

Differences in peat formation between an Atlantic blanket bog and a subcontinental raised bog

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Problem:



Moor House, UK:

- Maritime blanket bog
- Thermodynamic limitation of transformation of peat at ca. 40 cm depth
- Fractionation of organic matter in favour of lignin and almost complete removal of carbohydrates

Is this also true in other more continental peat bogs?



Pürgschachen, Austria:

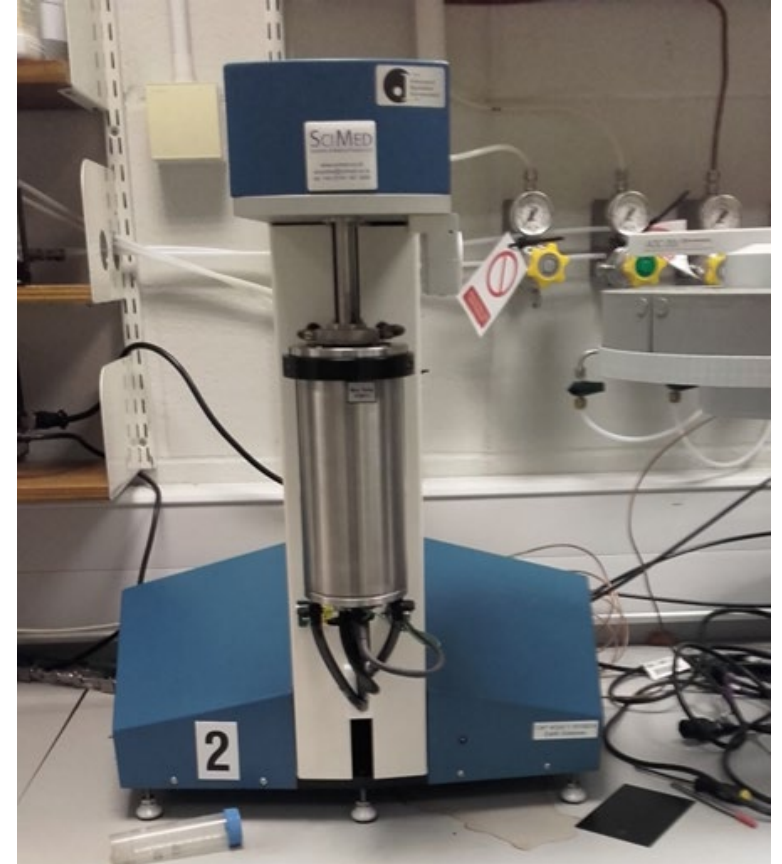
- Continental raised bog
- Published carbon/GHG budget
- Access to all carbon reservoirs and pathways

Examinations:

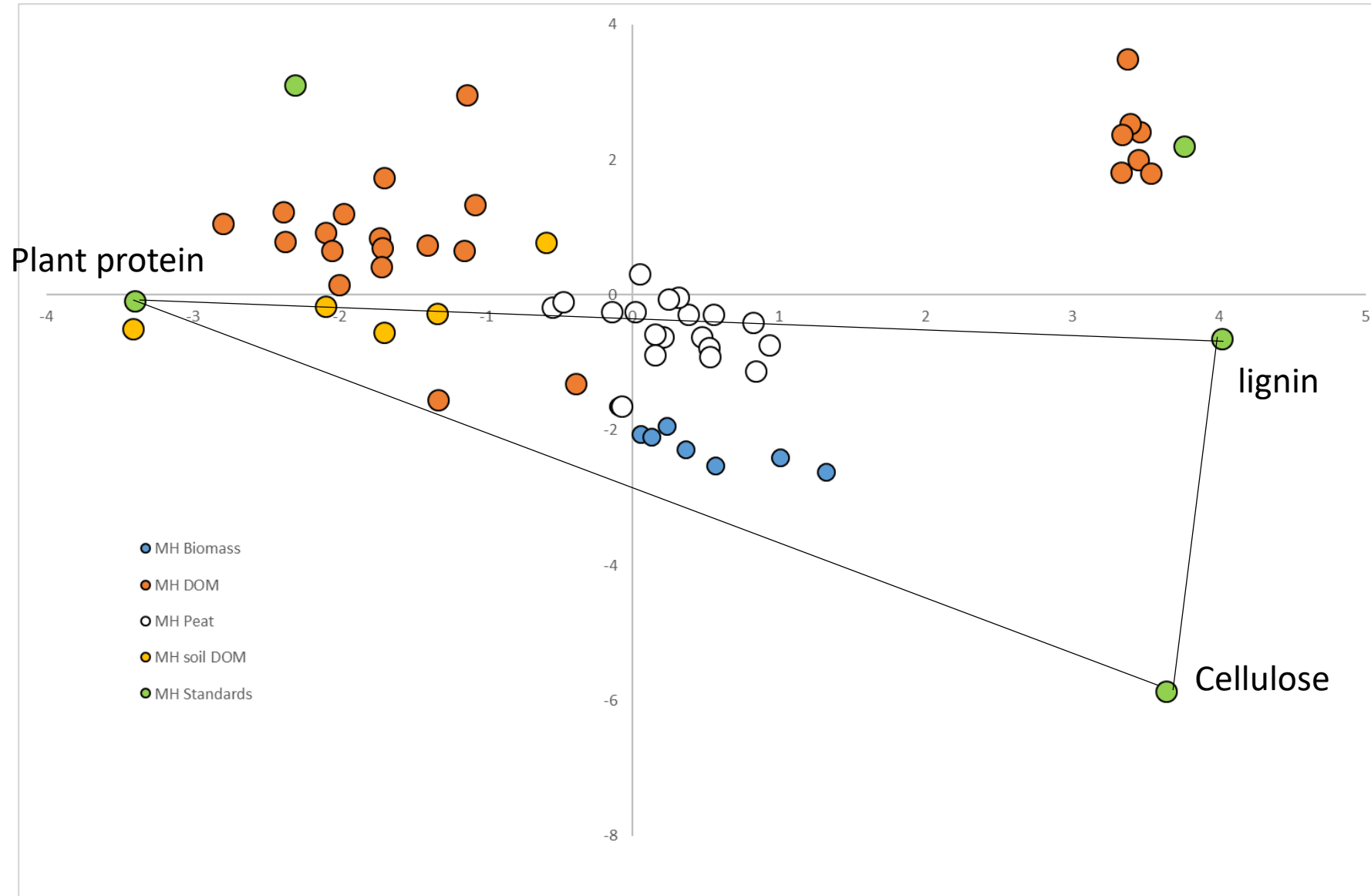
- Vegetation (Heather, Cottongrass, Pine, Sphagna)
- DOM
- Peat cores 0-100 cm

Dried, ground, then:

- Elemental analysis (CHNO)
- bomb calorimetry
- thermogravimetric analysis

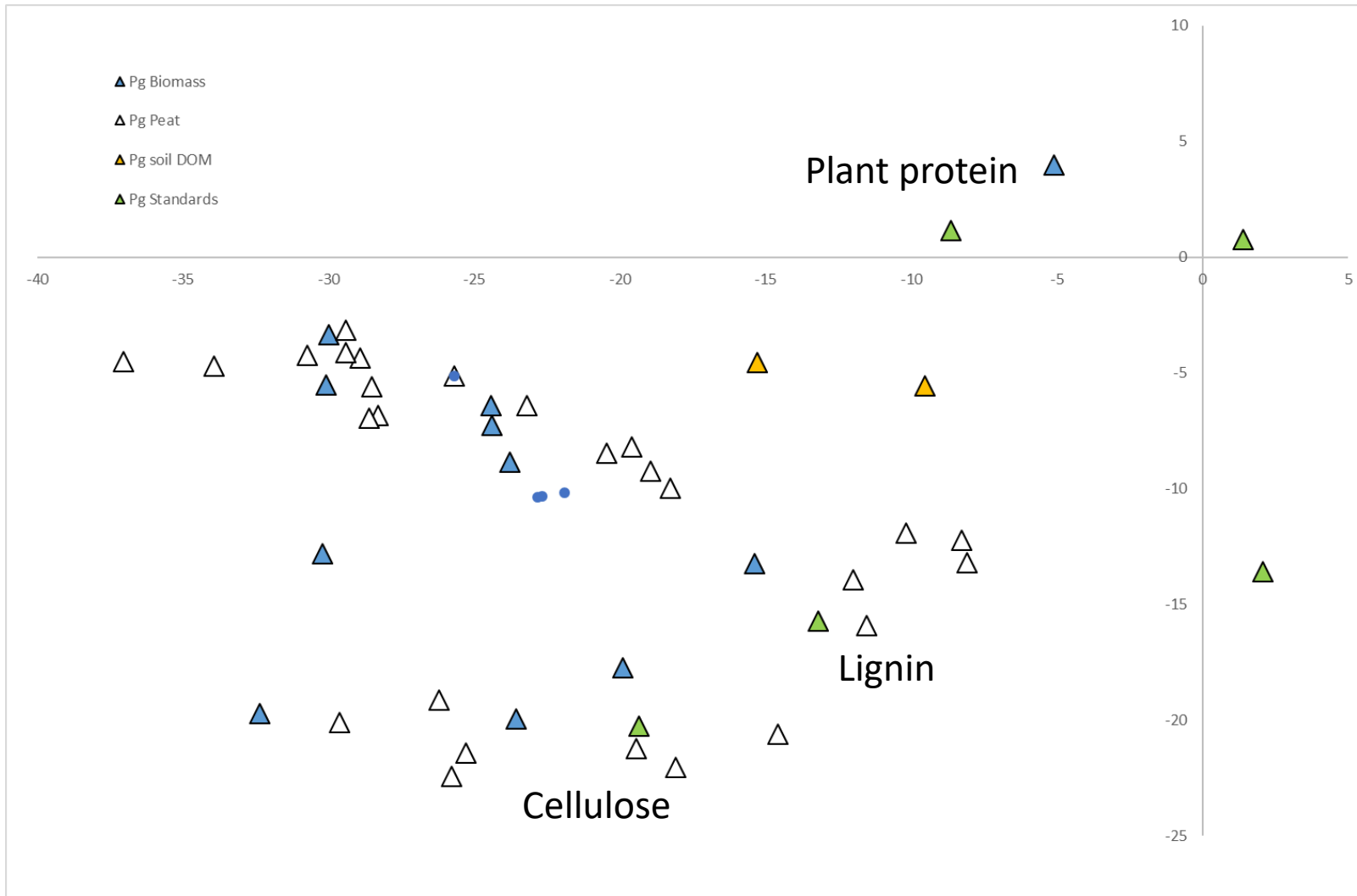


Principal component analysis: Moor House



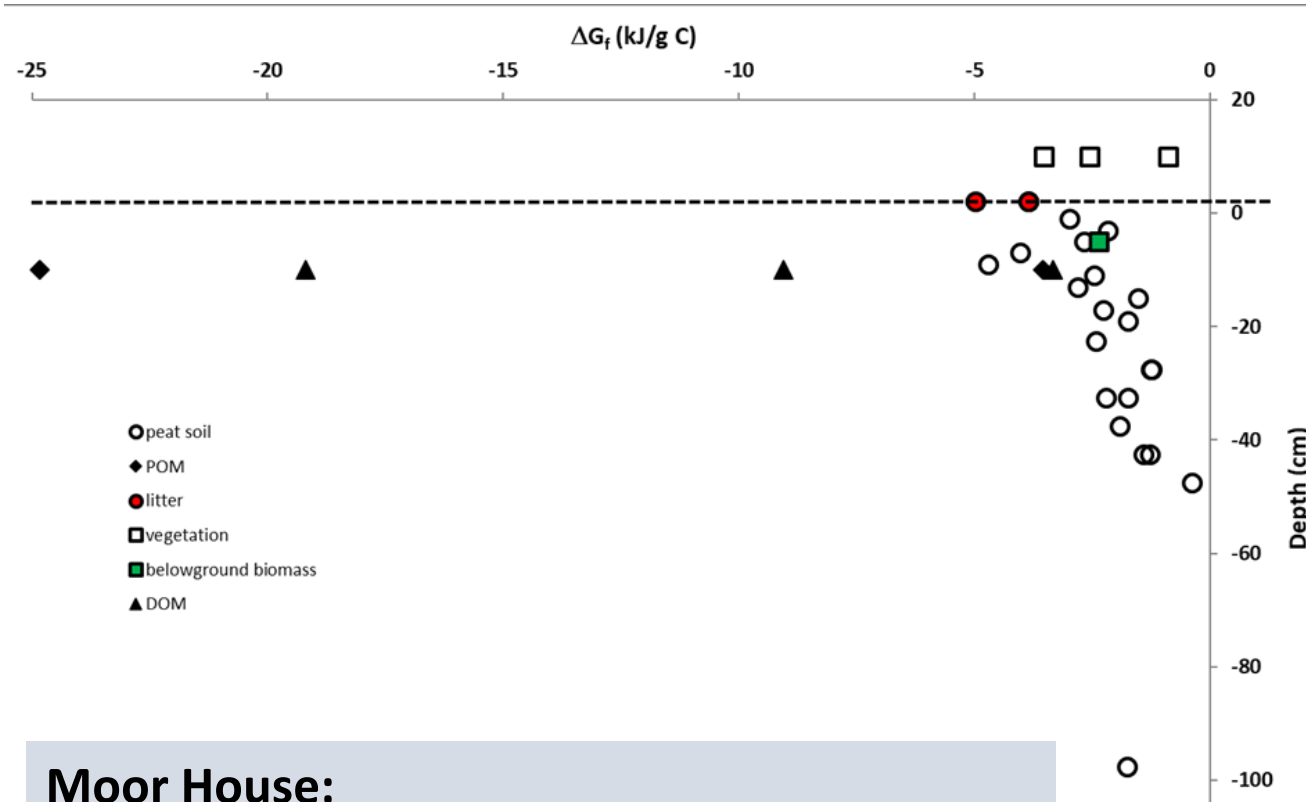
- Biomass and peat described by a mixing of protein, cellulose & lignin
- Peat soils has evolved away from biomass
- Peat soil evolves with depth towards lignin
- DOM composition are unrelated to biomass or soil

Principal component analysis: Pürgschachen



- For at least one core biomass and peat described by a mixing of protein, cellulose & lignin
- Peat soils and biomass over plot each other
- Peat soil has not evolved but closely reflects biomass
- Pürgschachen is rapidly burying and preserving biomass relative to Moor House

Gibbs Free Energy (ΔG):

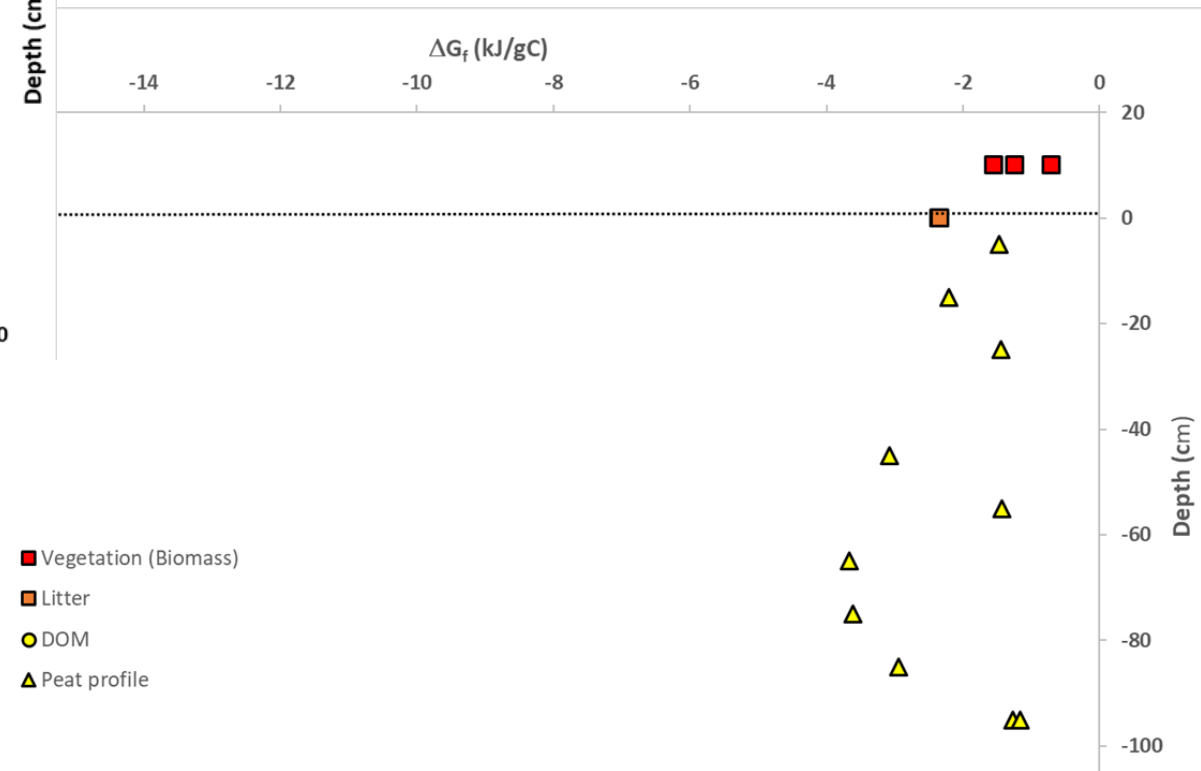


Moor House:

- A significant change in DG with depth
- ΔG maximises at approx. 40 cm
- ΔG of DOM suggests it is an alternative degradation pathway

Pürgschachen:

Degree of unsaturation does not change with depth at Pürgschachen



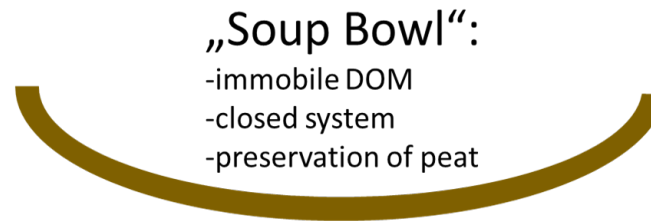
Summary:

Subcontinental raised bog:

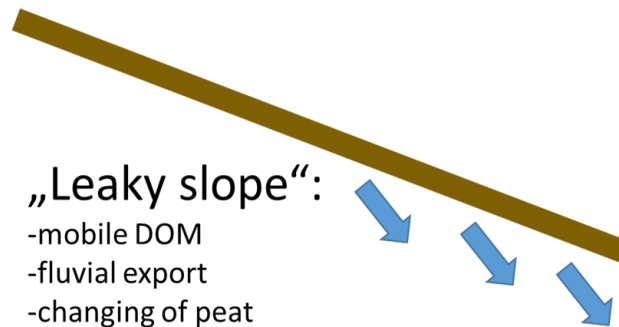
Immobile DOC and lack of pore water movement lead to a closed system and a rapid preservation of the peat in the raised bog.

Atlantic blanket bog:

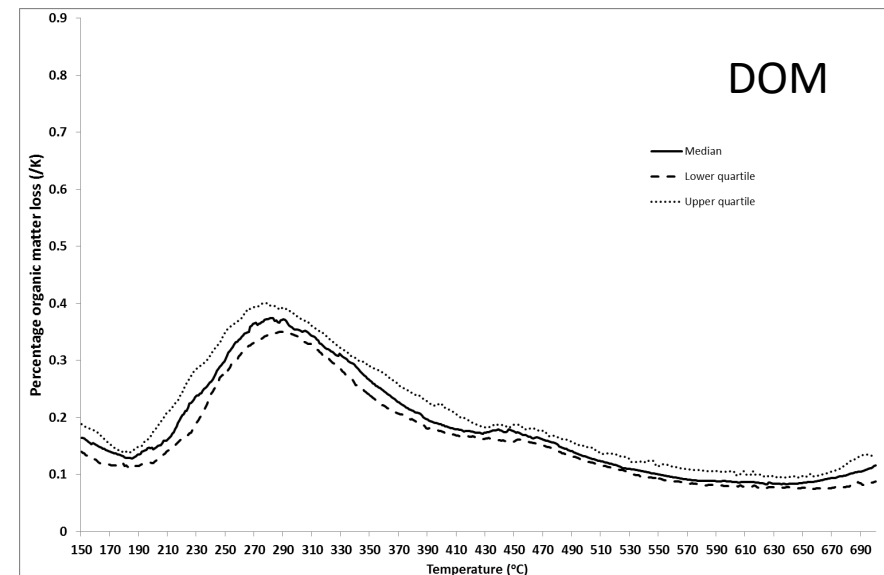
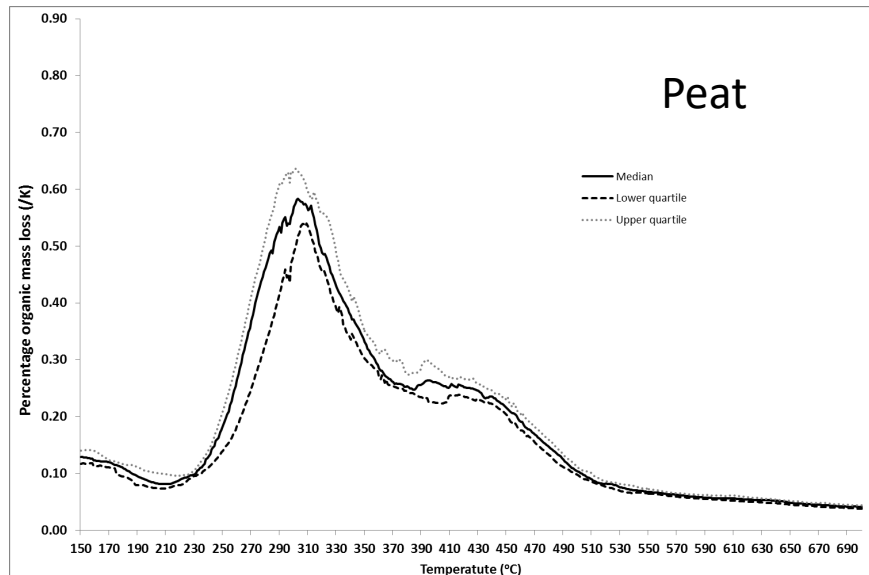
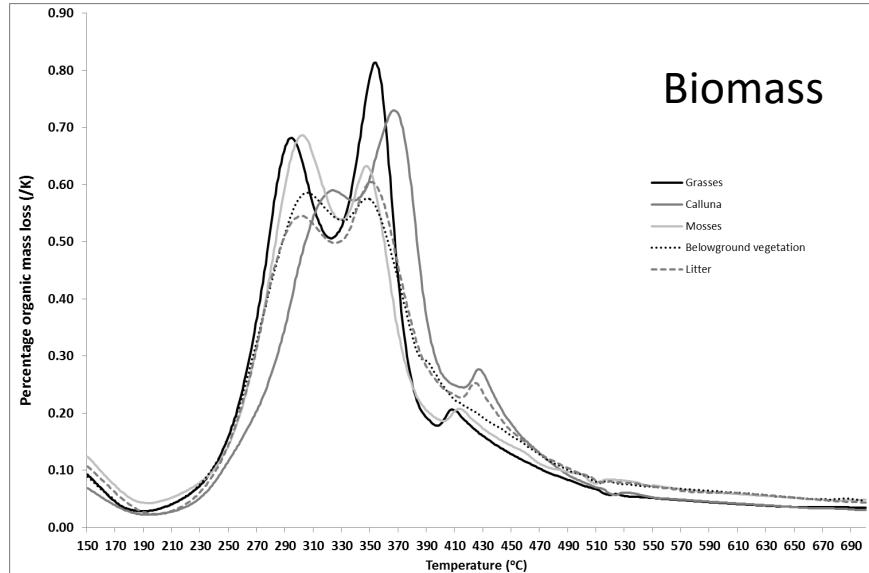
Mobile DOC and fluvial export promotes a relatively open pore water system that drives further chemical reaction in the organic matter.

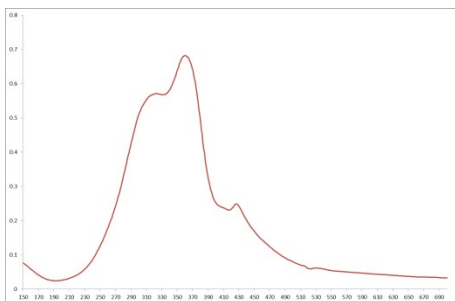


VS.

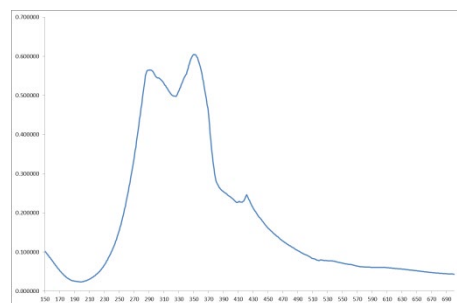


TGA traces



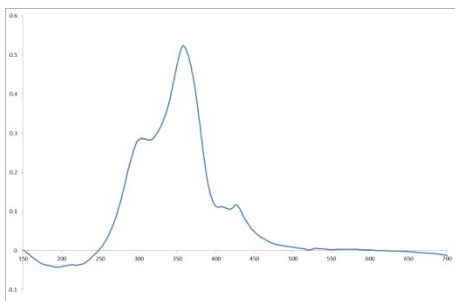
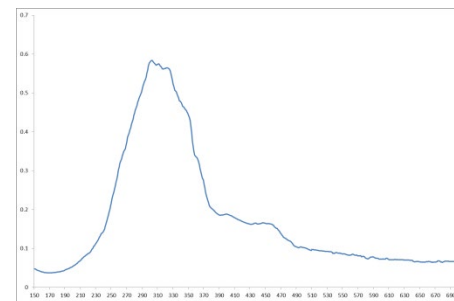


Biomass

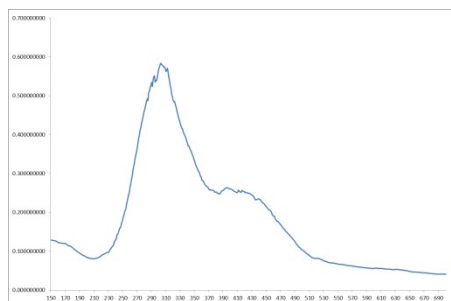
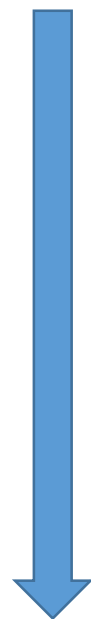


Litter

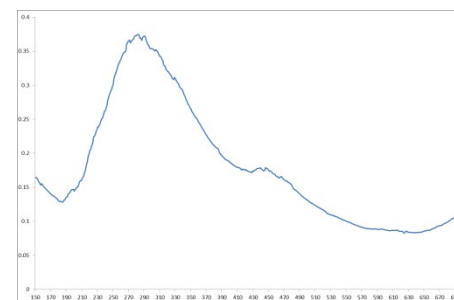
POM



The bit that must
have been lost



Deep peat
(1m)



DOM