The effect of the addition of ^{13}C labelled artificial root exudates on carbon cycling in intact peat bog mesocosms

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Problem:

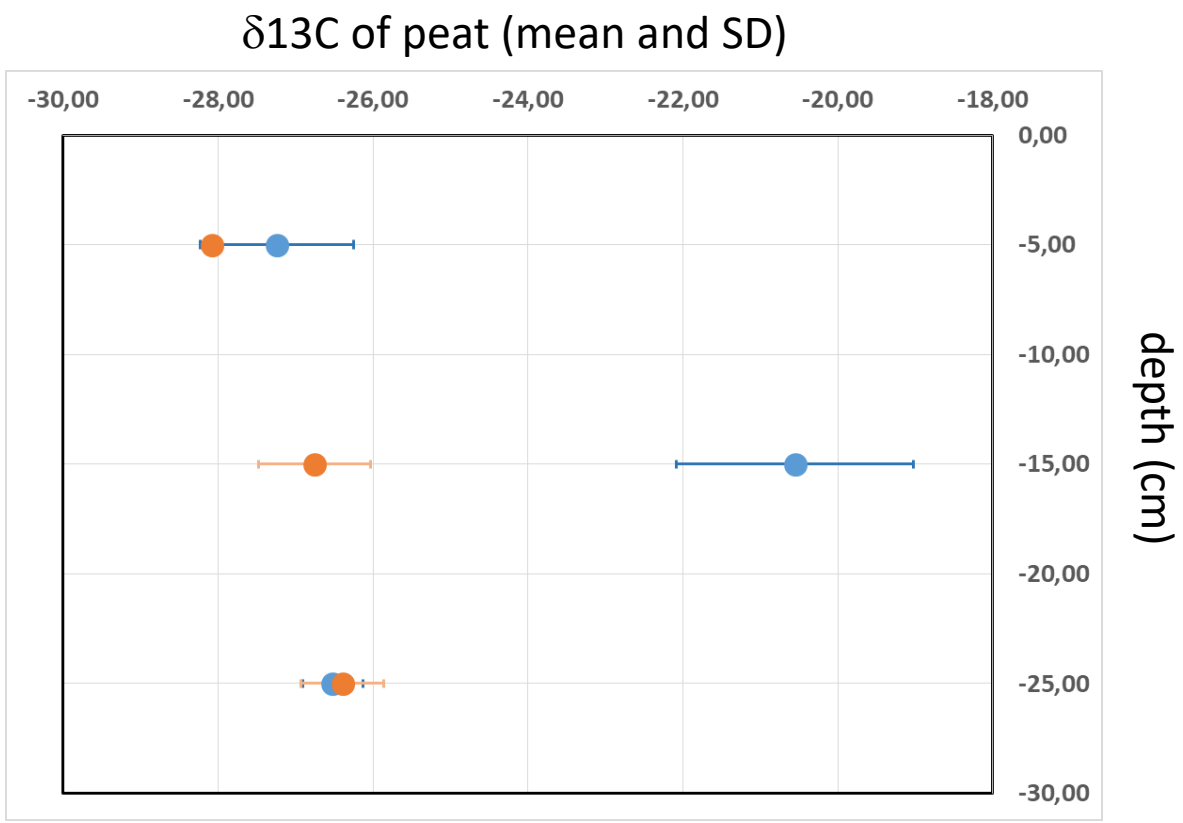
- Do root exudates enhance peat decomposition?
- What is the fate of root exudates in acidic bog peat?

Experiment:

- Addition of artificial root exudates(99% ^{13}C- glucose, amino acid and acetic acid into intact peat cores)
- Monitoring of release of $^{12}CO_2$, $^{12}CH_4$, $^{13}CO_2$, $^{13}CH_4$
- Repeated DOC sampling in 5, 15, and 25 cm depth and analysis of DOC and DO^{13}C concentration
- Analysis of peat for ^{13}C content following the experiment

Results Peat:

Strong accumulation of label in depth of injection 3 weeks after labelling: **20.25 % of added ^{13}C**

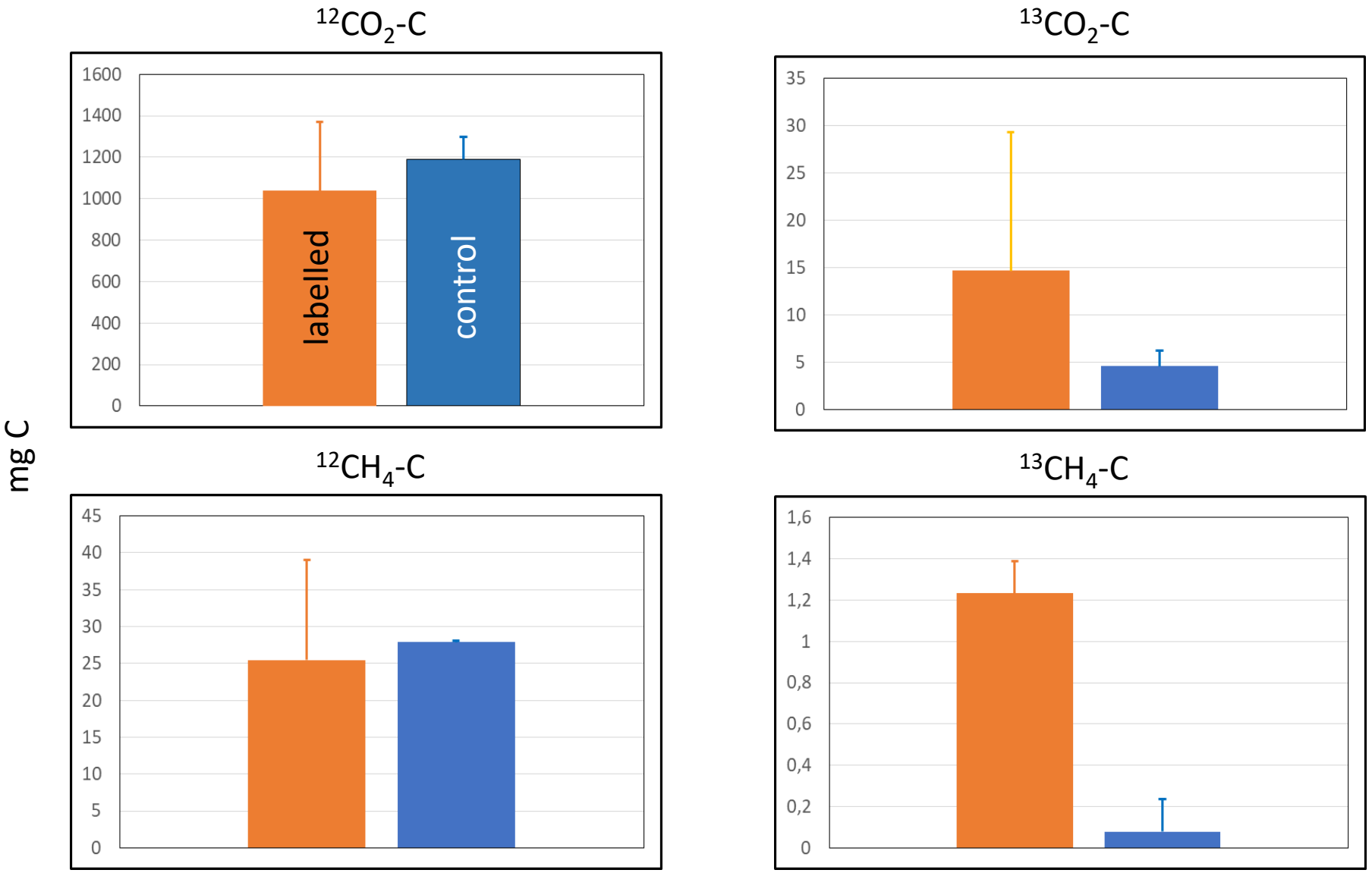


Results CO_2 and CH_4:

31,31% of ^{13}C

Substantial evolution of added 13C as $^{13}CO_2$ and $^{13}CH_4$:

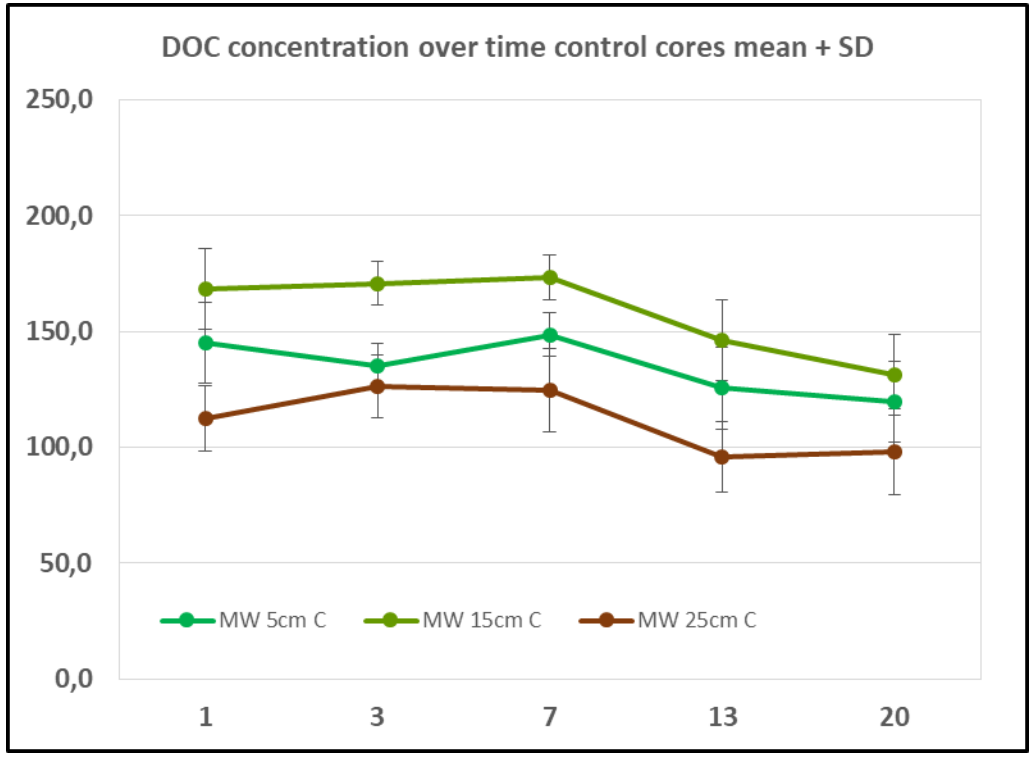
31.31 % of added ^{13}C

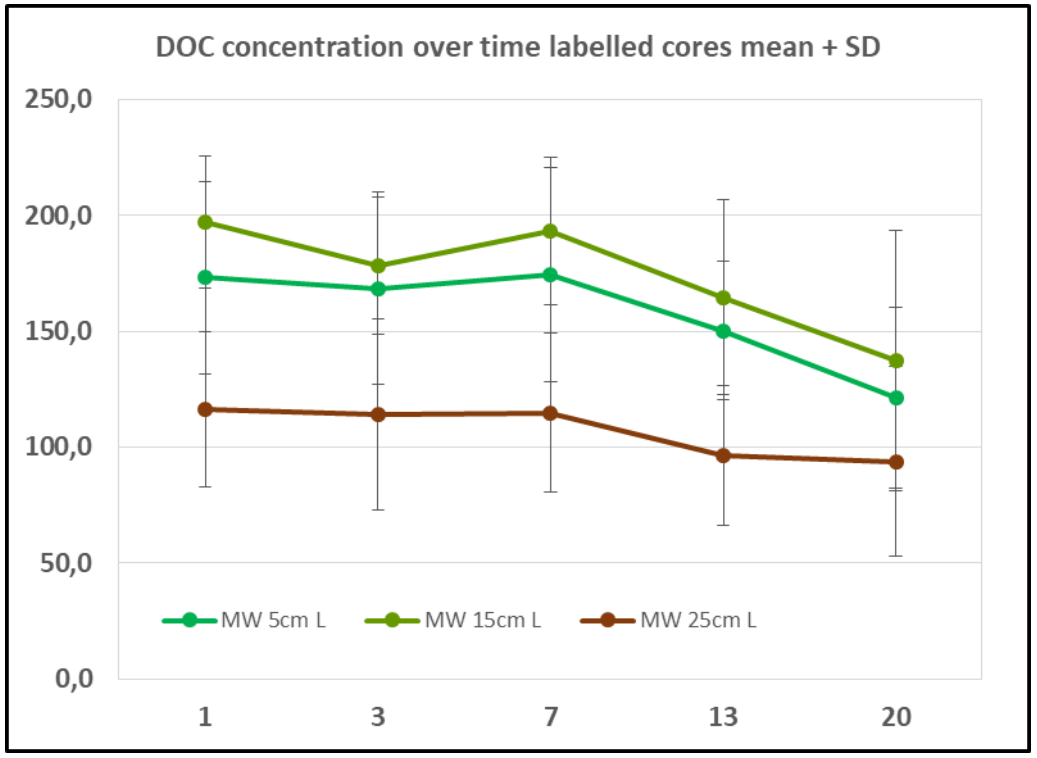


$^{13}CH_4$-C: background subtracted

Results DOC:

- highest DOC concentration at 15 cm depth (rhizosphere) indicates immobile DOC
- up to 20% ^{13}DOC in 15 depth! (made further analyses impossible for a while)





Summary:

<u>140 mg of injected ^{13}DOC did not enhance peat decomposition</u>

<u>After 3 weeks, of injected artificial labelled root exudates…</u>

- probably up to 50% remained in solution in the depth of injection
- 20% were found in peat in the depth of injection
- 30% were released as CO_2 and CH_4

➔ **DOC in the examined bog peat is remarkably immobile and stable**