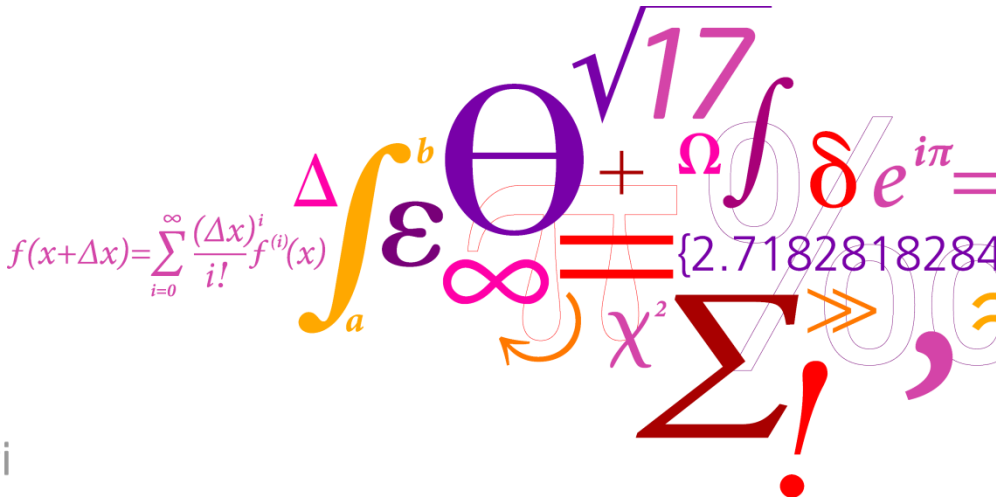
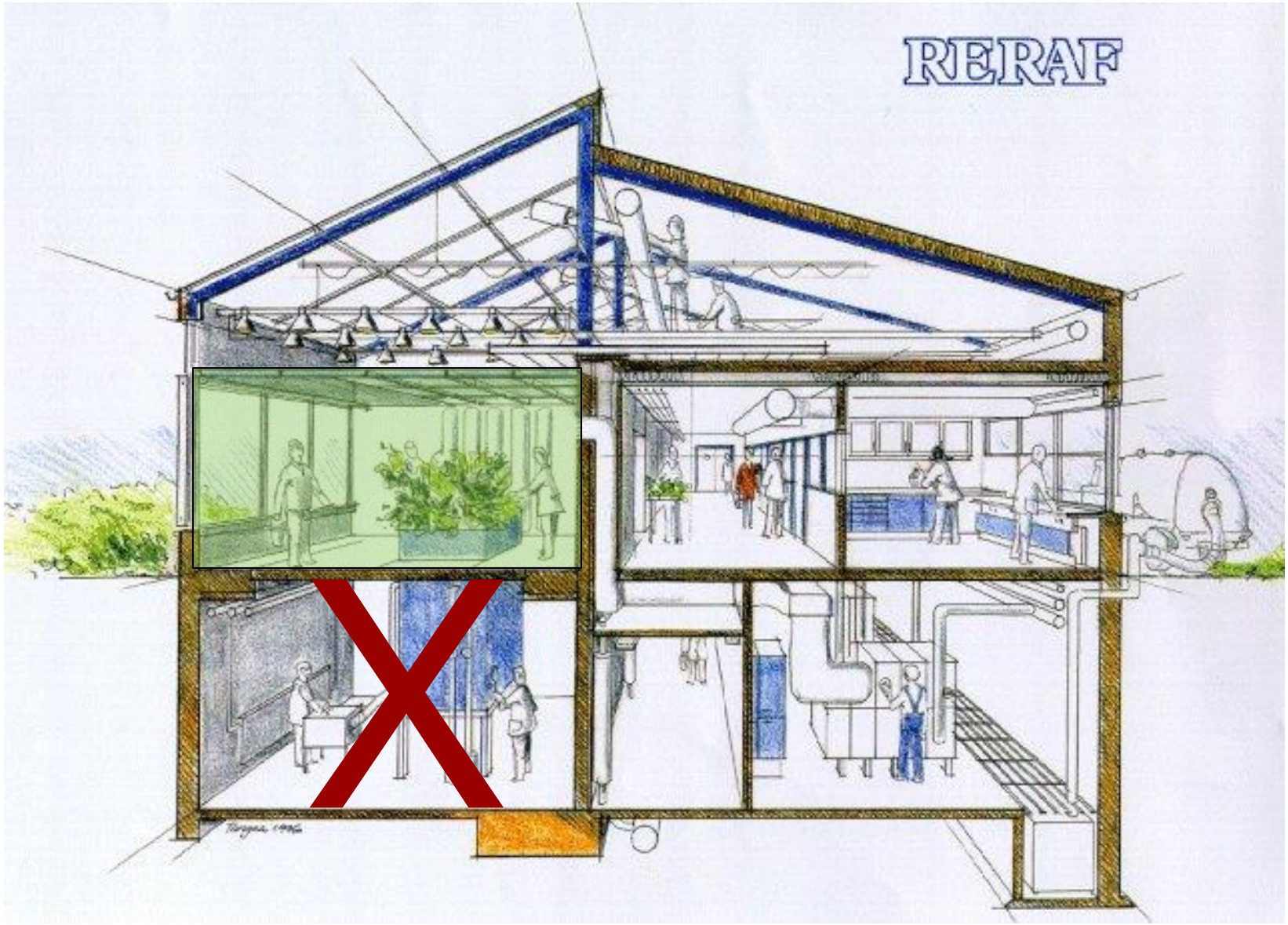
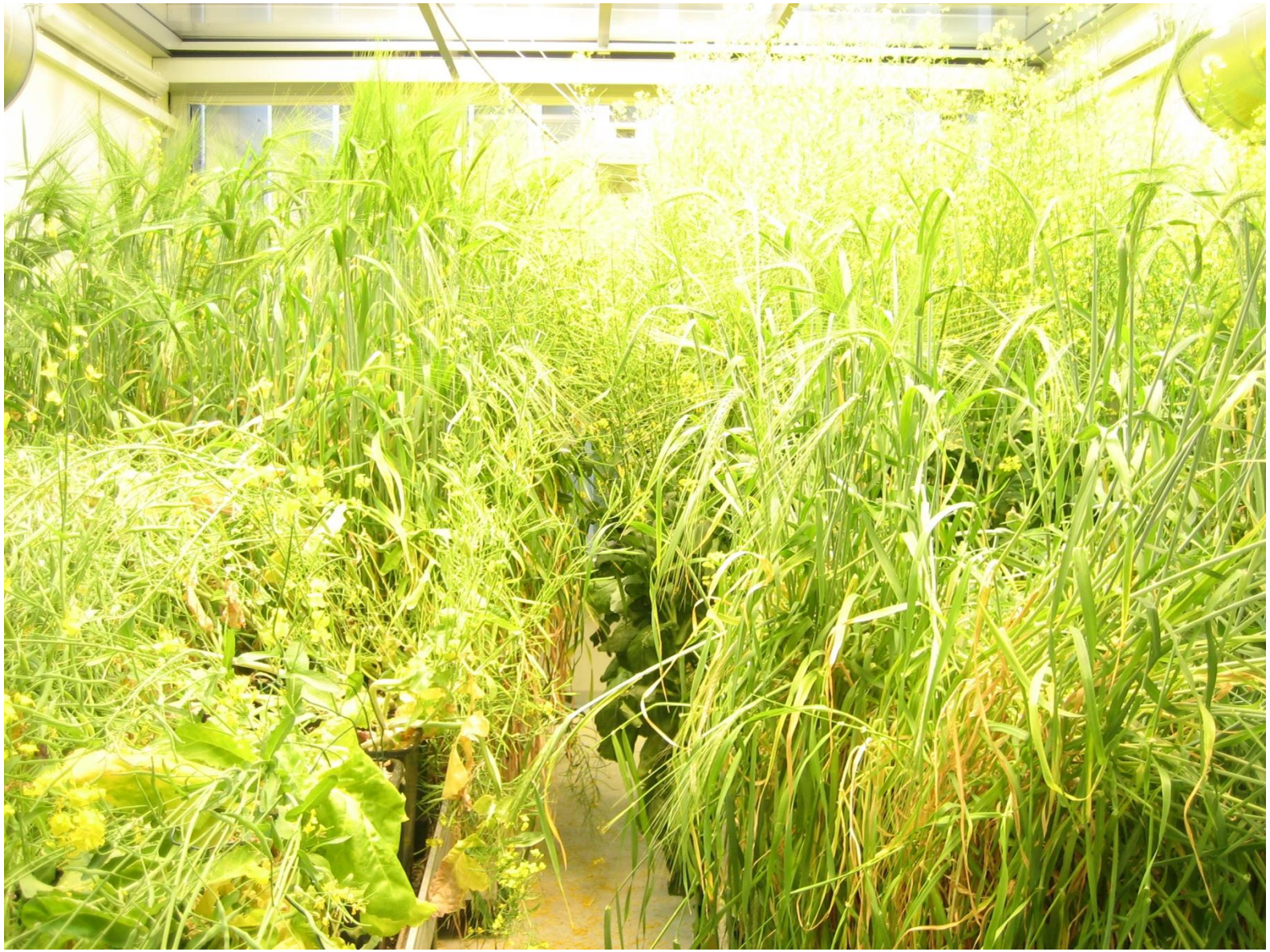
OZONE FUMIGATION IN AN ONGOING CLIMATE CHANGE PROJECT

Teis Nørgaard Mikkelsen
DTU, Institut for kemiteknik
temi@kt.dtu.dk



Risø DTU
Nationallaboratoriet for Bæredygtig Energi


RERAF



Oilseed rape (*Brassica napus*, exposed to climaite change in RERAF

Ambient

+ Ozone

+ CO2

+ 5 °C

+ CO2 + 5 °C

+ CO2 + 5 °C + Ozone

Important subject in climate change experiments:

How realistic is the treatments/manipulations?

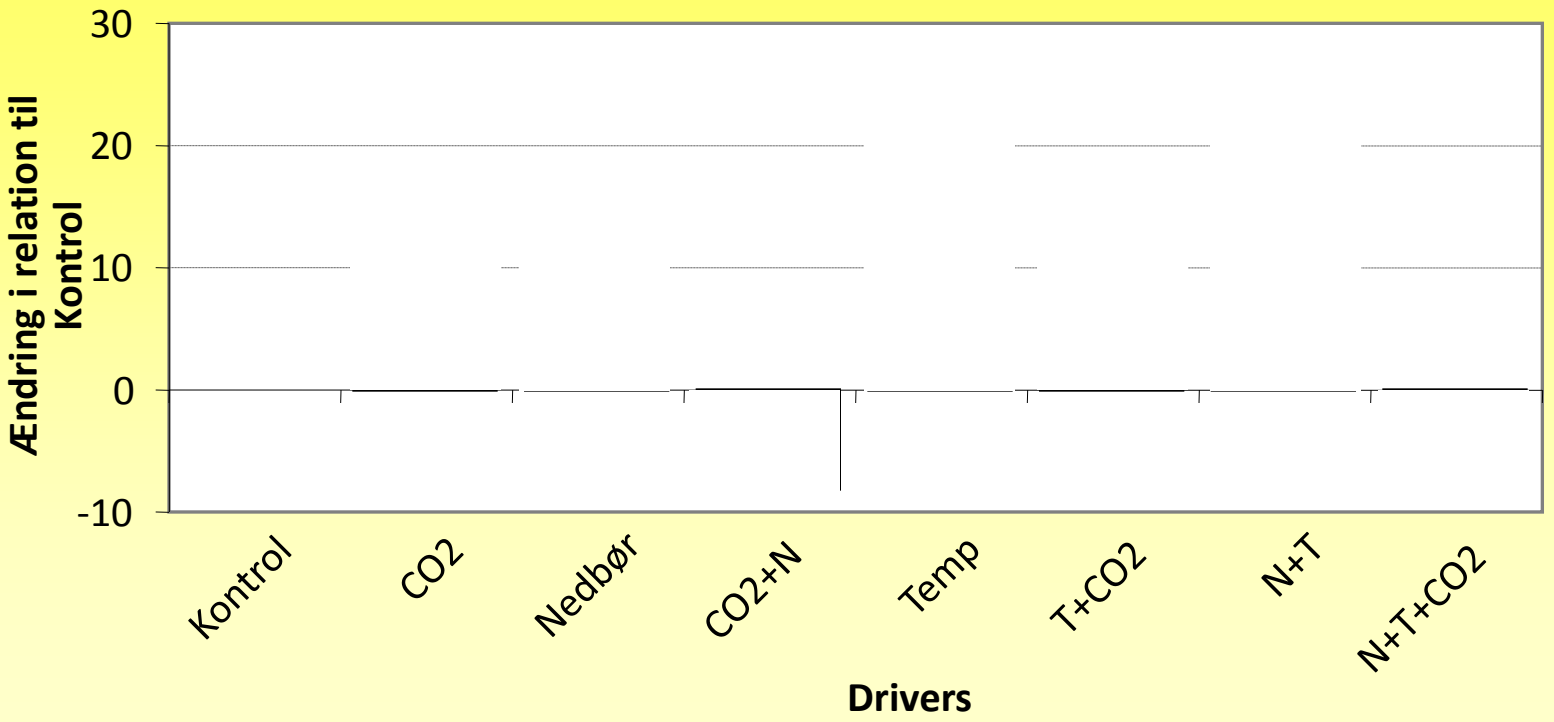
Feedback processer

Donald Rumsfelt, famous American ecologist:

”It is not what we don’t know, it is what we don’t know that we don’t know that worries me”

Multifaktor klimaændrings eksperiment

Effekter af klima faktorer på Netto Primær Produktionen



Shaw et al., Science 2002

Alle kombinationer med CO_2 viser uforudsigelige interaktioner
(baseret på enkelt faktorer)

Climate - tidsmaskinen i Jægerspris

DTU, KU & ÅU

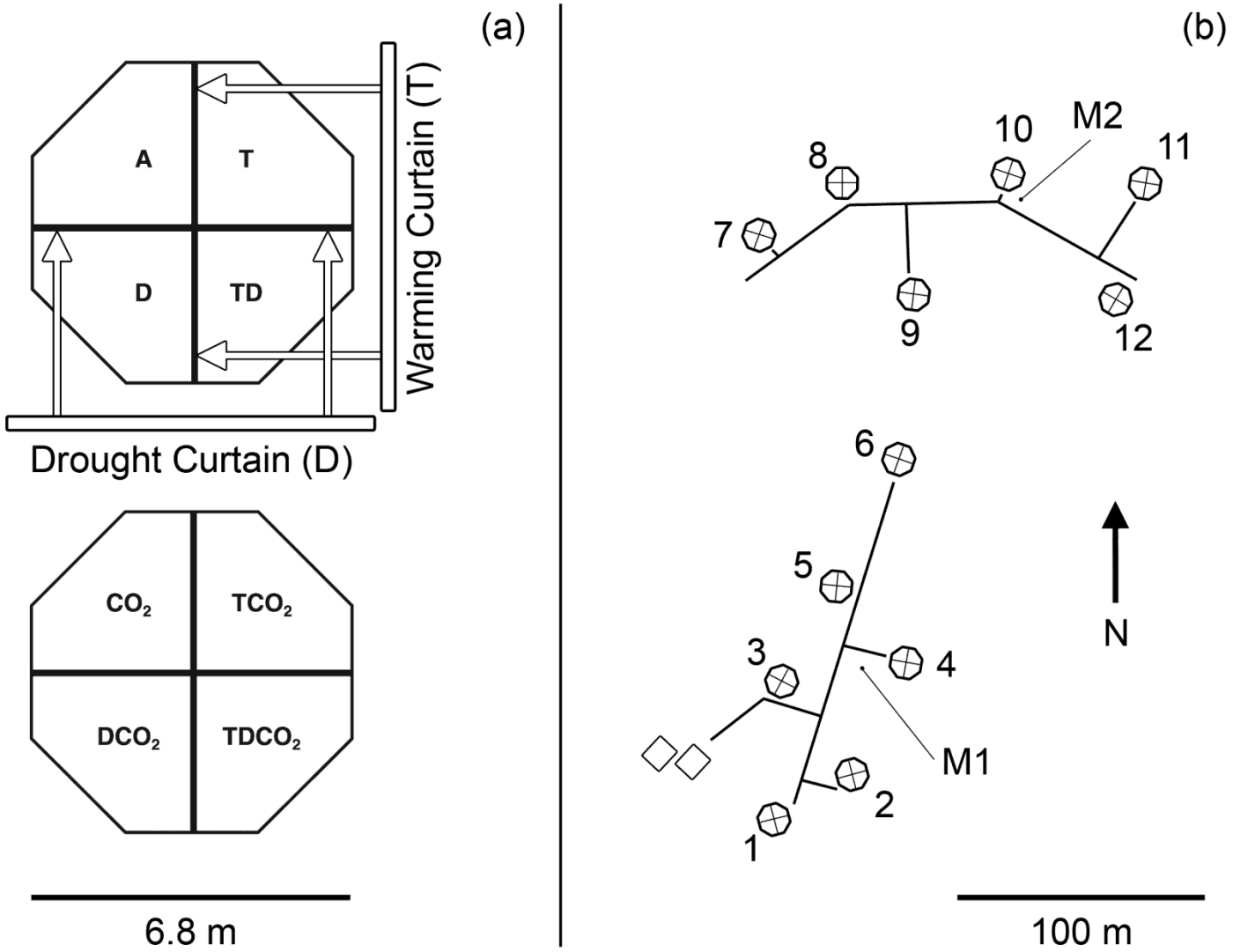
Støttet af Villum Kann Rasmussen fonden med 50 mill. kr.

Start april 2005


Climate


Climate
VILLUM KANN RASMUSSEN FONDEN

The CLIMAITE experiment



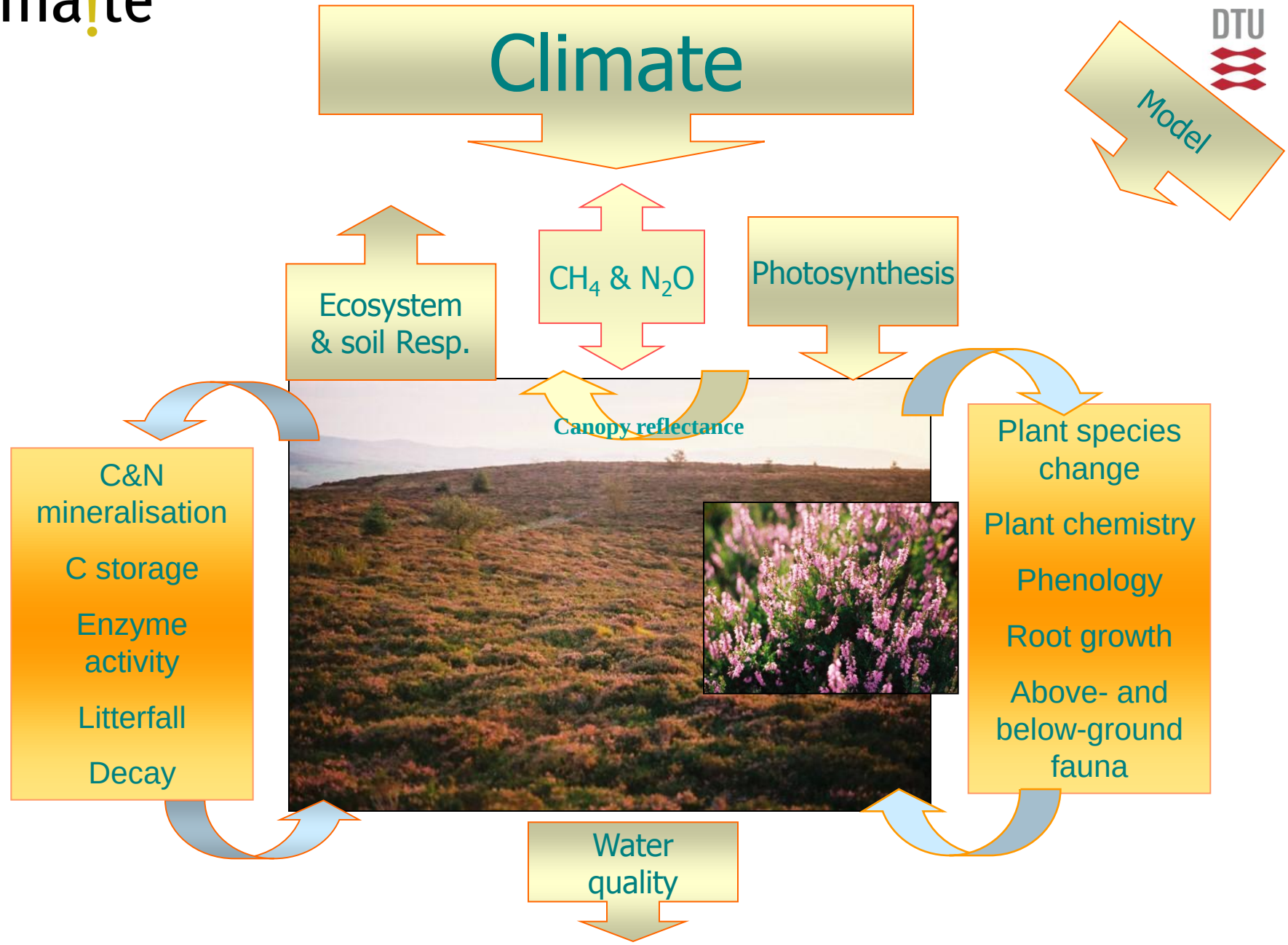

FACE, CO_2
+Temperature
Drought

Climate

DTU

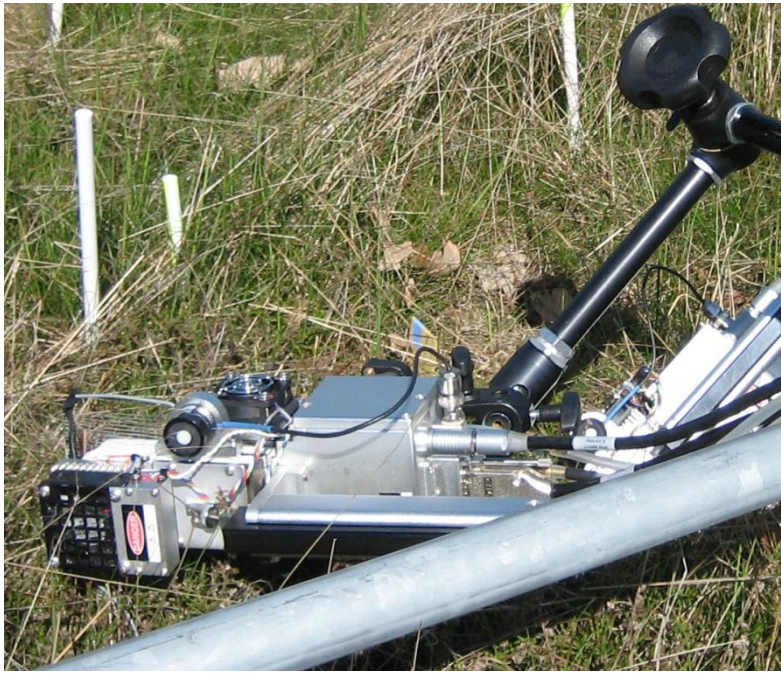
Sådan fungerer FACE-

CO2 konc. hæves til fremtiden niveau (510


Climate
Model
DTU
Ecosystem & soil Resp.
CH_4 & N_2O
Photosynthesis
Canopy reflectance
C&N mineralisation
C storage
Enzyme activity
Litterfall
Decay
Plant species change
Plant chemistry
Phenology
Root growth
Above- and below-ground fauna
Water quality

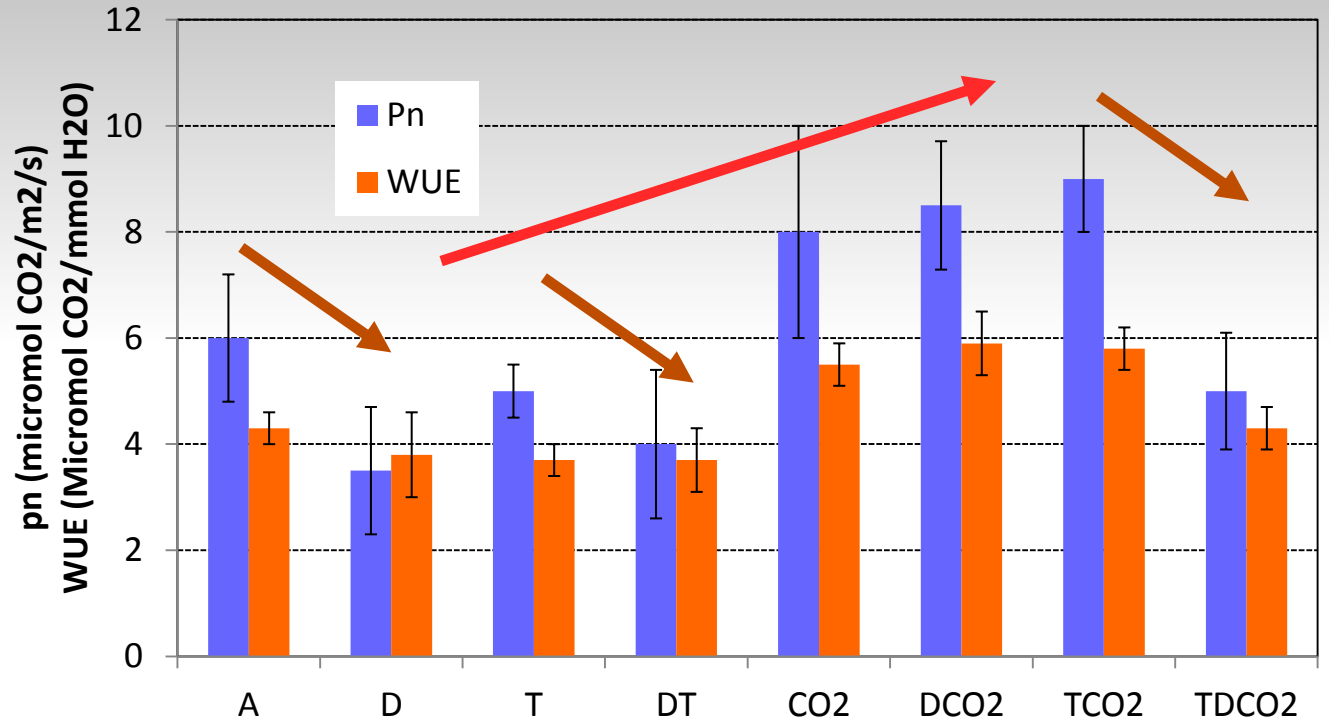
Bølget bunke

Hedelyng



Effects on the leaf level

Photosynthetic rate at maximum light and **WUE** at peak drought



Pn

[CO2] $p < 0.05$

[D] $p < 0.05$

WUE

[CO2] $p < 0.05$

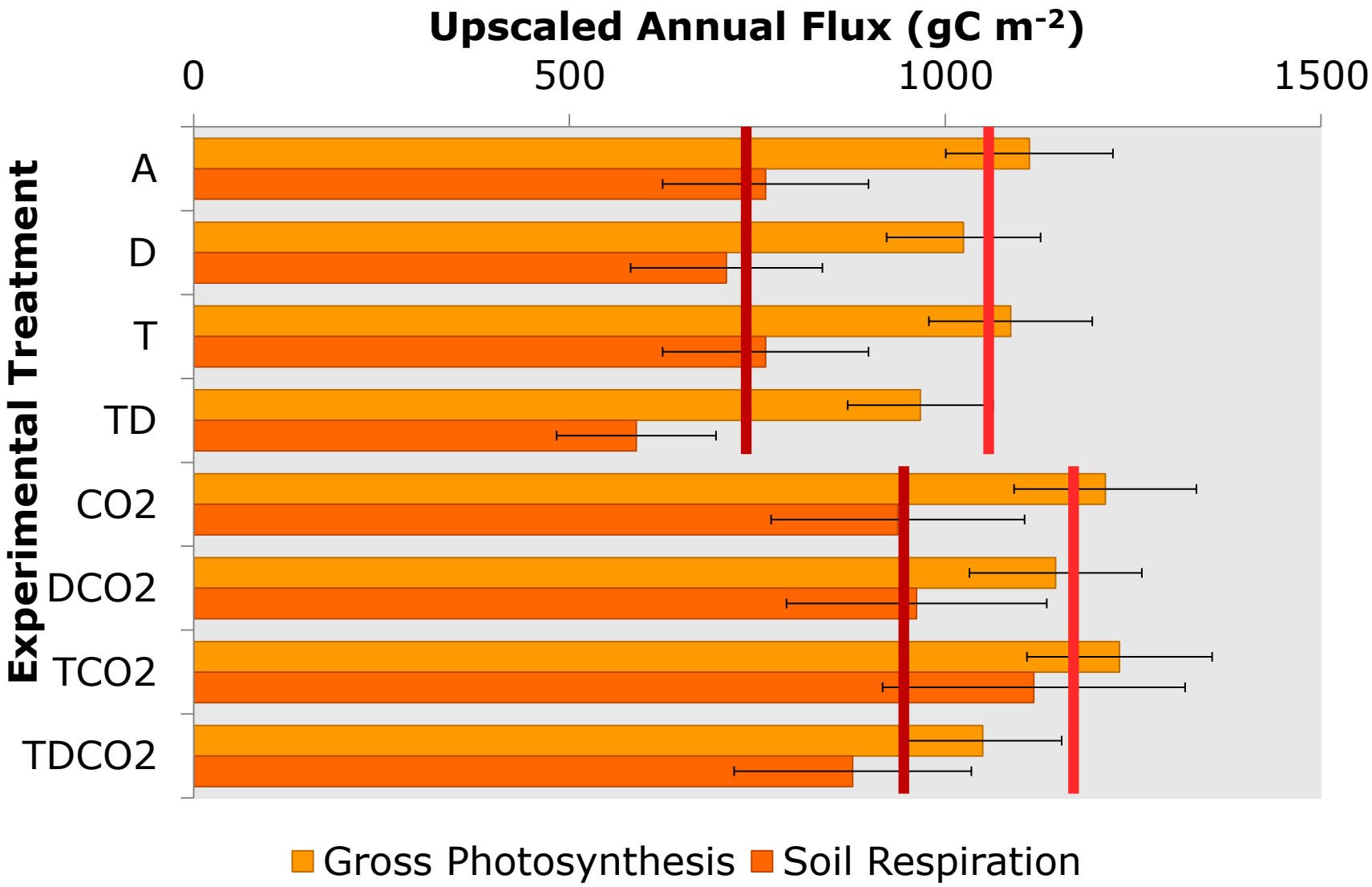
CO_2 improves photosynthesis and WUE (quick responses)

Drought reduces photosynthesis

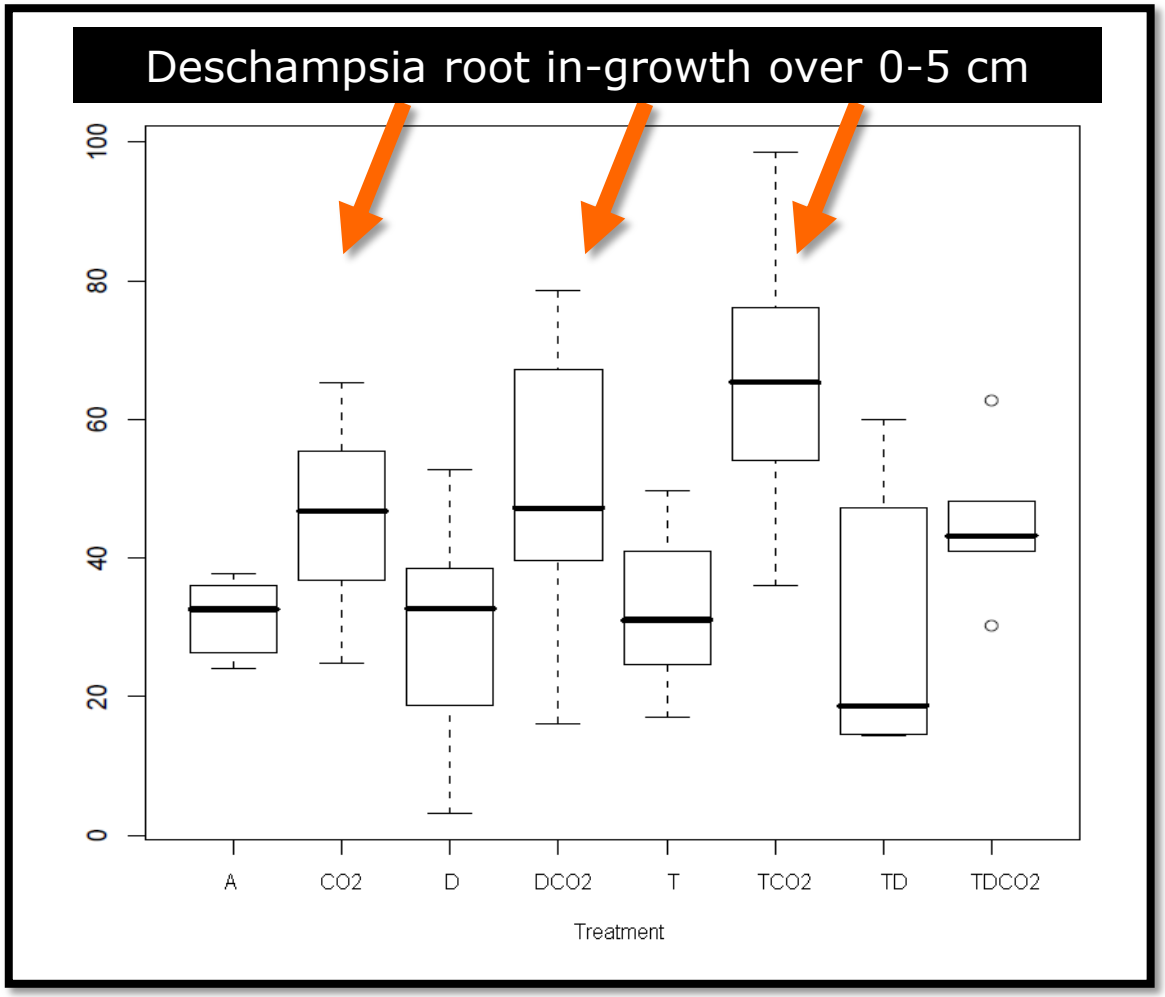
No major change in full factor combination

Octagon

Photo: K.

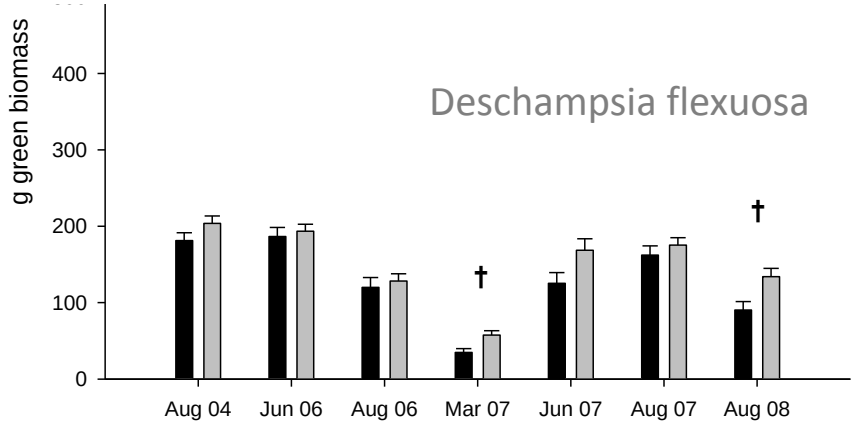

Upscaled Annual Flux (gC m-2)
0
500
1000
1500
Experimental Treatment
A
D
T
TD
CO2
DCO2
TCO2
TDCO2
Gross Photosynthesis
Soil Respiration

Evidence?

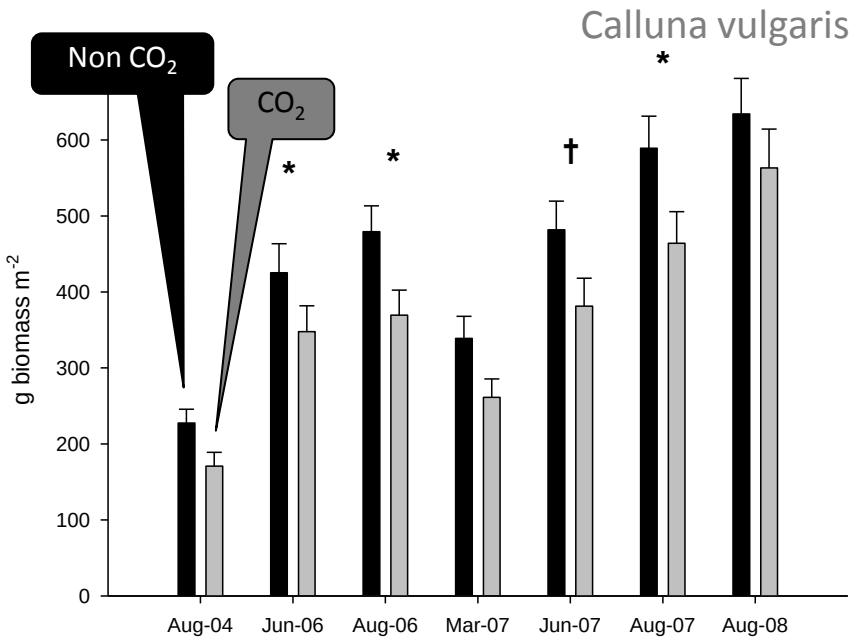


Increased root growth under elevated CO2 ($p<0.05$)

MF Arndal *unpublished*
13 month root in-growth bag study.

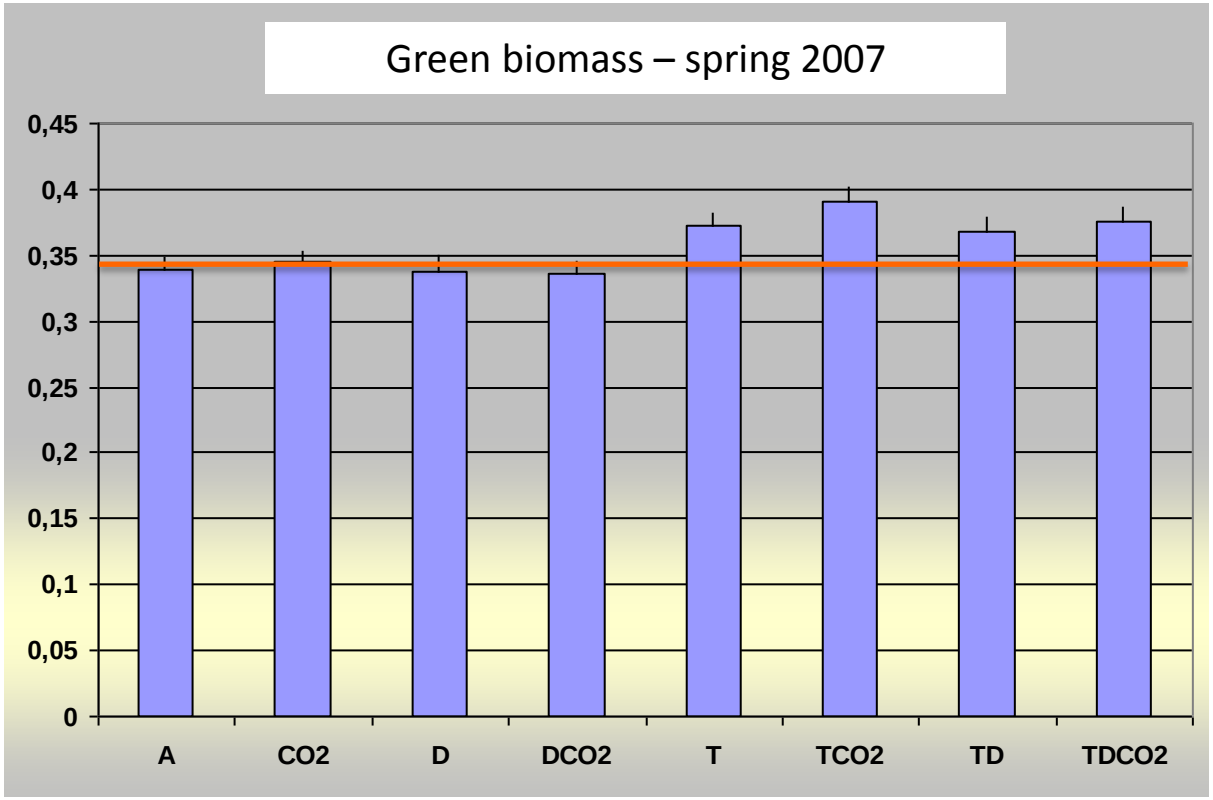


b)



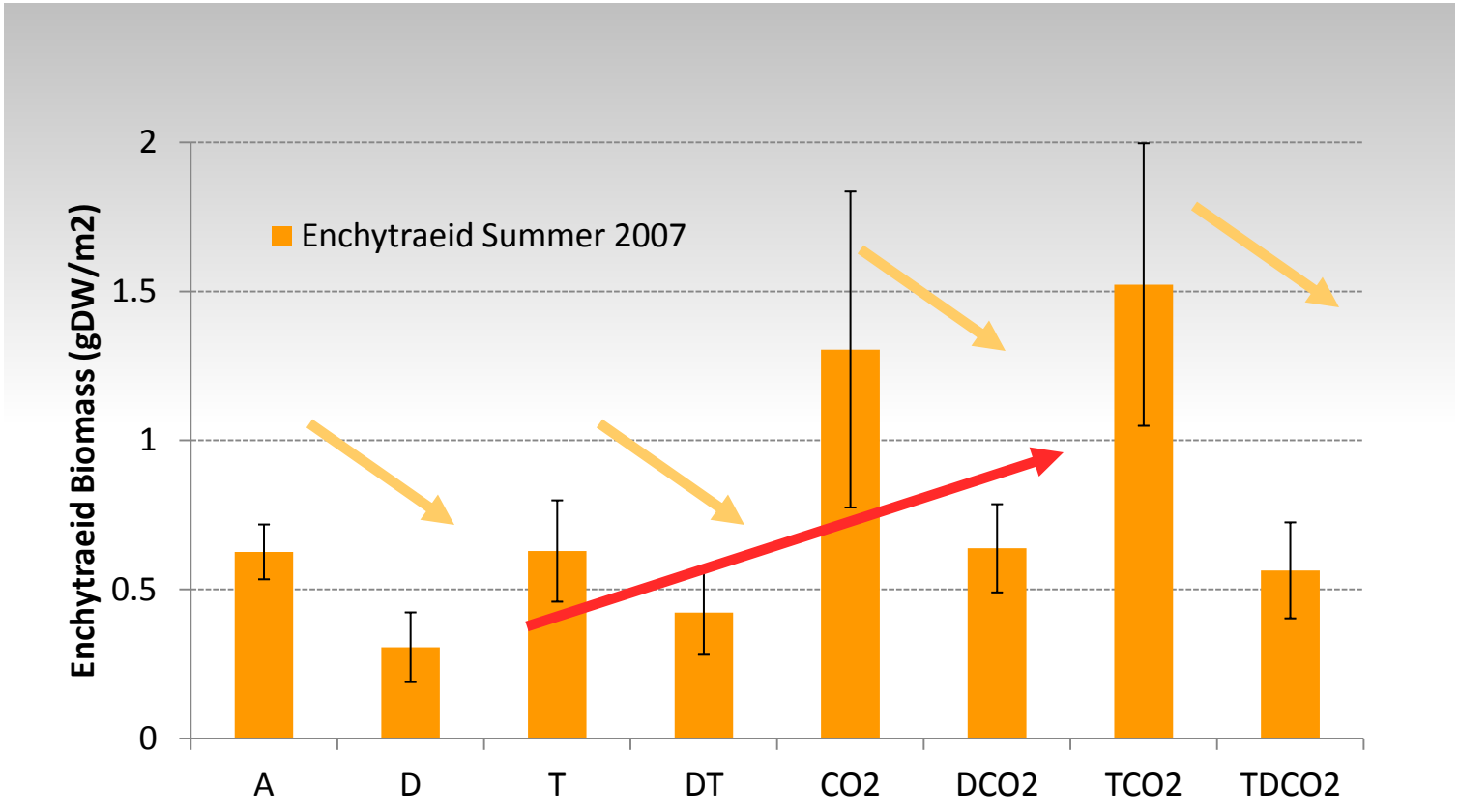
CO2 affects Deschampsia flexuosa positively and calluna negatively

= change in species composition



Earlier onset of the growing season in the warmed plots.

Enchytraeid Biomass at drought



D has a negative effect
CO2 stimulates
No interactions.

”Med-hjem" beskeder

Klimaændringerne optræder samtidigt

Klimaet påvirker levende organismer

Levende organismer påvirker klimaet

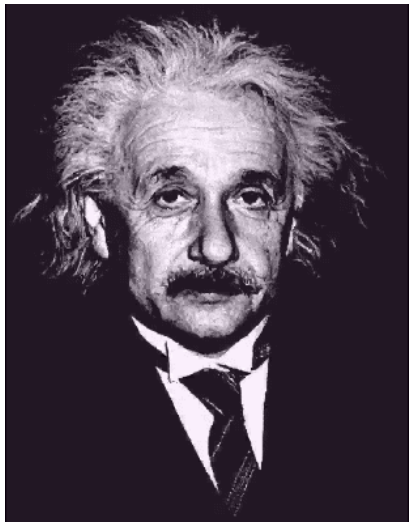
Vi mangler informationer vedr. kombinationseffekter

Kun forsøg i kombination med avanceret modeller kan give troværdige svar

Ekstreme begivenheder kan have meget store effekter

’One thing I have learned in a long life: that all our science, measured against reality, is primitive and childlike – and yet it is the most precious thing we have.’

Albert Einstein (berømt videnskabsmand)



http://87.63.145.42/