Ring test for measuring soil hydraulic properties
Remarks and methodical innovations

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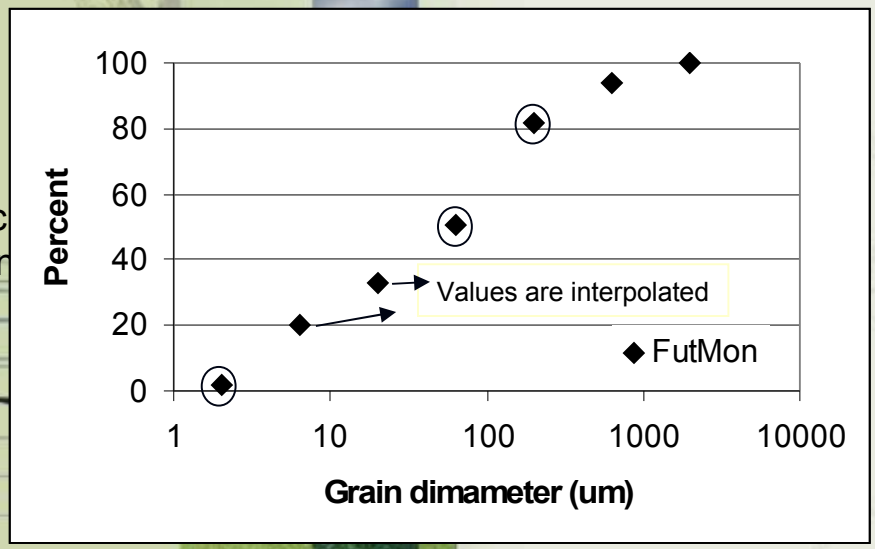
Content:

- Soil preparation
- Evaluating the results
- Methodical innovations of the Evaporation method
- Conclusions

Workshop: Ring test for quantifying soil hydraulic properties, Warsaw, 12./13.10.2009

Texture

Clay: 9.5%
Silt: 48.6%
Sand: 41.2%



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Slu acc. to German soil classification KA5

Dry bulk density_Soil preparation

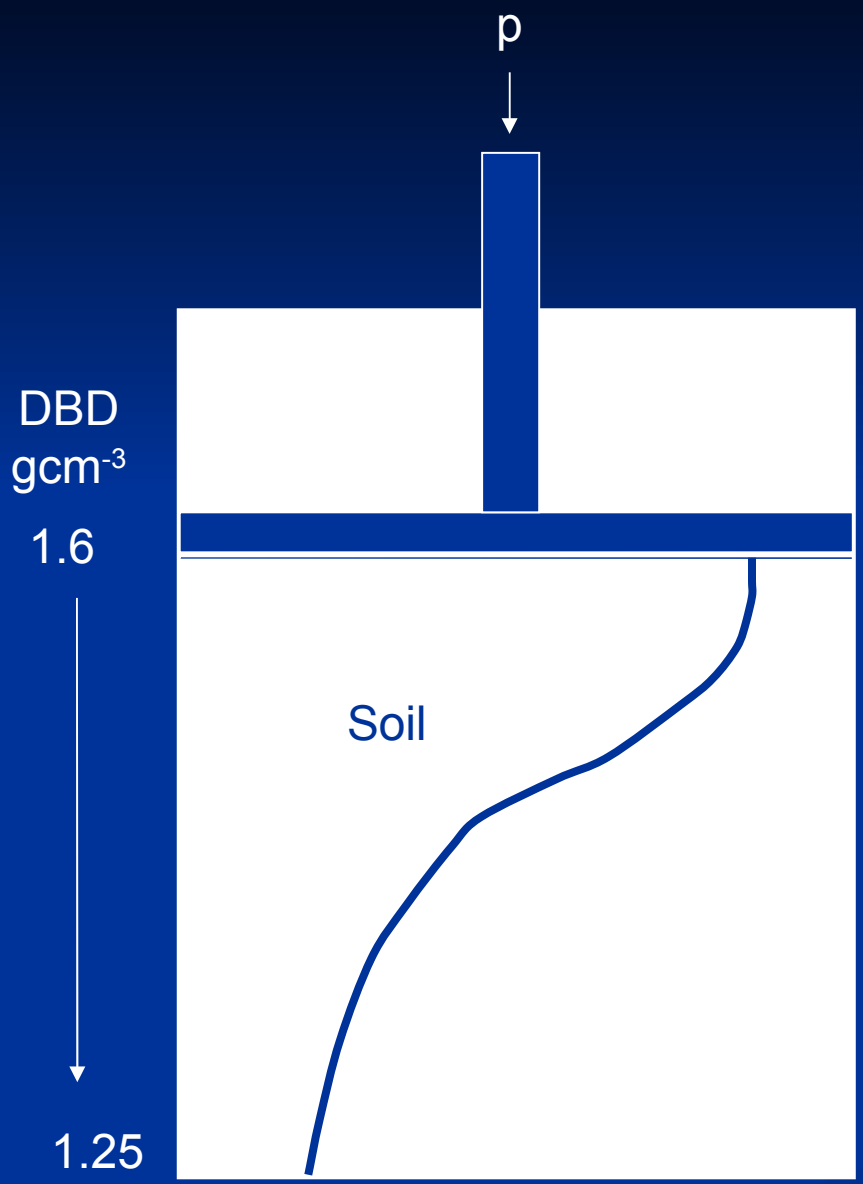
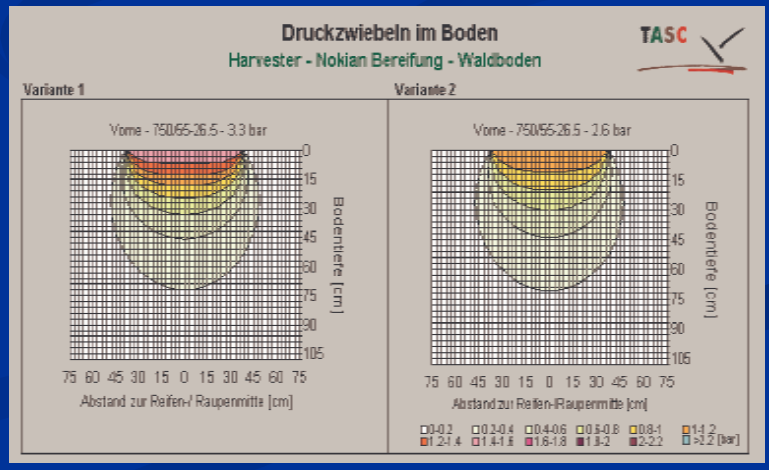
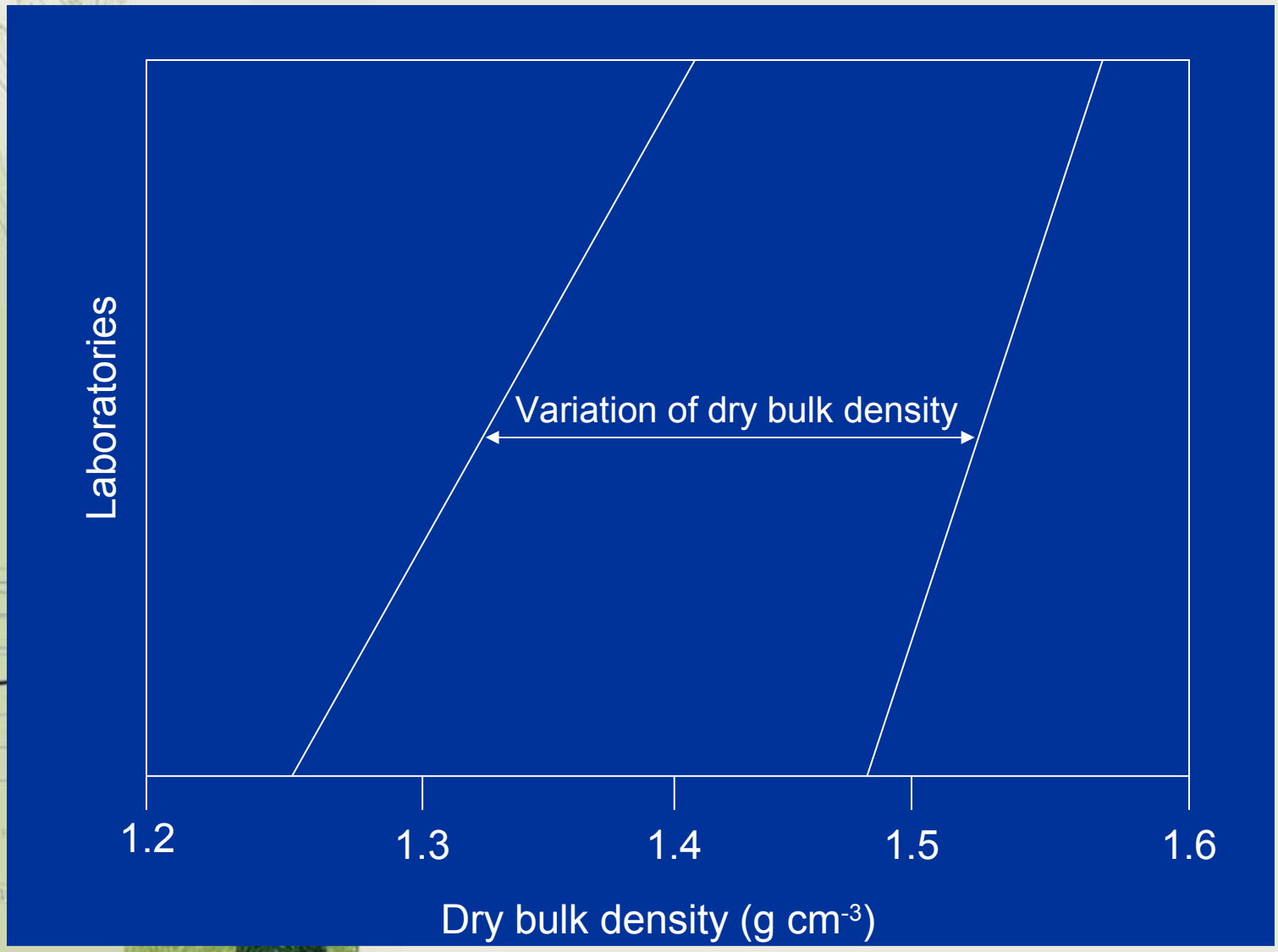


Photo 1: Hydraulic compression system driven by the PTO of a tractor

Pressure distribution under load

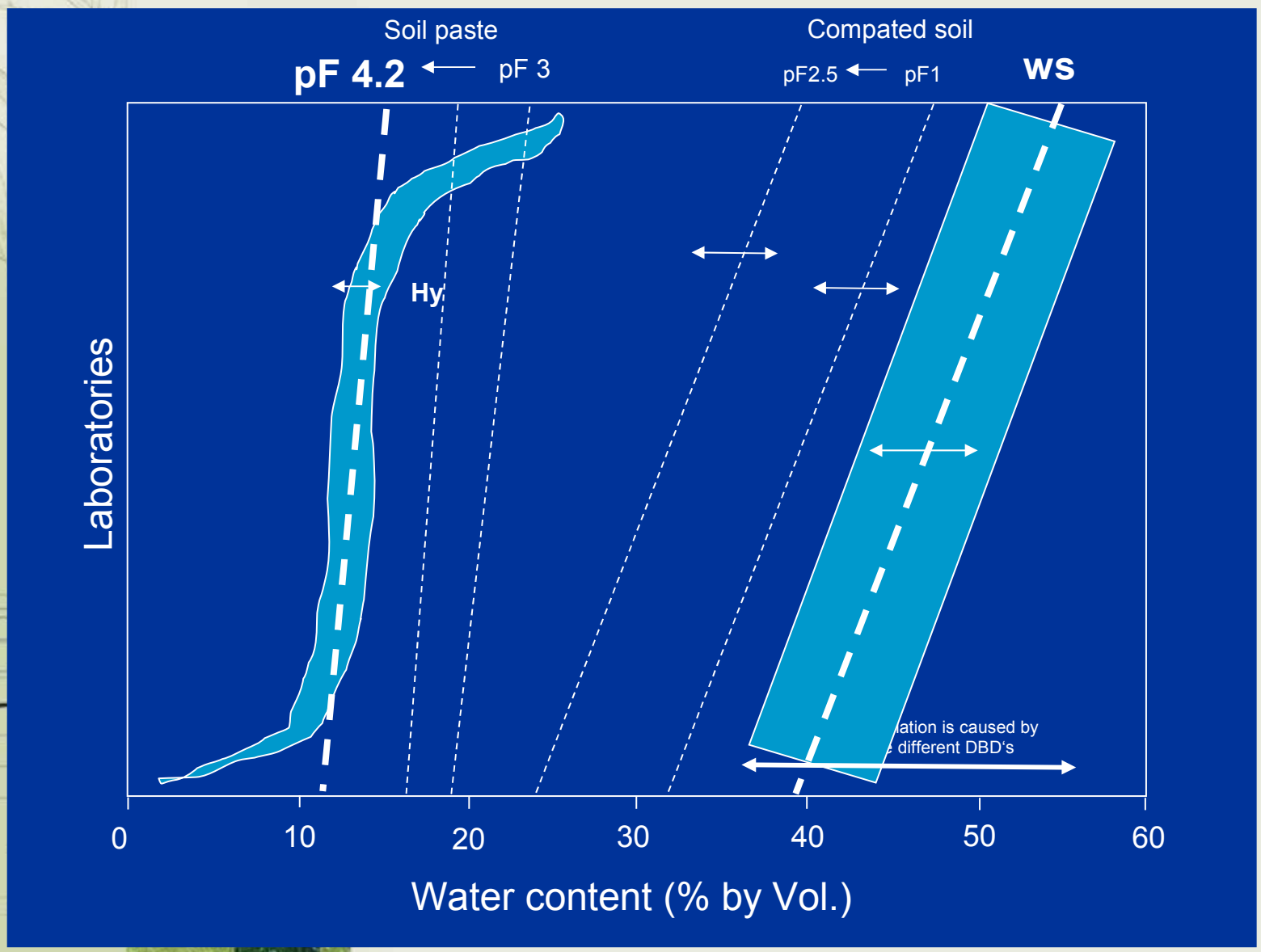


Variation of dry bulk density



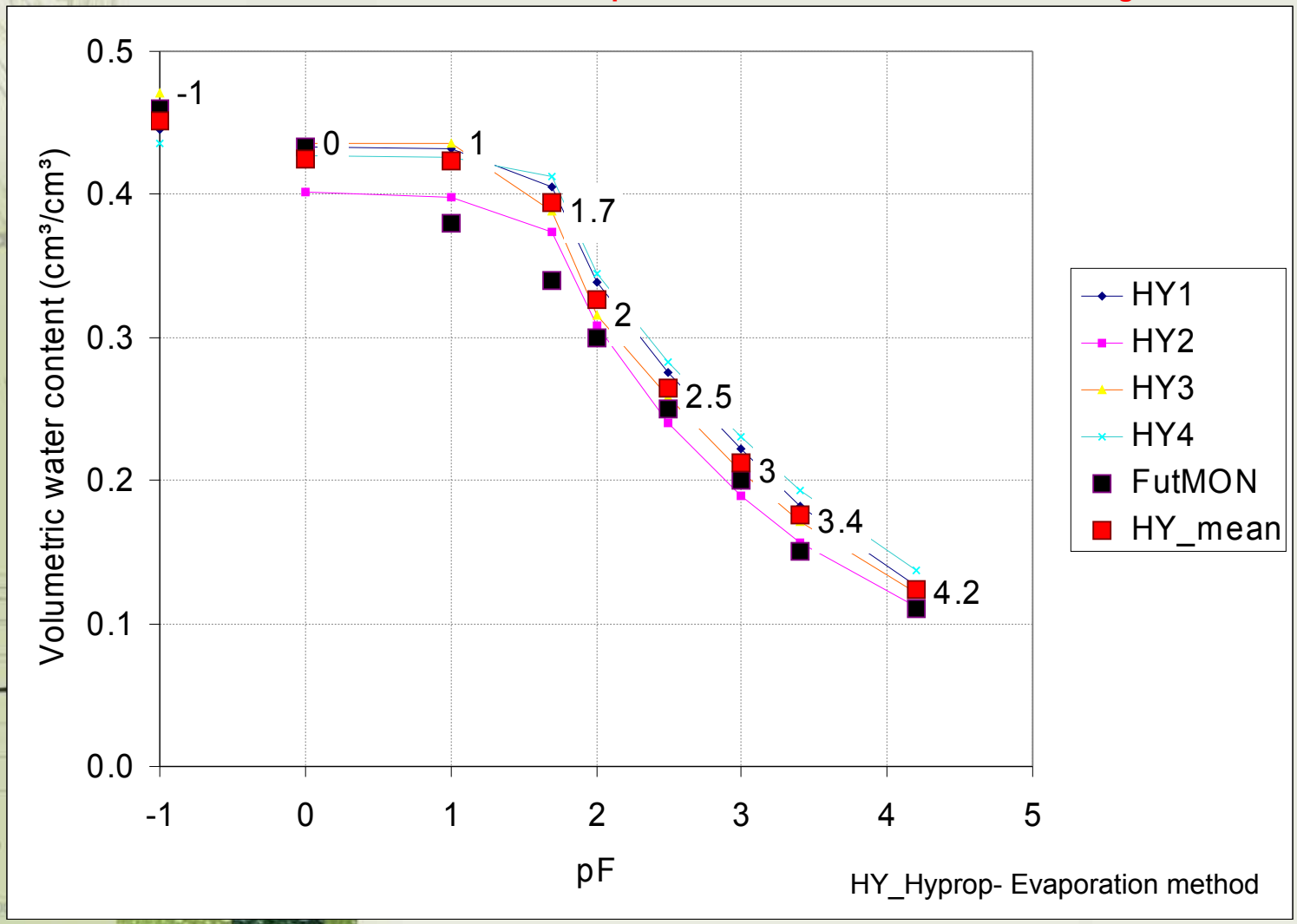
The variation is much greater than at any natural site!

Variation of water content measurements



Water retention relationship

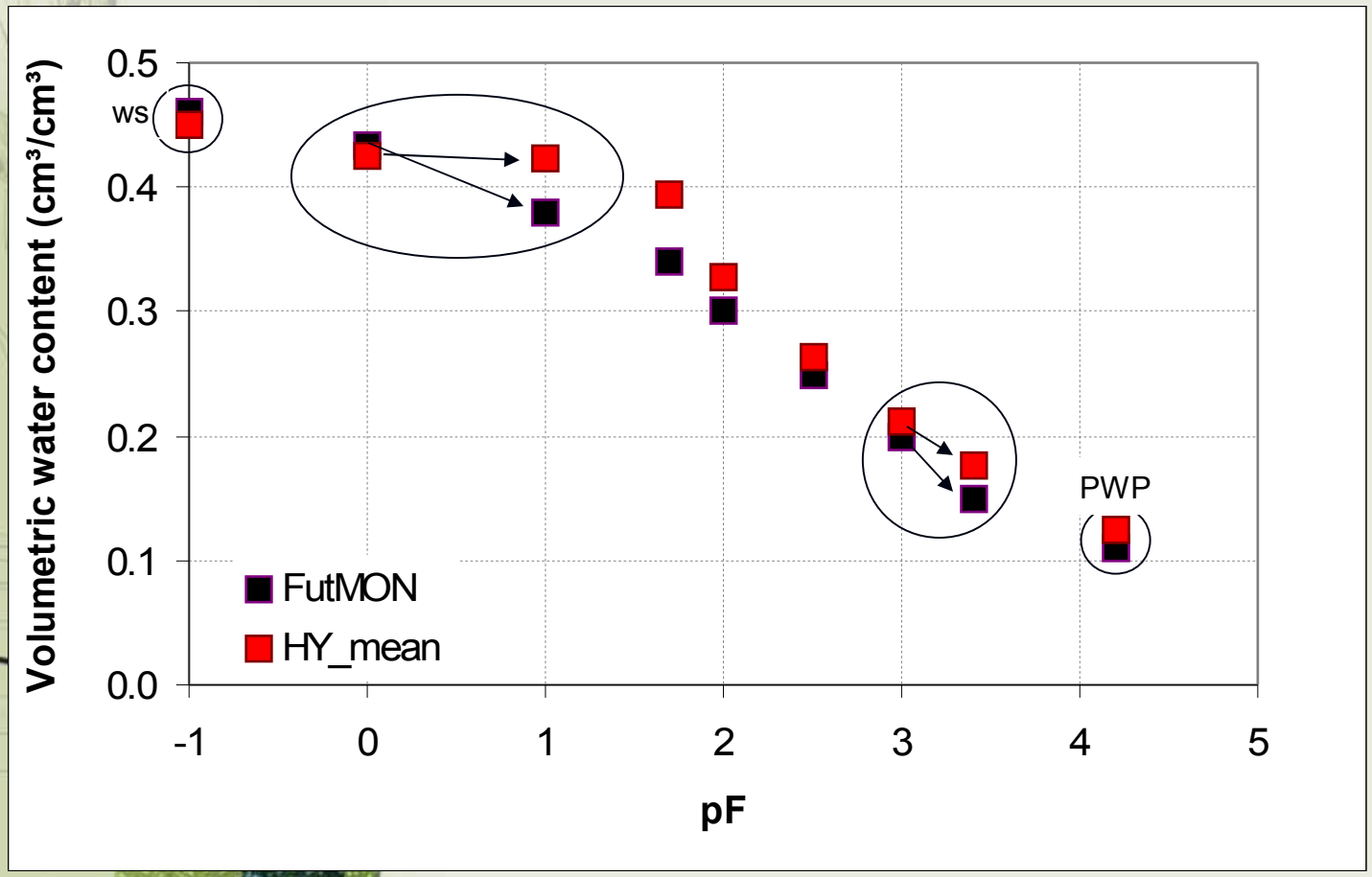
HYPROP and mean FutMon are comparable. Differences have to be investigated!



Slu (Uls) (KA5) WC pF4.2 = 11-12 % by vol

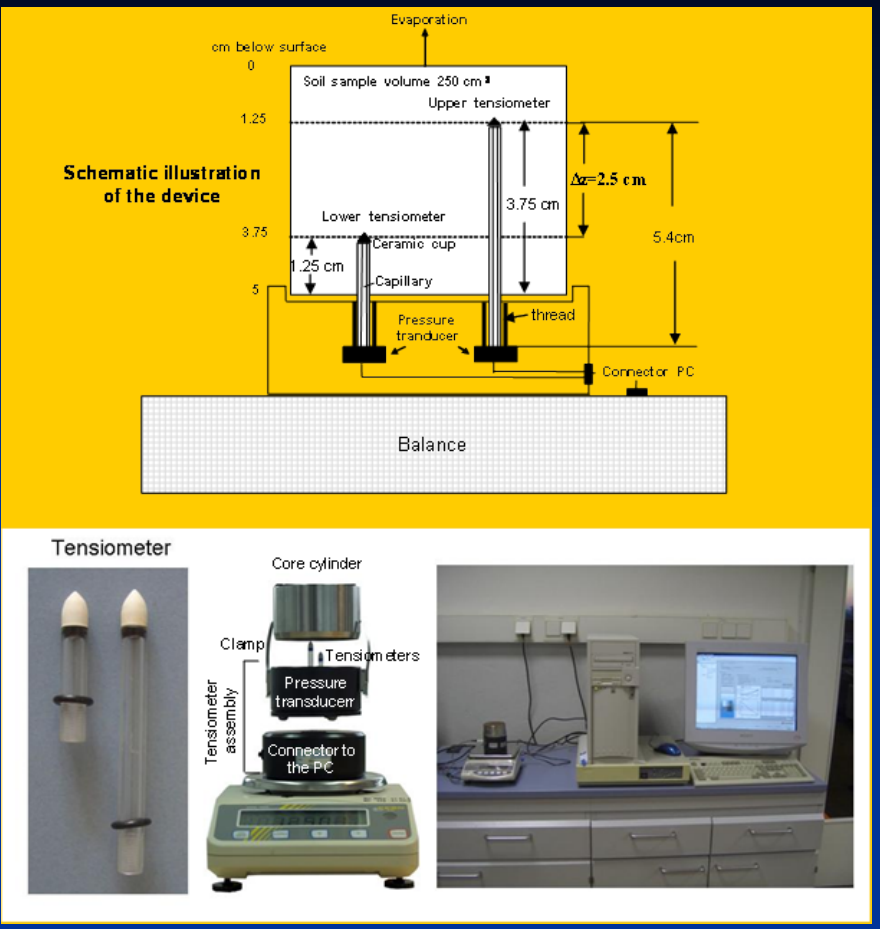
Water retenion Relashionship

Comparison FutMon versus HYPROP



ws and PWP are generally fixed values

Evaporation method- Innovations

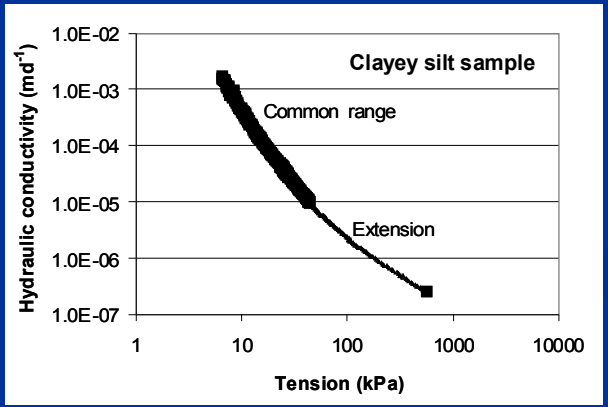


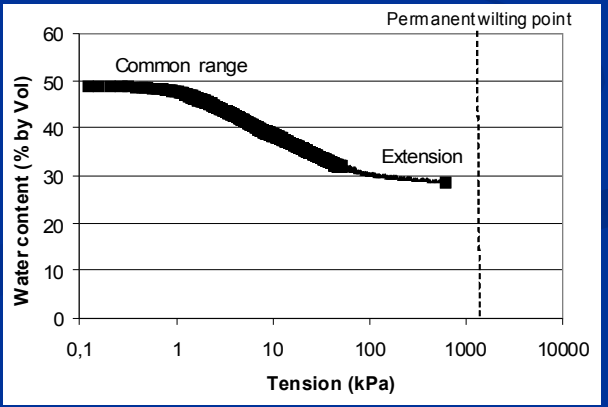
1. Evaporation functions- Weighing accuracy reduced *JPNSS 2006*
1. New tensiometers- Measurement extension 300 kPa *SSSAJ 2009*
1. Bubble point extension- Extension the range to 800 kPa *JPNSS 2009*

Properties:
- Water retention function
- Hydraulic conductivity function

Measurement range
- 0 – 800 kPa (pF 3.9)

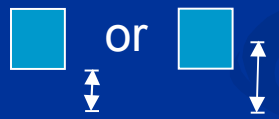
Measurement time
- 3 (clay) to 8 days (sand and peat)





Conclusions – open questions

- HYPROP and mean FutMon were quite comparable. Differences have to be investigated!
- Natural undisturbed soils are better than artificial compaction for this ring test.
- For steady-state procedures: How is the water potential when steady-state is achieved? Which potential is charged?



- HYPROP: Dynamic effects have to be analyzed
- Do we have evaporative water loss (sand box) within the measurement time?
- A water potential of 1hPa is unrealistic for steady-state procedures, because the average gravitation potential is 2.5 hPa.

Thank you