HUMBOLDT-UNIVERSITÄT ZU BERLIN

Soil physical properties of organic soils in Germany and their relevance for the climate reporting

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Background

The carbon cycle in soils is mainly influenced by:

- Soil type,
- Climate,
- Land use,
- The presence or absence of water.

Due to soil development, each soil type has specific properties which influence the gas and water dynamics in soils.

In the context of climate-related issues, it is necessary to take detailed soil properties into account to:

- Optimize modeling approaches,
- Produce more precise input data for carbon budget calculations,
- ….

Background

potato growing on a cutaway bog (Lower Saxony)

Background

pasture on paludification mires (near Berlin)

Background

Interior delta: Spree river near Berlin

“pristine” bogs in the Alps

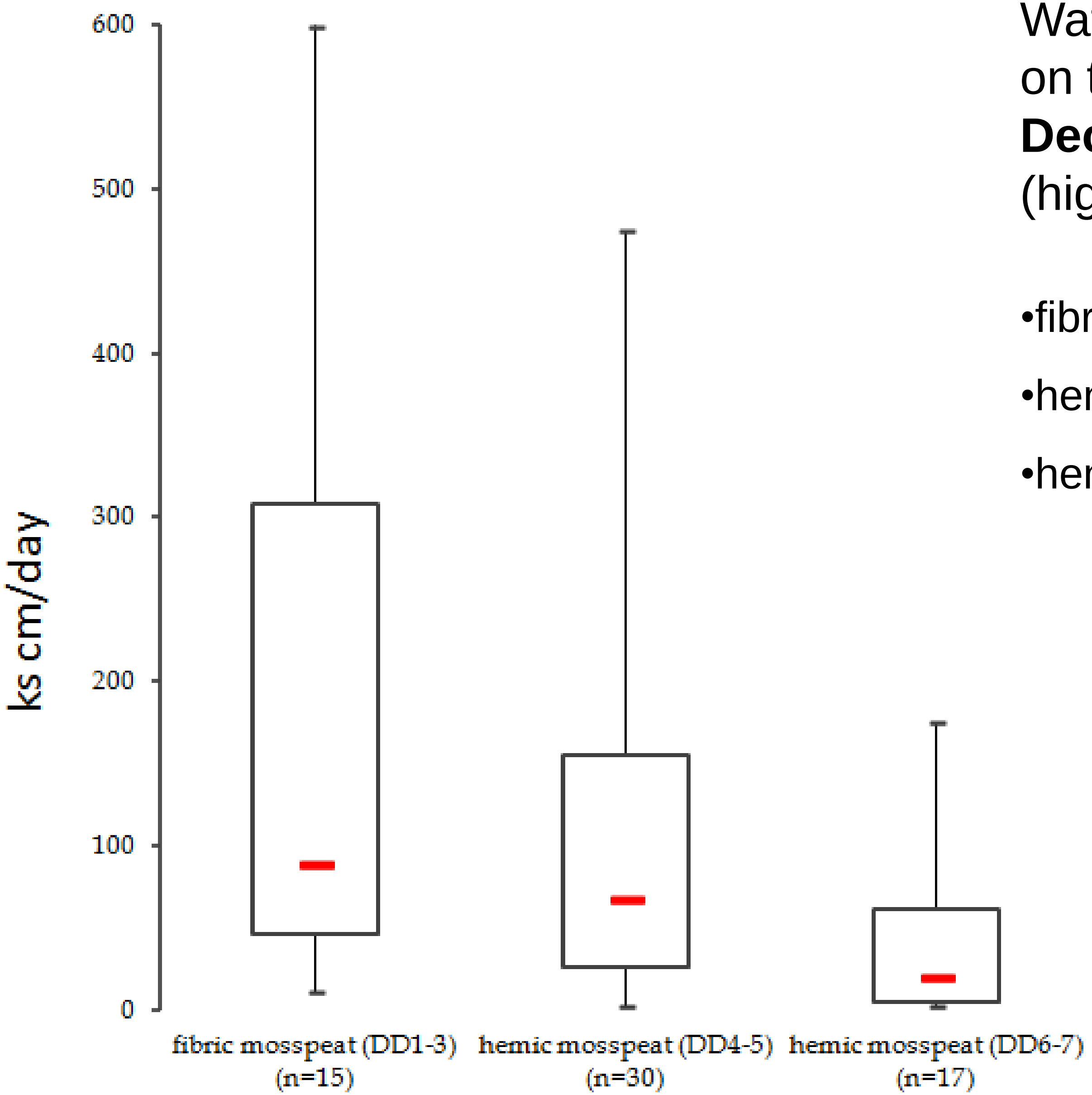
Sampling design / Methods / Aim

1. Sampling design
   - 13 test sites around Germany
   - 49 soil profiles,
   - 620 soil samples (disturbed and undisturbed).

2. Analyses of water conductivity, water retention, bulk density and main chemical parameters

3. Evaluation of these soil properties according to their climatic relevance

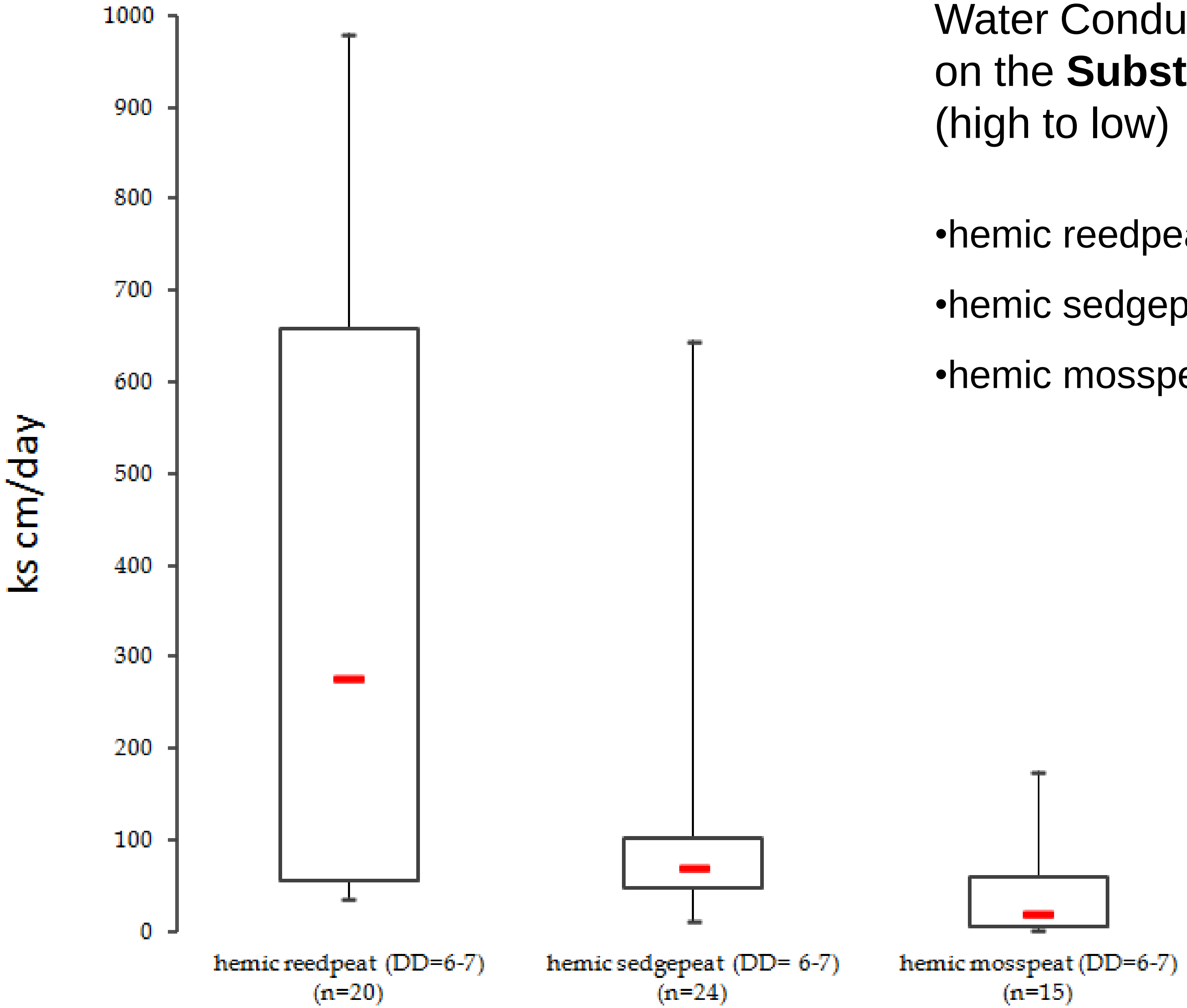
Results- water conductivity



Water conductivity depending on the **Degree of Decomposition** (DD) (high to low)

- fibric mosspeat DD1-3
- hemic mosspeat DD4-5
- hemic mosspeat DD6-7

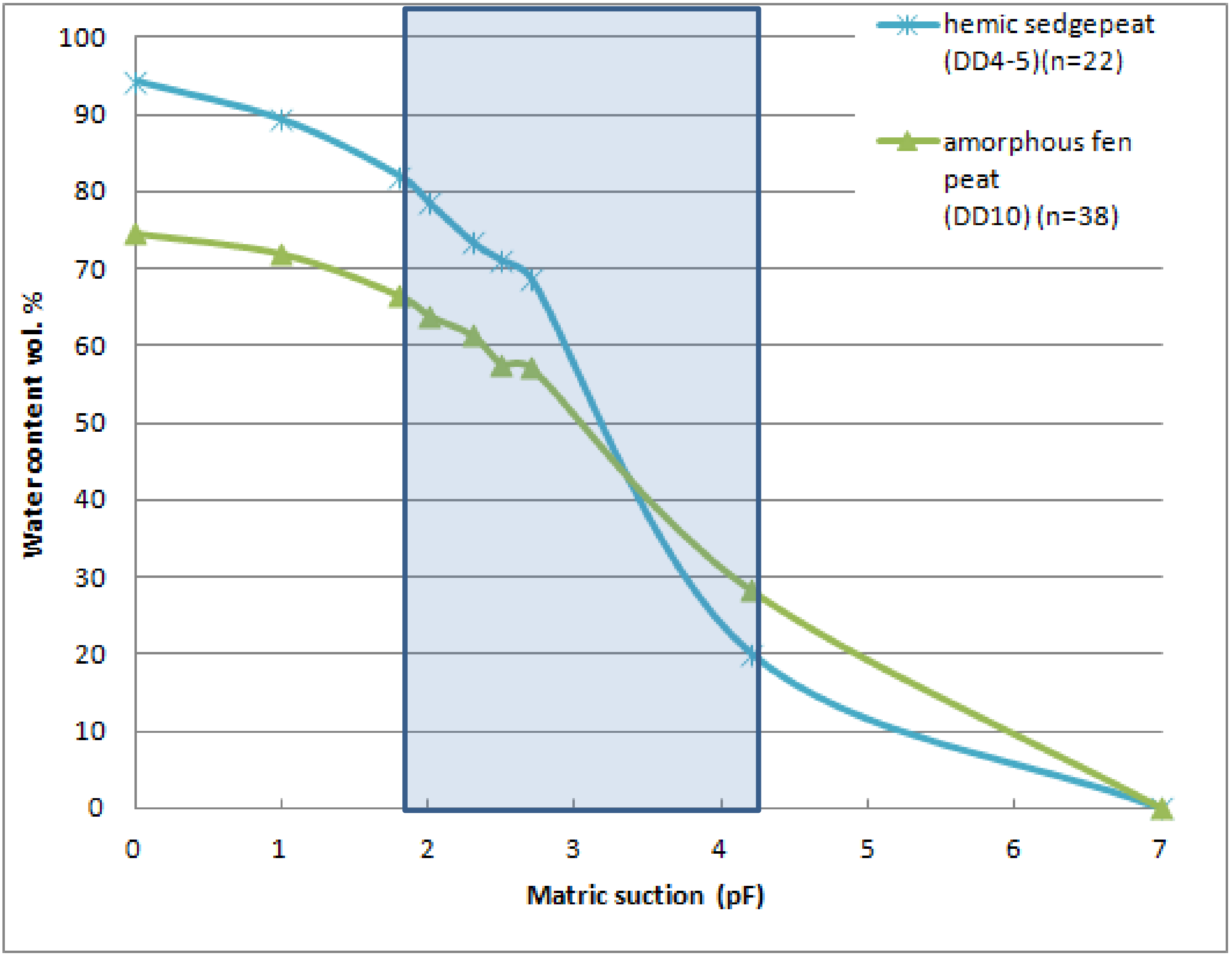
Results- water conductivity



Water Conductivity depending on the **Substrate**
(high to low)

- hemic reedpeat (DD6-7)
- hemic sedgepeat (DD6-7)
- hemic mosspeat (DD6-7)

Results–
pore space distribution/ water retention



hemic sedge peat (DD4-5)

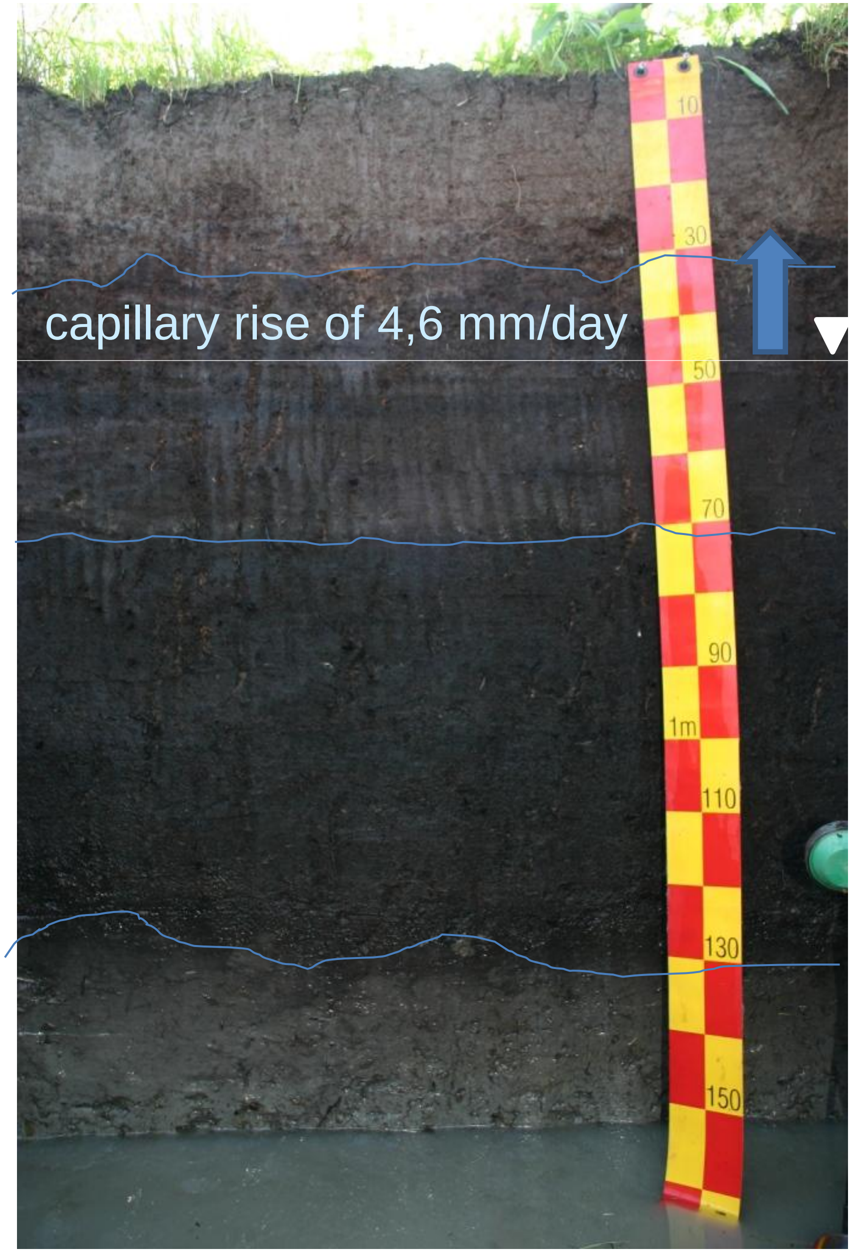
- high total pore space
- low substance volume
- high available water capacity
- 62% medium pores

amorphous fen peat

- lower total pore space
- higher substance volume
- lower available water capacity
- 40% medium pores

Use of measured data- estimation of water dynamics

sapric Histosol:



Earthified topsoil
amorphous peat

Reductive subsoil
hemic sedge peat (DD4-5)

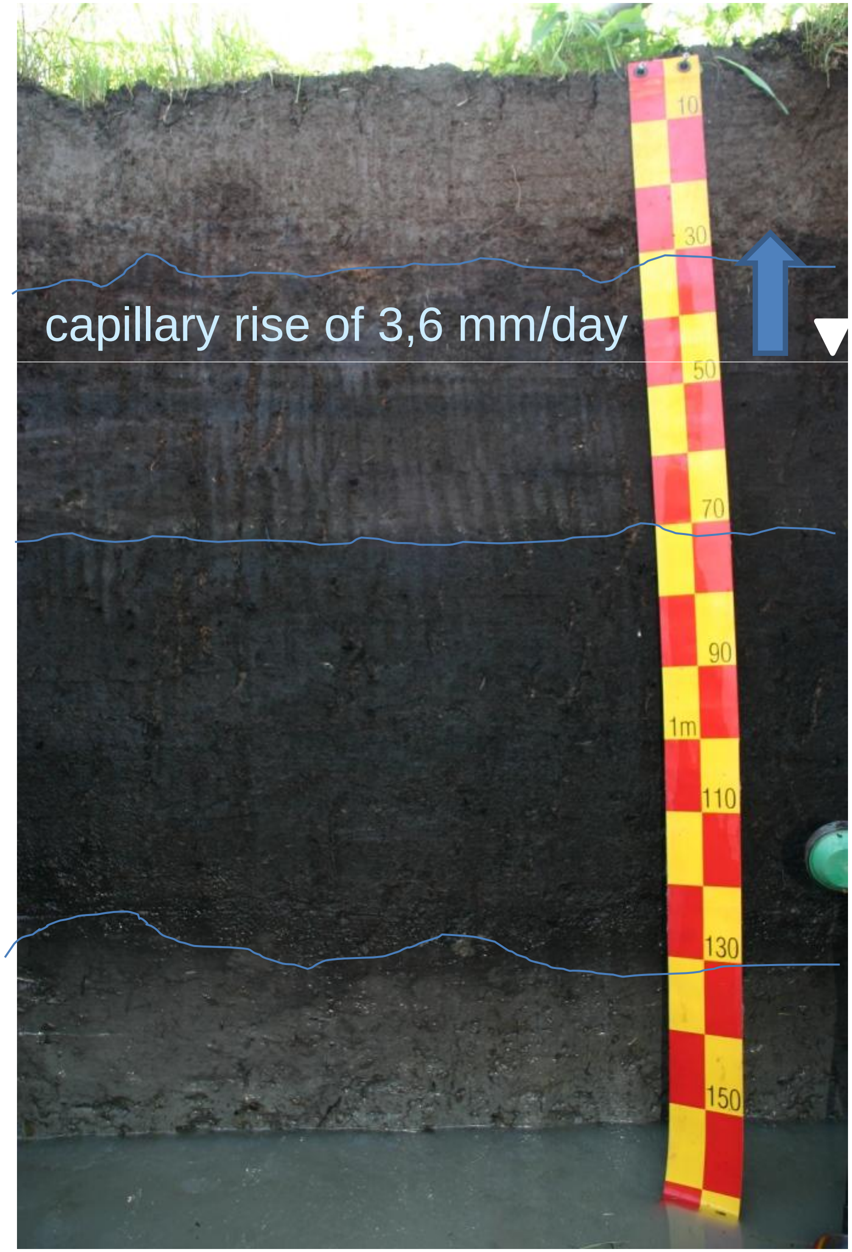
Reductive subsoil
hemic sedge peat (DD3)

Organic clay (Gyttia)

Input data for capillary rise: estimation:
water conductivity, pF, bulk density

Use of measured data- estimation of water dynamics

sapric Histosol:



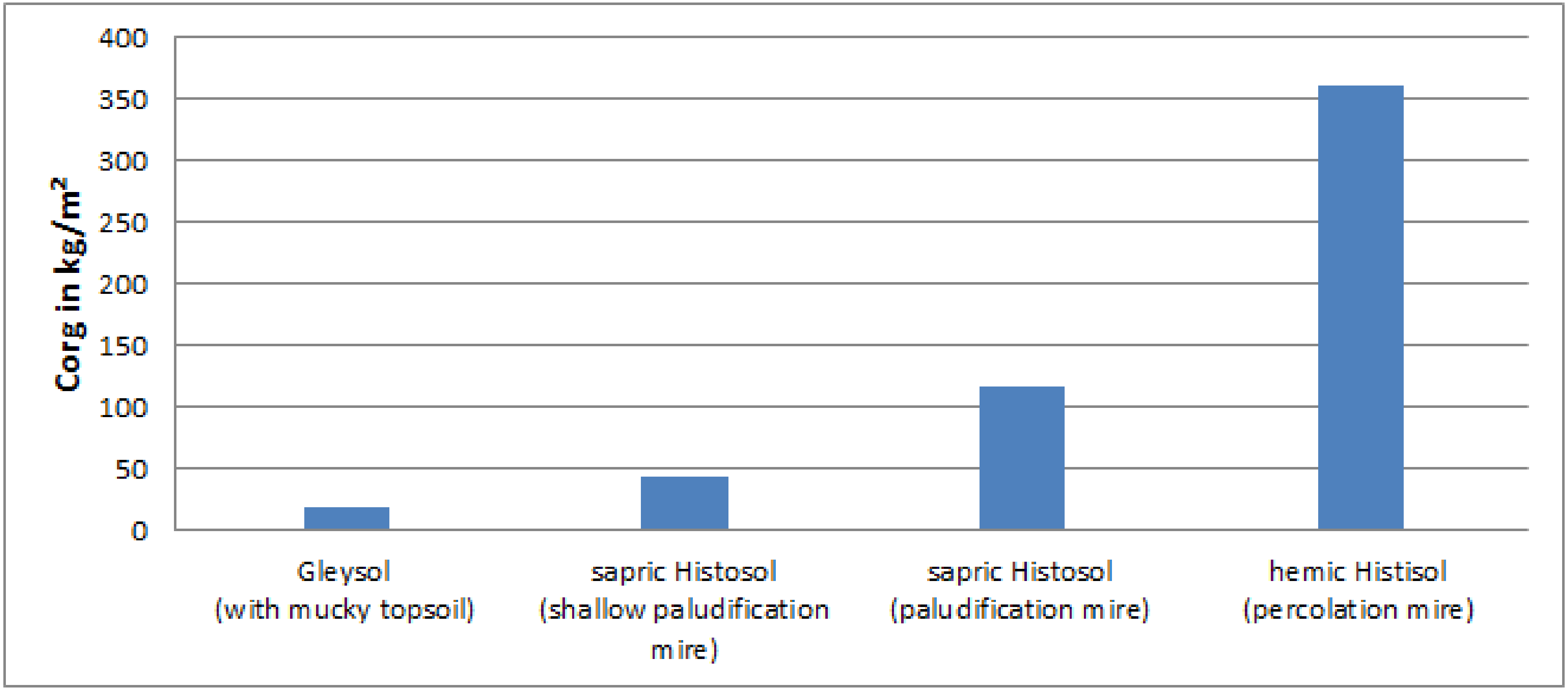
Earthified topsoil
amorphous peat

Reductive subsoil
hemic sedge peat (DD3)

Organic clay (Gyttia)

Input data for capillary rise:
estimation:
water conductivity, pF,
bulk density

Use of measured data- carbon budged calculation



Taking stratigraphic and pedogenic differences into account leads to more precise carbon budged calculations

Conclusions

For climate reporting issues, it makes sense to take stratigraphy and pedogenesis into account because:

- it leads to a better understanding of the soil carbon turnover,
- it could optimize modeling approaches (gas flux and hydrological),
- it allows more precise carbon budget calculations.

Thank you very much
for your attention!!

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