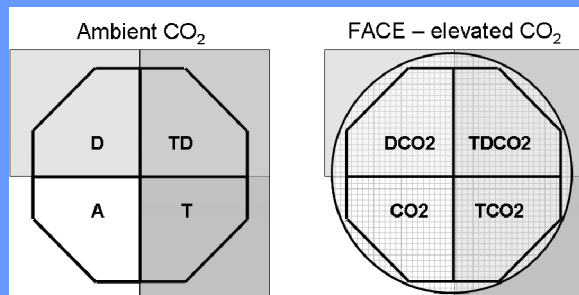


Ammonium concentration: TCO₂ ↑





DON:
TCO₂ ↓



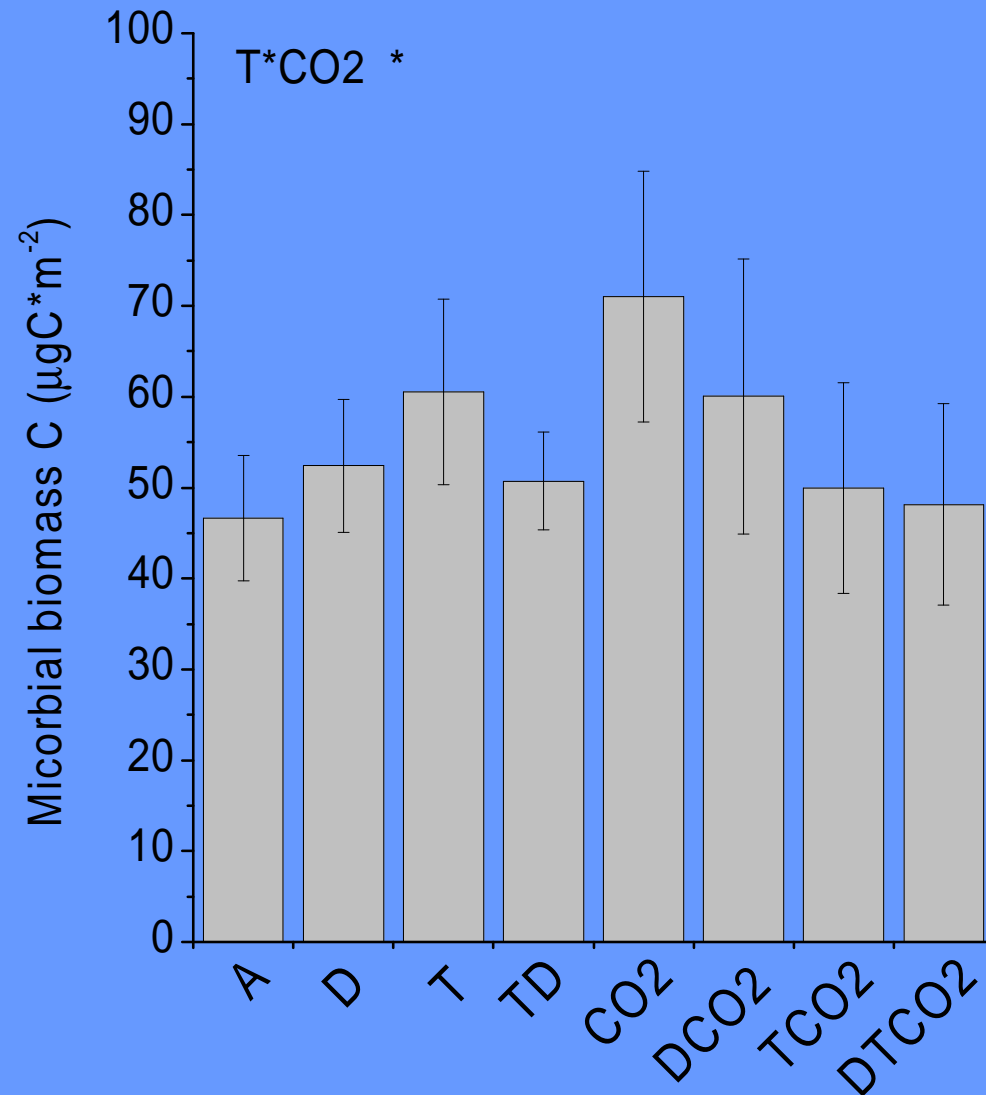
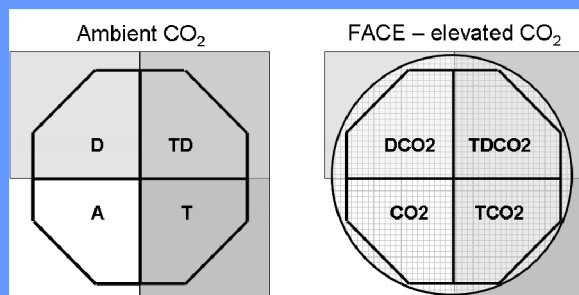


Microbial carbon:

T ↑

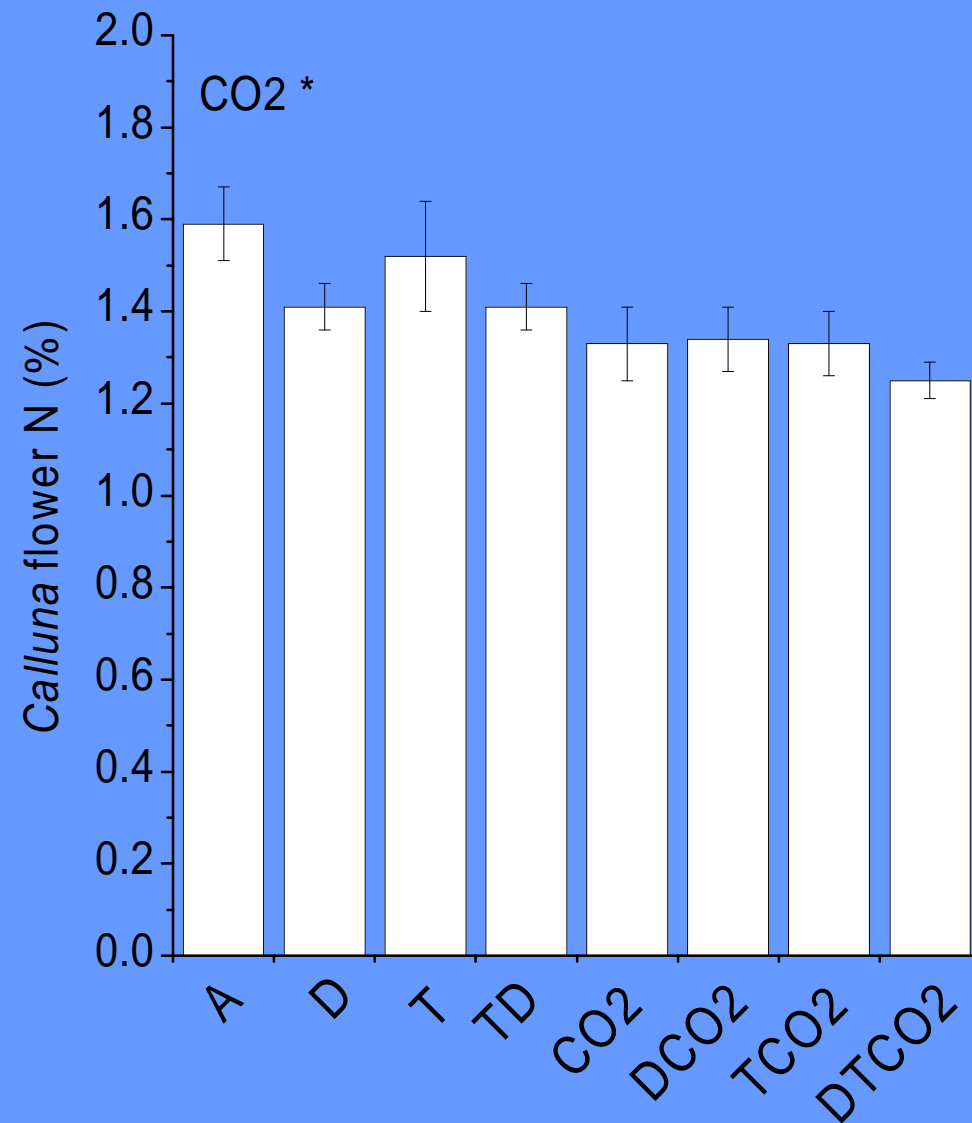
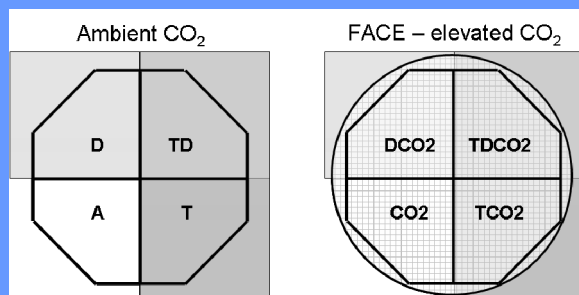
CO₂ ↑

TCO₂ --





Heather
flower N %:
CO₂ ↓

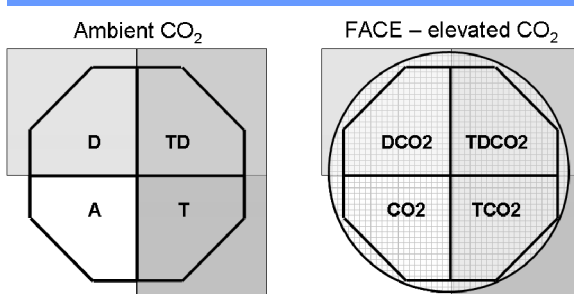
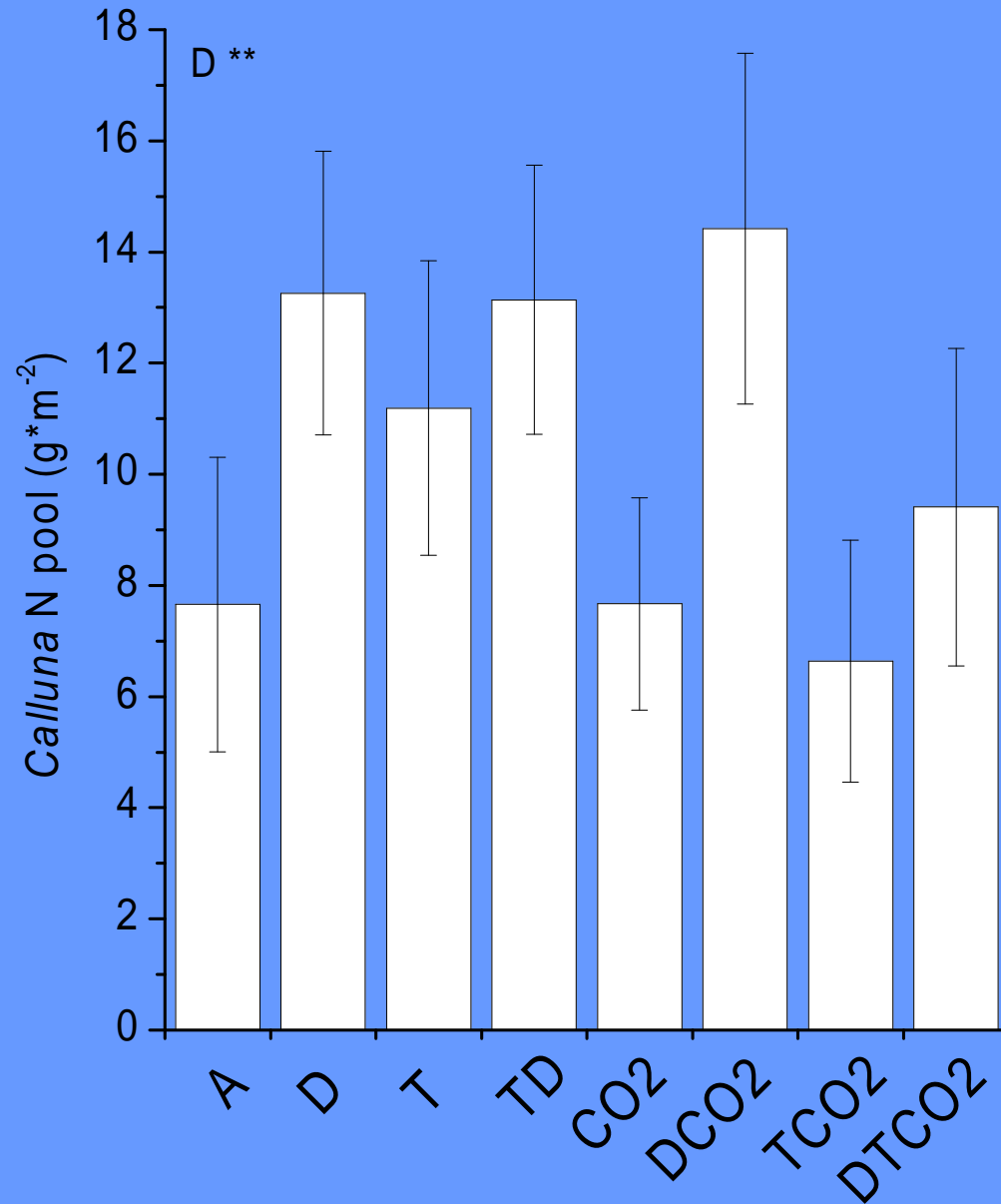




Heather

N pool:

D ↑

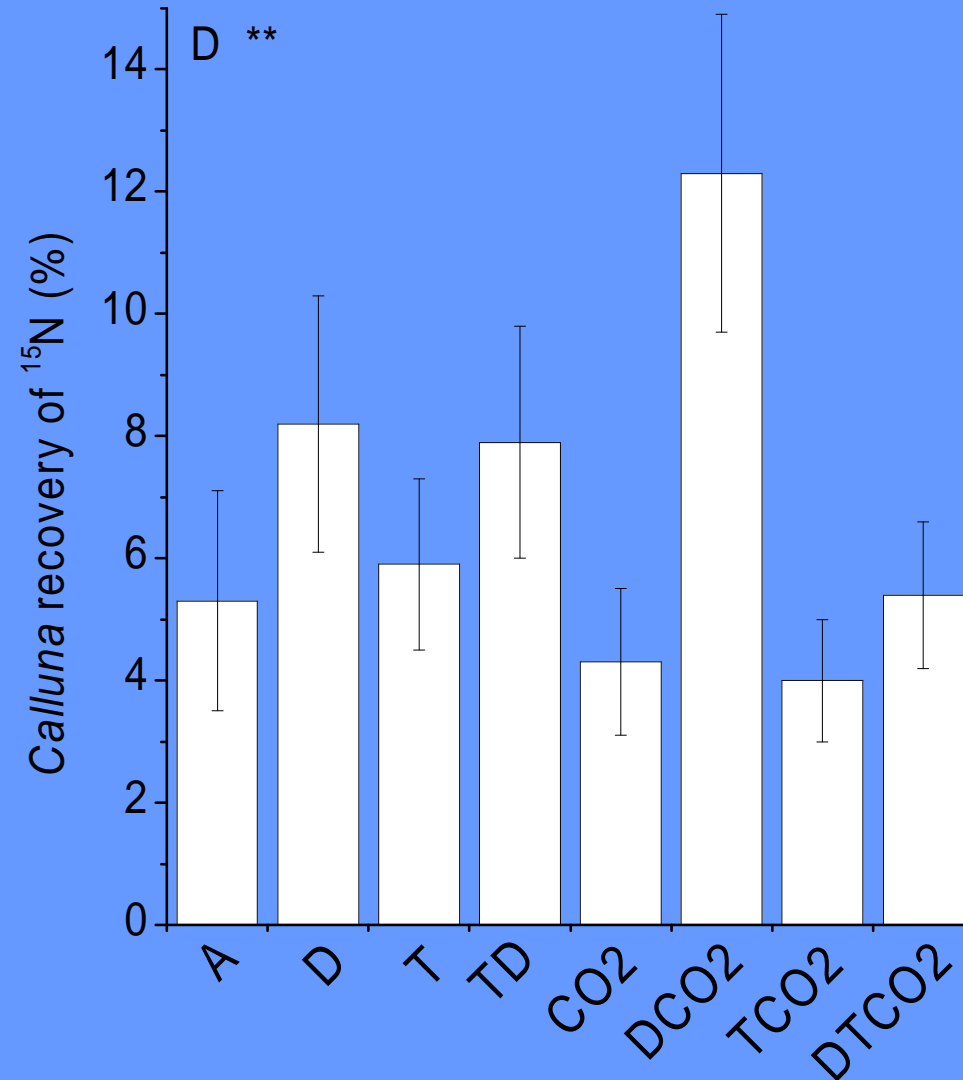
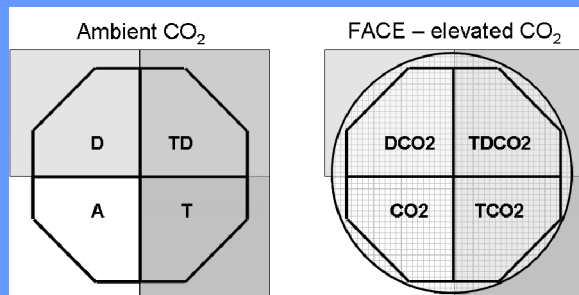




Heather

^{15}N recovery:

D ↑





Nitrification

rate:

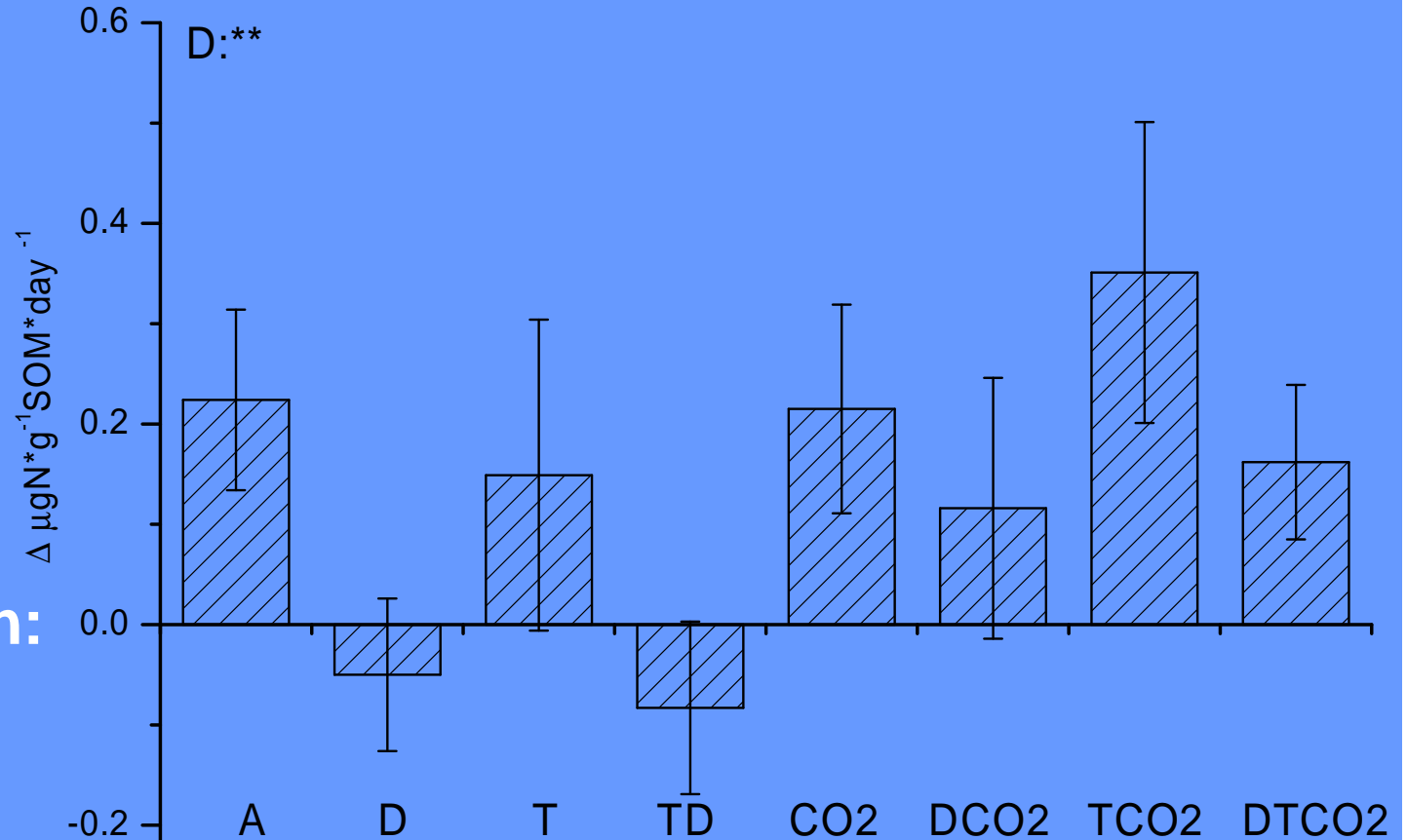
D ↓

ALSO litter

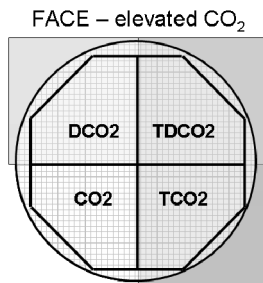
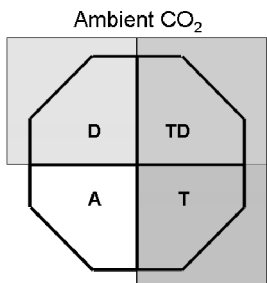
decomposition:

D ↓

Nitrification (ΔNO_3^- -N) rates



½ year incubated *Deschampsia* soil with no plants



Submitted to Plant and Soil (2009)
Andresen, Michelsen, Jonasson,
Mikkelsen, Schmidt, Ambus, Beier

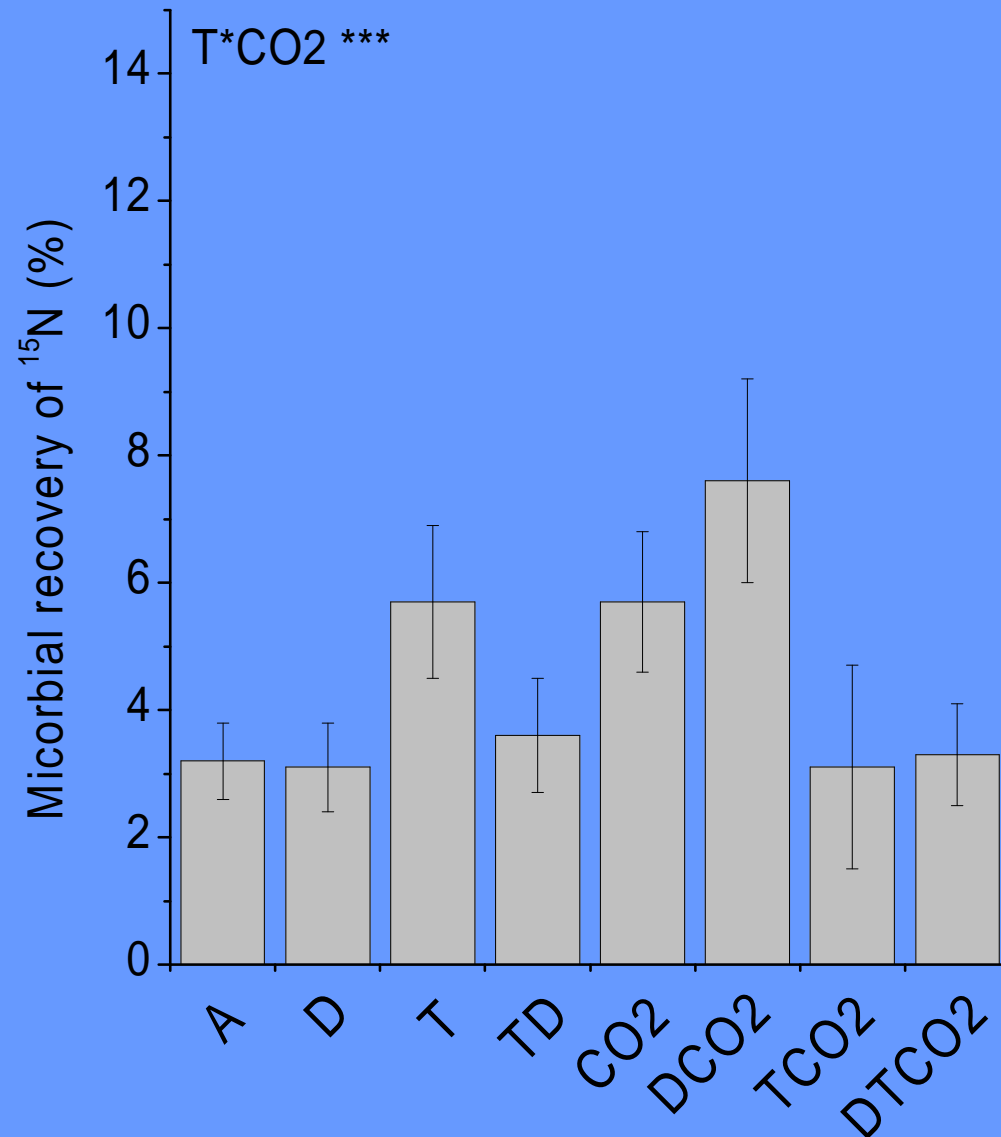
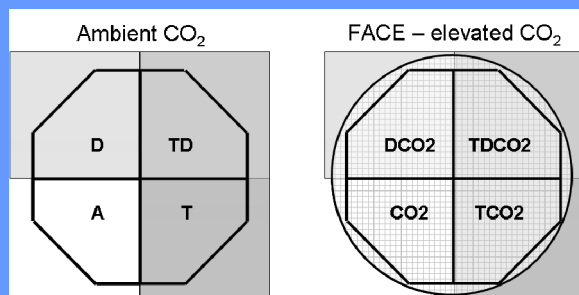


Microbial ^{15}N recovery:

T ↑

CO₂ ↑

TCO₂ --



TWO years of climate change treatments:

- Combined warming and elevated CO₂ kicks up mineralization of DON into ammonium
- Microbial biomass C and ¹⁵N tracer recovery higher in warmed and elevated CO₂ plots (not in TCO₂)
- CO₂ dilutes nitrogen in Heather flowers (and fine roots)
- Drought increases Heather N pool, biomass and tracer recovery

Papers from the field site:

Experimental design: Mikkelsen *et al.*
Functional Ecology 2008, vol **22**, 185 – 195.

N and P application: Nielsen *et al.* Applied
Soil Ecology 2009, vol **42**, 279 – 287.

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DONG

Jægersprislejren

