

# Methods of soil (hydro-) physical measurement at NIBIO

Attila Nemes

NIBIO, Norwegian Institute of Bioeconomy Research, Ås, Norway

Gembloux, 30 January, 2019

Sample **sizes** used:



100cm<sup>3</sup> – for bulk density (in some projects, 37mm in height)

200cm<sup>3</sup> – for WRC, K, BD (custom built to fit UGT ku-pF, but be suitable for X-Ray tomography, aluminium, 60 mm height)

250cm<sup>3</sup> – for WRC, K, BD (steel, 60mm in height, standard with UGT ku-pF)

Cca. 900cm<sup>3</sup> – for K<sub>sat</sub> by some projects (plastic, 100mm height)

## Measurements in-house - WRC:

- Sandbed (Eijkelkamp)  
(0-100 hPa)



- ku-pF (UGT)  
(50-1000 hPa)



- pressure chambers (Soil Moisture)  
(1,3,15 Bar)



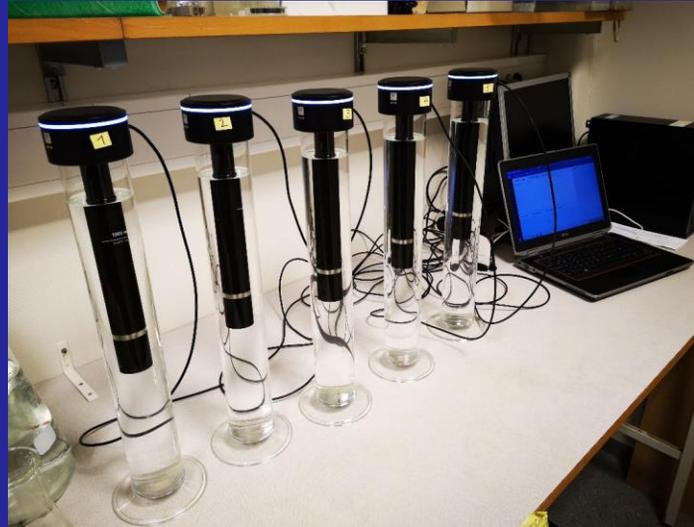
## Measurements in-house – hydraulic conductivity:

- Saturated hydraulic cond.  
(constant head, self-built)
- Near-saturated hydr. cond.  
(mini-disk infiltrometer,  
Meter/Decagon)
- Unsaturated hydr. cond.  
(ku-pF, UGT)



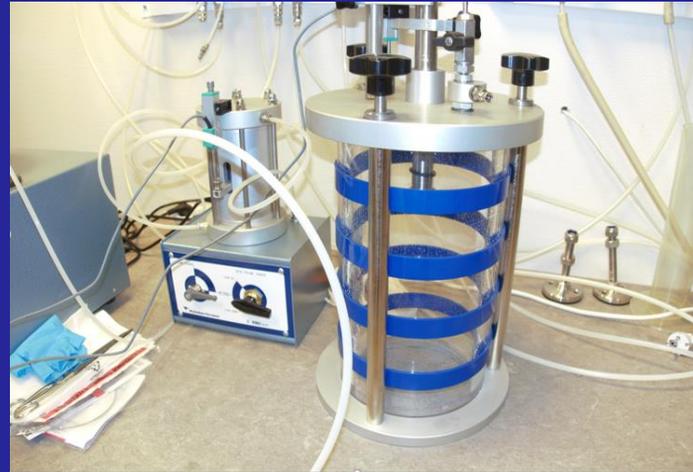
## Measurements in-house – basic physical props.:

- Particle size distribution (pipette, PARIO)
- Bulk density (core-method, oven-drying)
- Organic carbon (CHN analyzer - Elementar Vario EL)
- Aggregate size analysis (wet sieving)



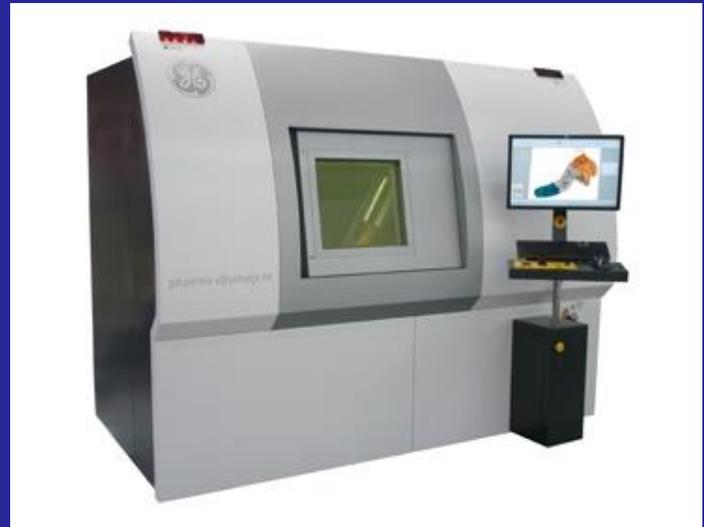
New acquisitions – under test:

Sheer stress - Triaxial Test System (Controls Group)



## Externally provided:

- WP4C (Dewpoint Hygrometer)  
(Meter Group, Rutgers University)
- X-Ray tomography  
(GE phoenix v|tome|x m,  
Uppsala, Sweden)



## Some concerns we ran into:

- Sample sizes?
- Bottom boundary?
- Degree of saturation achieved/assured/checked?
- Duration of measurement (e.g. with Ksat, some labs read early (low risk of internal rearrangement) vs. late reading (steadier measurement))



Thank You!

[attila.nemes@nibio.no](mailto:attila.nemes@nibio.no)