



University of
Zurich ^{UZH}



SWISS NATIONAL SCIENCE FOUNDATION

No recalcitrant material in a warming world – Loss of plant-derived and pyrogenic polymers in subsoils after 4.5 years of whole-soil warming

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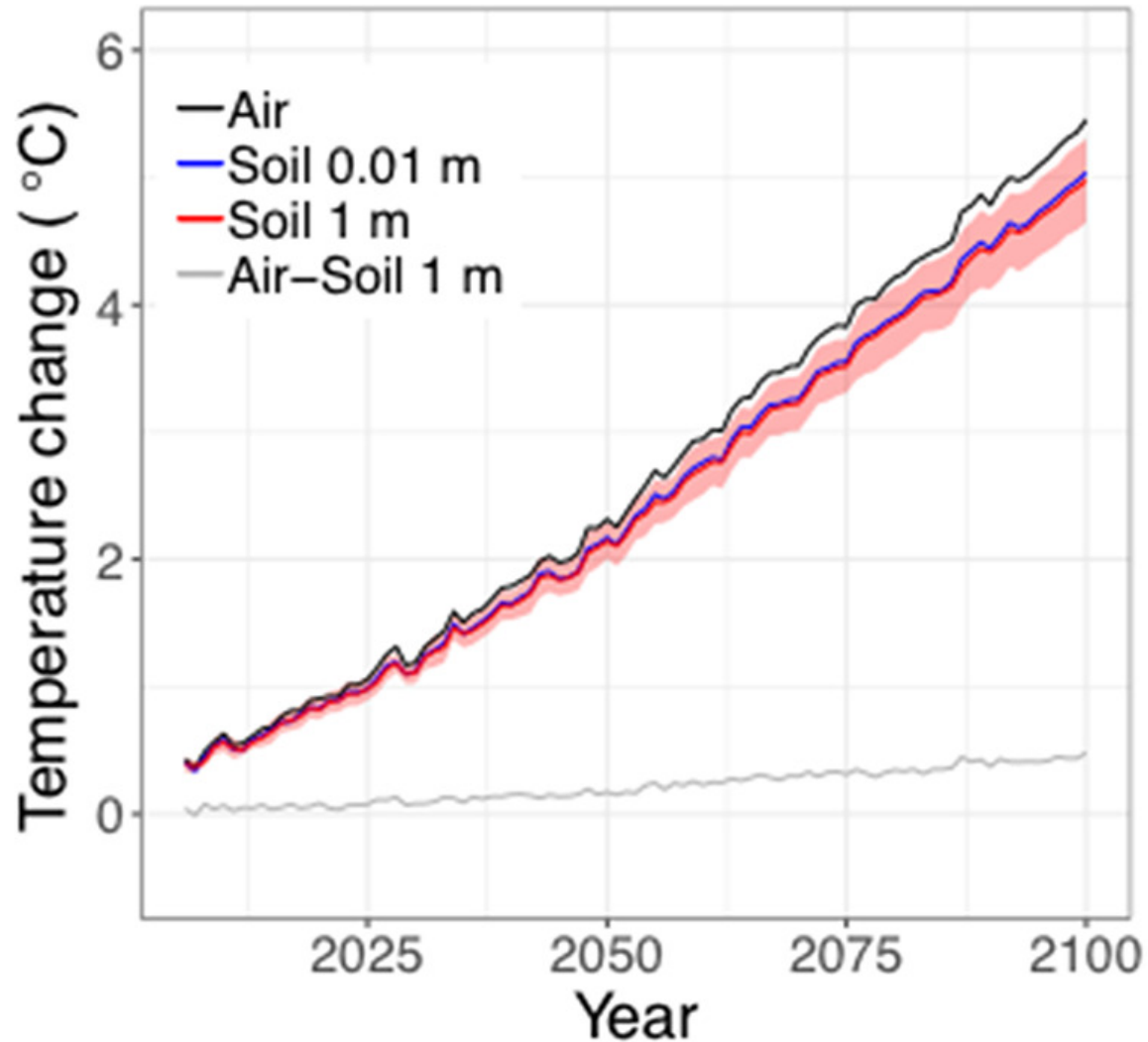
This presentation participates in OSPP



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Soils warm in synchrony with the air – throughout the whole soil profile



Representative carbon pathway 8.5:

→ *Very high baseline emission scenario*

→ *Air temperature: $+4.85 \pm 0.93^{\circ}\text{C}$*

→ *Soil temperature 1cm: $+4.50 \pm 1.13^{\circ}\text{C}$*

→ *Soil temperature 1m: $+4.45 \pm 1.10^{\circ}\text{C}$*

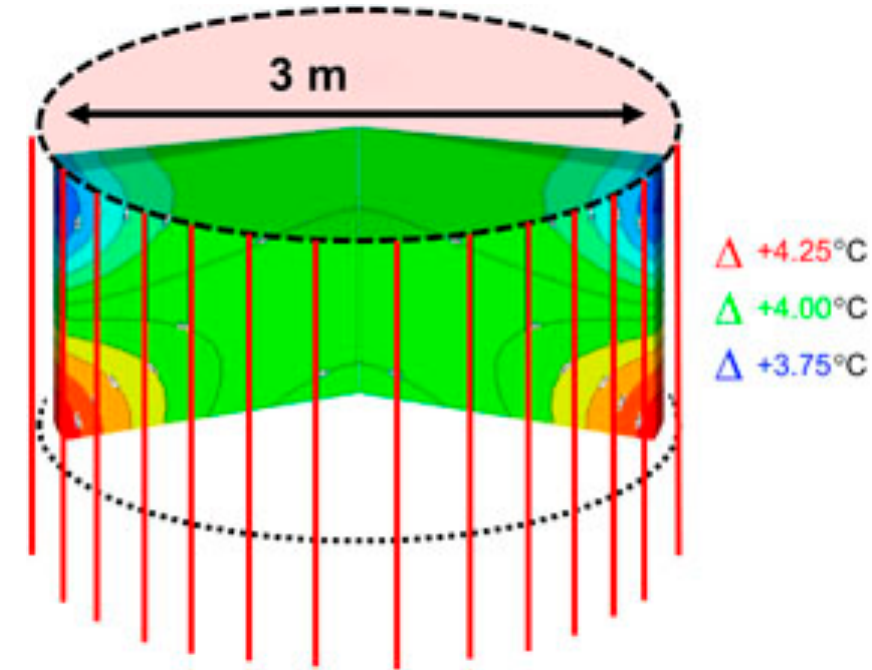
Experiment: Whole soil warming at Blodgett experimental forest, CA, USA



-Mediterranean climate

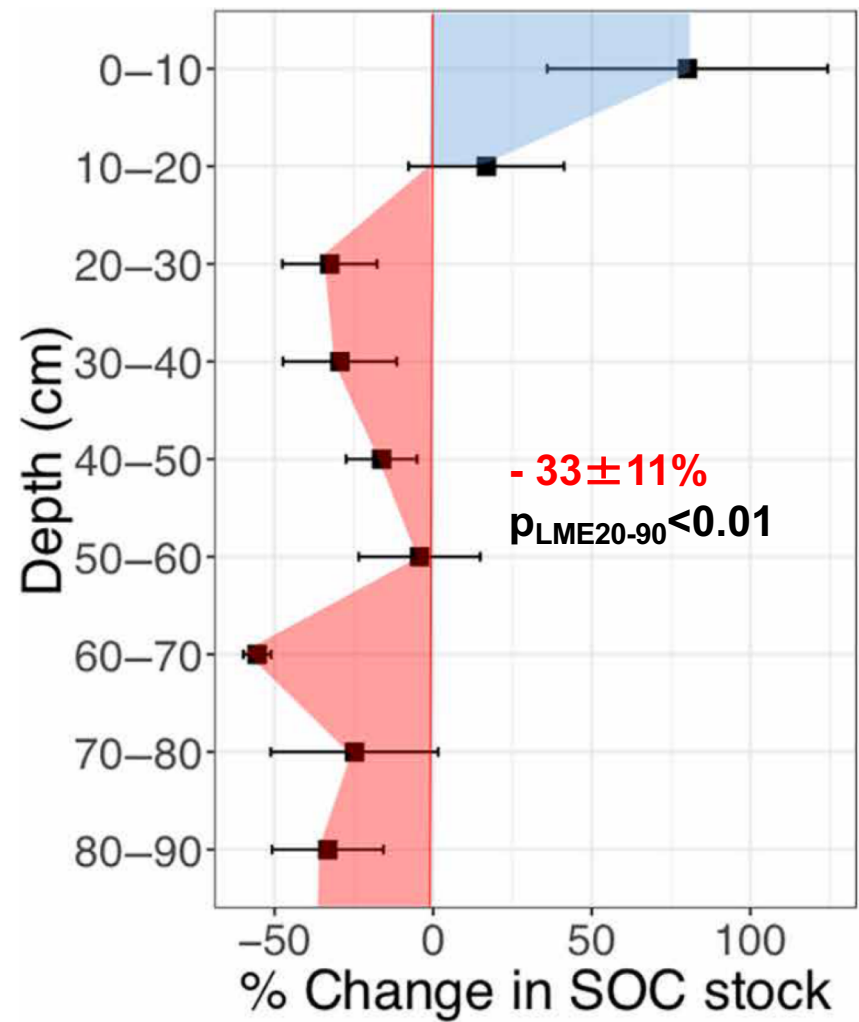


-Coniferous forest
-Alfisol of granitic origin



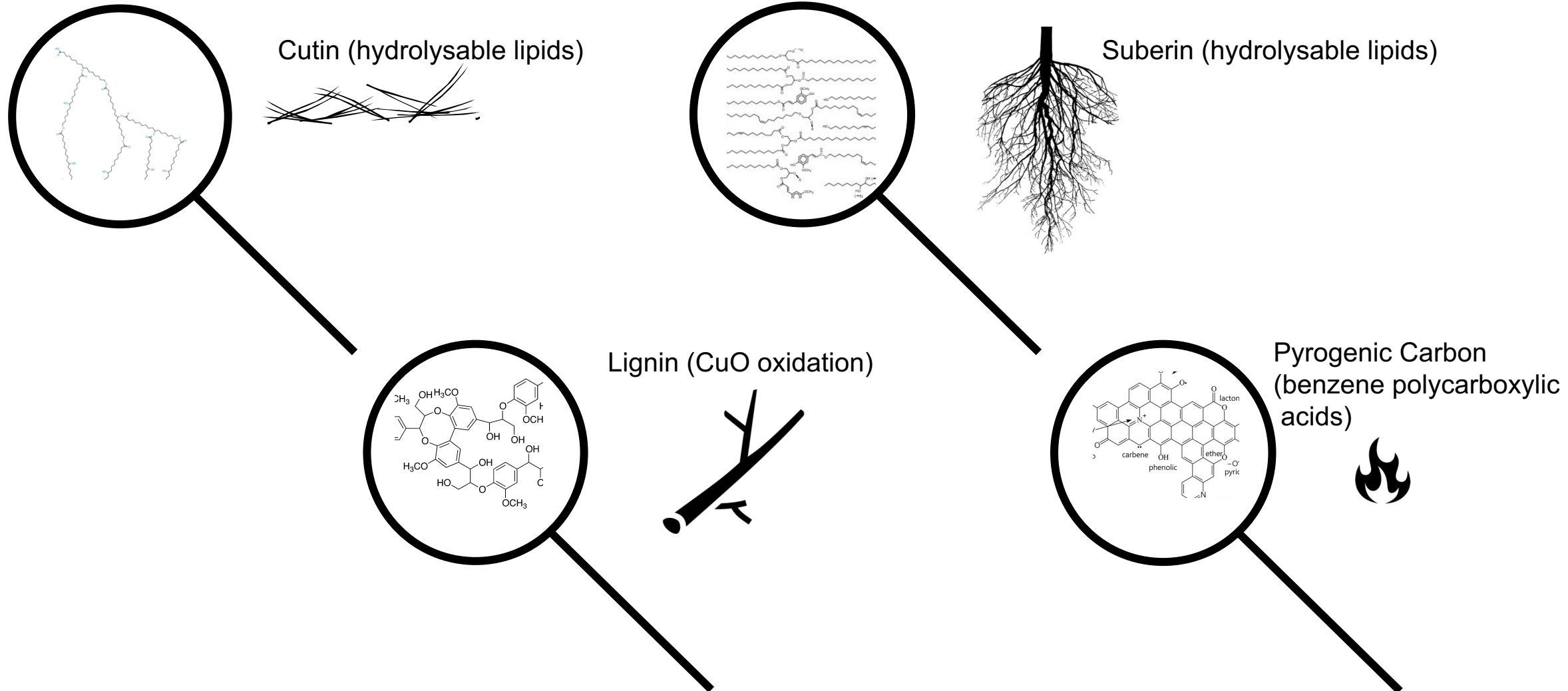
-Vertical heating rods
-+4°C
-4.5 years of warming

Loss of subsoil carbon stocks due to warming

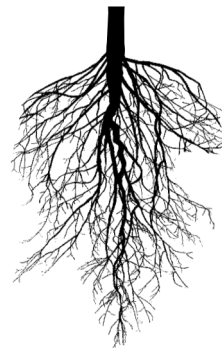
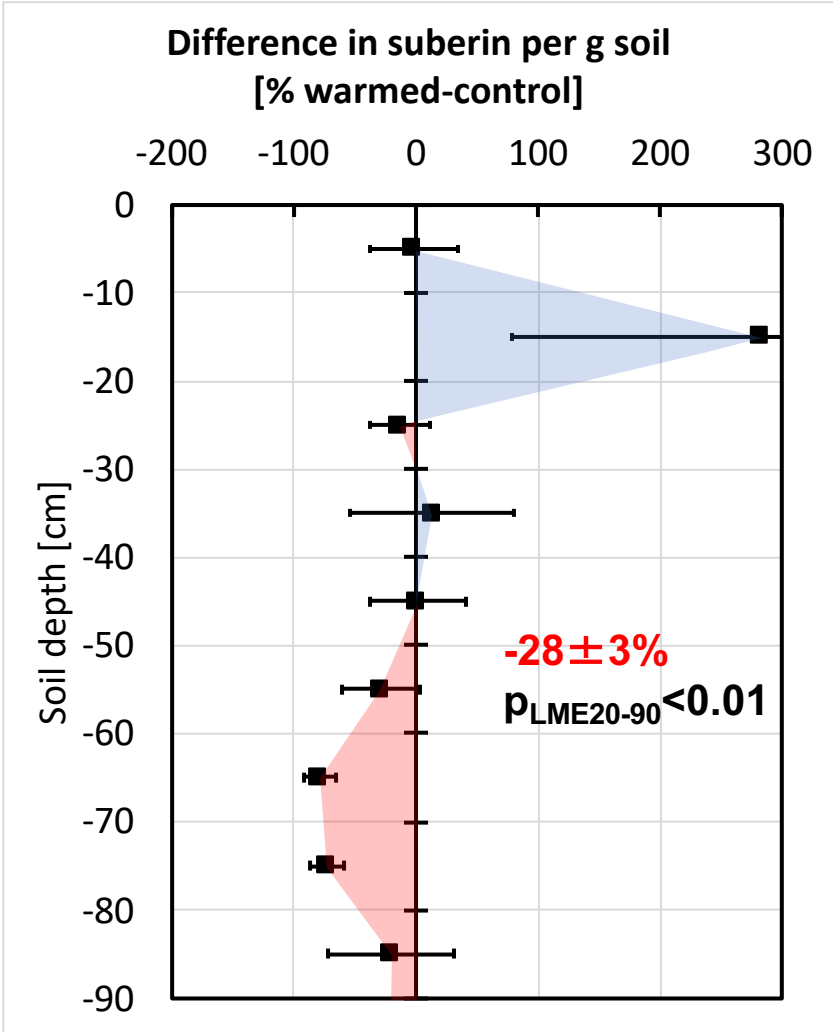
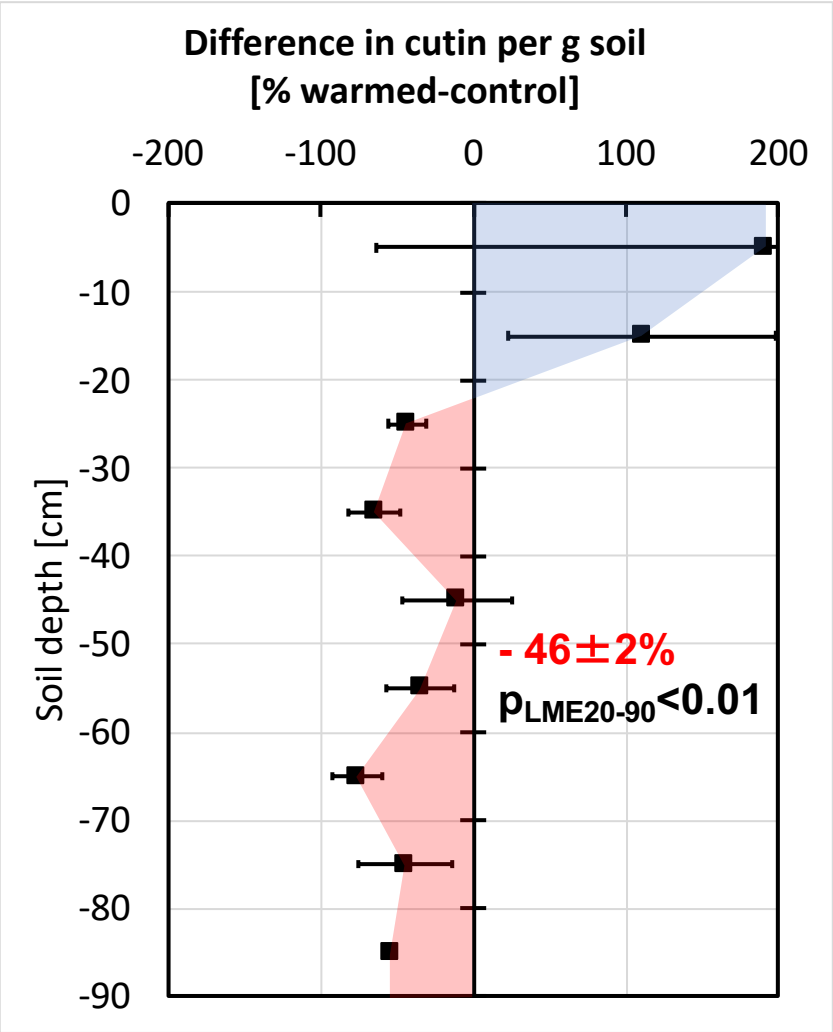


How are specific polymeric SOC pools affected by warming?

Heat proof compounds?



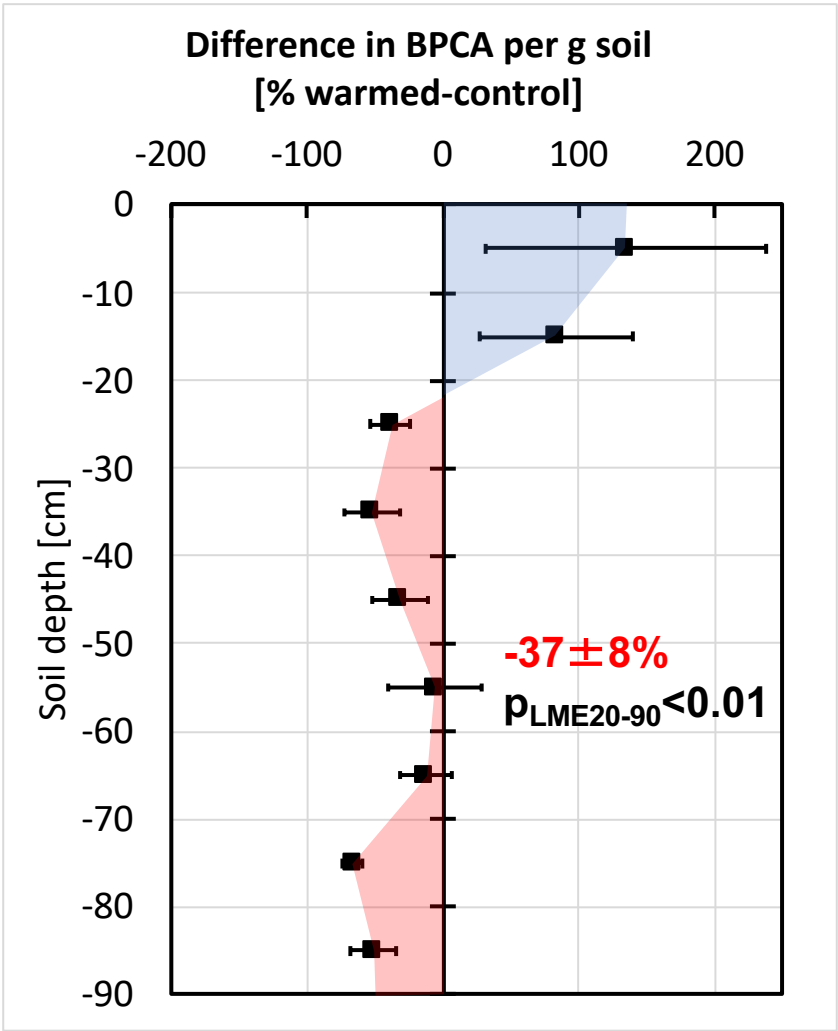
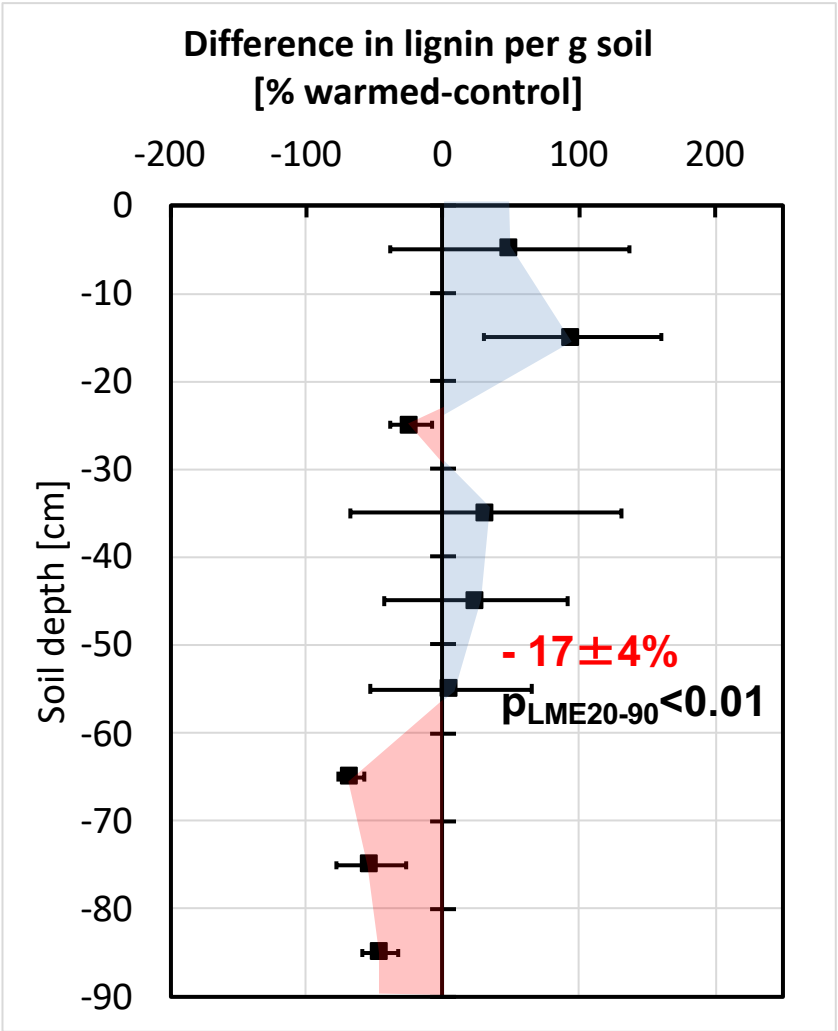
Aboveground- and belowground derived carbon in subsoil is lost



Less More

Less More

Also lignin and even pyrogenic carbon was lost in warmed subsoils



← →
Less More

← →
Less More



Conclusions

No recalcitrant compounds in warming subsoil

- Plant (suberin, cutin, lignin) and pyrogenic carbon lost after 4.5 years of +4°C warming
- Compounds lost on the same order of magnitude as bulk SOC

Several of these compounds (cutin, suberin, pyrogenic carbon) proposed for long term SOC sequestration

- Potentially cannot rely on specific compound groups for C-sequestration?

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