



WATER BALANCE IN ECOSYSTEM - MEASURING AND CONTROL TECHNOLOGY

Conference at NAIK MGI Gödöllő

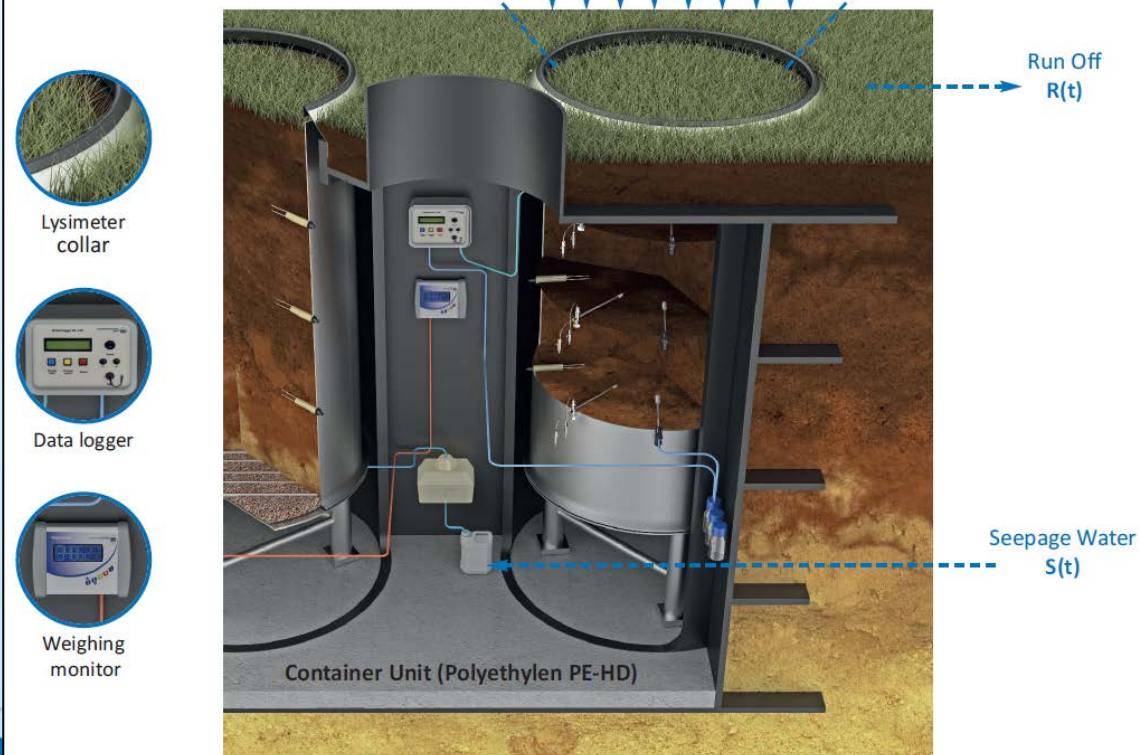
Lysimeter – unique equipment for complex measurment - applications

- Lysimeters are used to:
 - Determine the water balance under natural or controlled conditions
 - Monitor the correlation between the soil, environmental influences and plant parameters such as root growth or harvest
 - Monitor the movement, the storage and the degradation of contaminants in the soil and the soil water

Water balance and lysimeters

Waterbalance:

$$\Delta W(t) = P(t) - ET(t) - S(t) - R(t)$$



- Soil column is cut off from its surroundings to enable an insight
- Boundary conditions are influenced as little as possible

Precision weighing system



- Load triangle with load cells



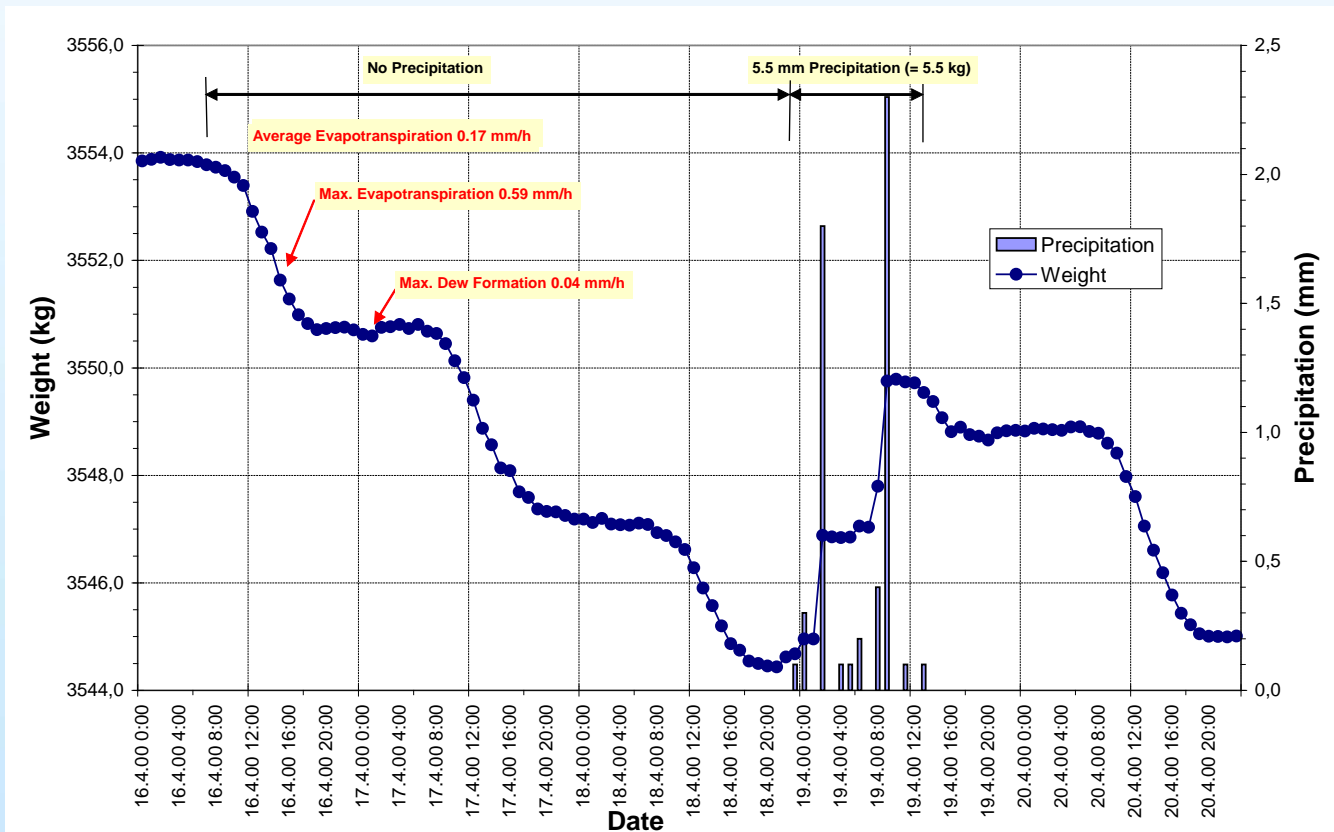
- Weighing monitor

Precision weighing system

- Total weight: up to 5,5t
- Resolution: 100 g
- Accuracy: 10 g

- All kinds of precipitation can be seen in the weighing data
 - For a lysimeter with a surface area of 1 m² 1 mm rainfall accords to 1 L and means a weight increase of 1 Kg
 - Dew as a weight increase in the early morning hours and also rime in winter

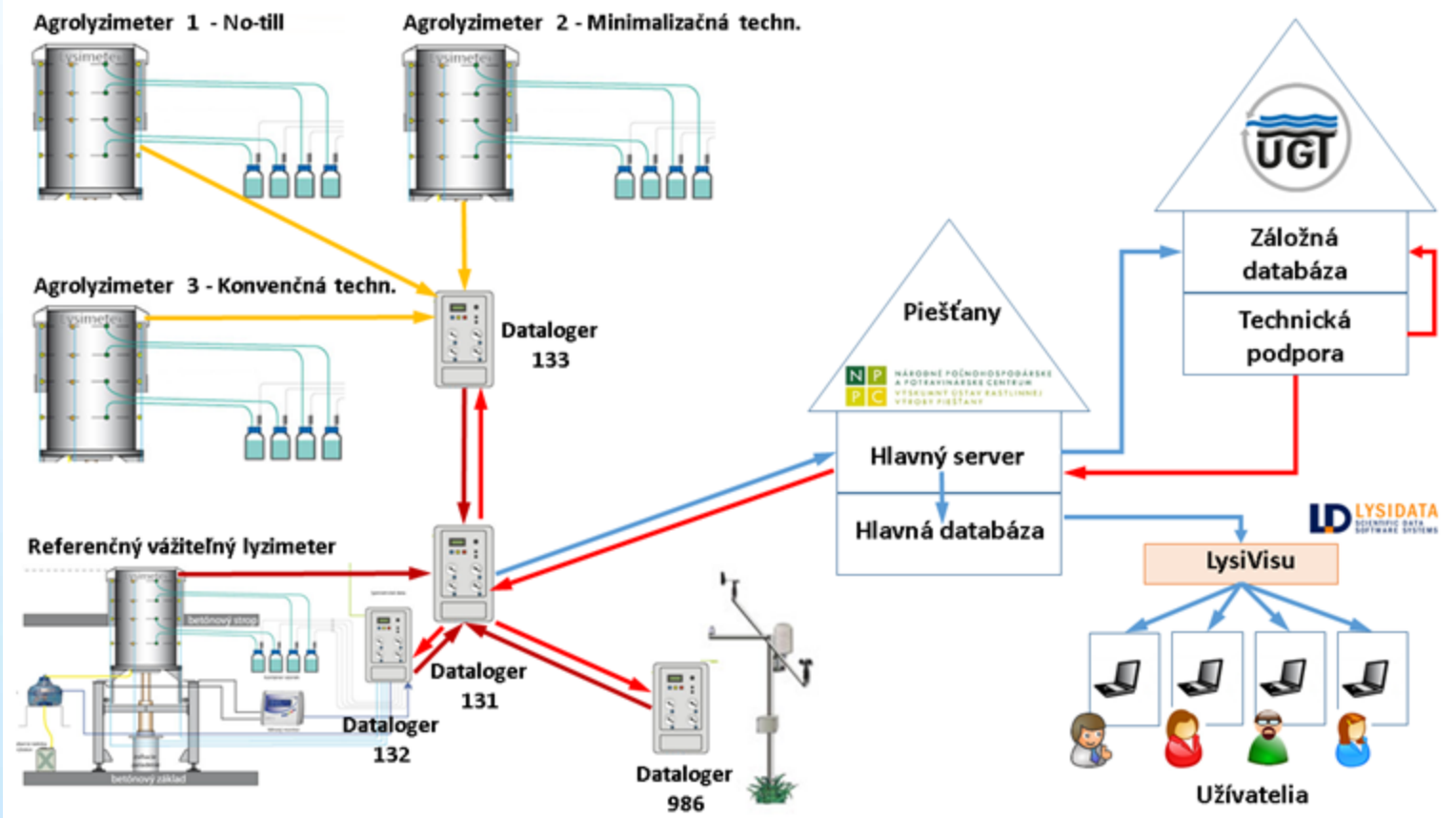
Precision weighing system



- Example of the diurnal weight change of a gravitation lysimeter planted with grass



Excavation of soil monolith



Lysimeter tensiometer TENSIO 160



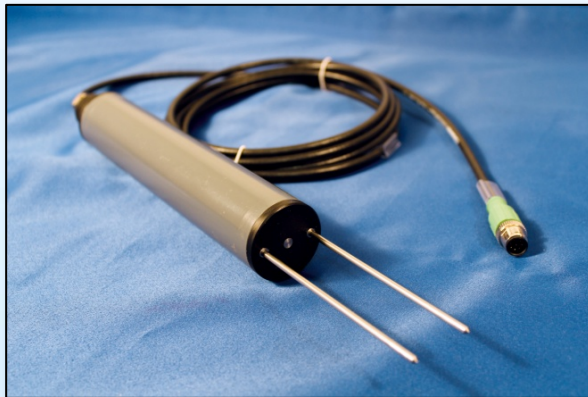
- Designed for the use in lysimeters
- Installed horizontally
- Can be refilled and maintained in horizontal position



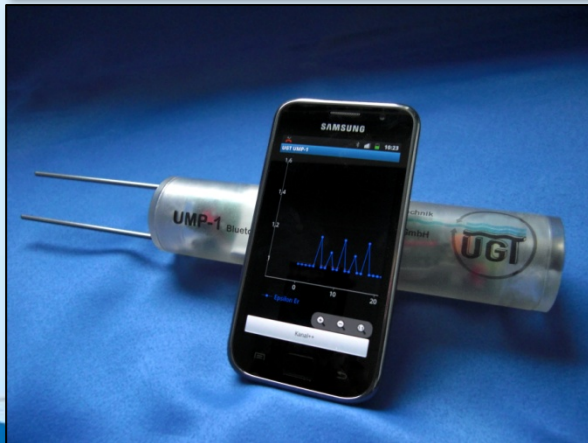
No deinstallation necessary!

- ✓ Measurement doesn't need to be interrupted
- ✓ Contact between soil and ceramic is not disturbed
- ✓ Soil bedding is not disturbed
- ✓ Automatic refill is possible

UMP-1 combined soil moisture, conductivity and temperature sensor



- Measuring range water content: 0 ... 100 %
- Measuring range permittivity ϵ : 0 ... 80
- Measuring range conductivity: 0,001 ... 5 mS/cm
Optional upgrade to 40 mS/cm
- Measuring range temperature: -20 ... +60

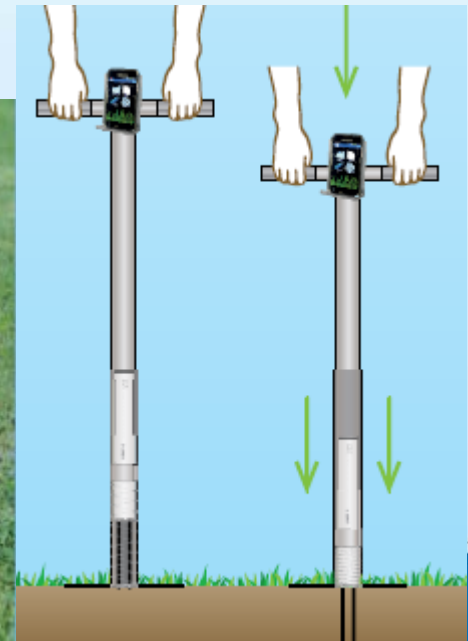


- Accuracy water content: $\pm 2\%$
- Accuracy conductivity : $\pm 1\%$
- Accuracy temperature: $\pm 0,2^{\circ}\text{C}$
- Measurement Volume: 1000 ml



Tensio 100
Very simple and friendly tool
to determine soil moisture

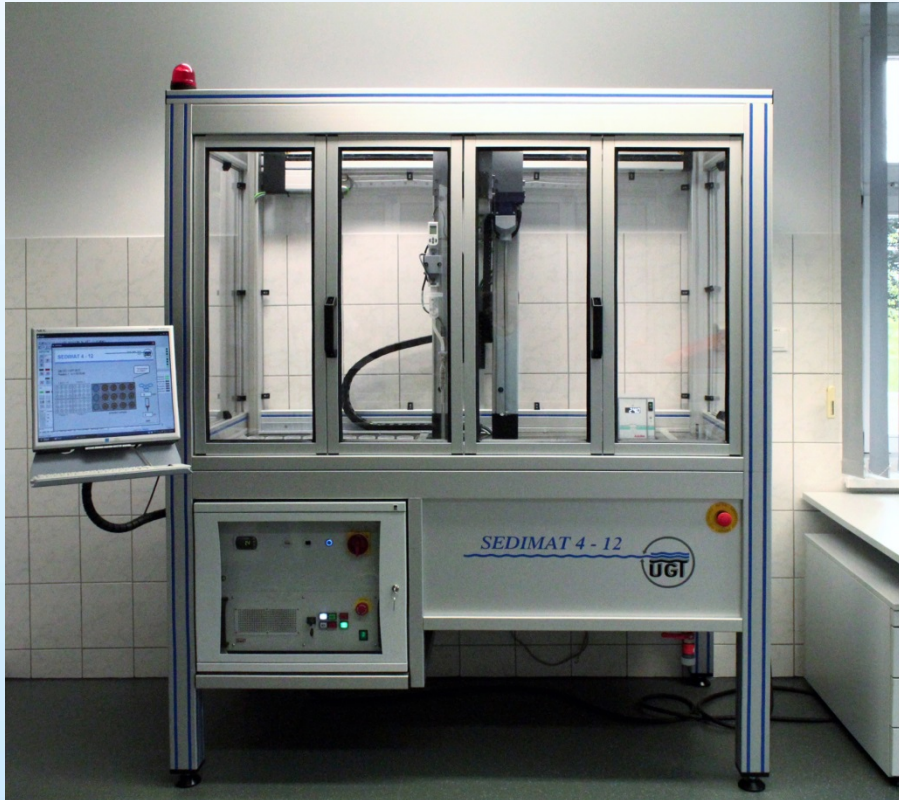
**New application of the UMP-1
for instantaneous measurement.
Smartphone based multi sensor system
for mobile determination of soil
hydrological parameters**





Ready to go Lysimeter - The Ready-To-Go lysimeter is instrumented with soil moisture probes and matrix potential probes which are connected to a data logger, as well as a compact climate station.

Sedimat



Laboratory apparatus to determine the particle size distribution in mineral soil

Ku-PF apparatus



Full automated
apparatus for 10
samples

technical Data

Soil sample ring volume:	250 cm ³
Cross section of the soil sample rings:	41 cm ²
Number of samples:	1 - 10
Cycle time of data acquisition:	10 - 40 min
Resolution of weighing:	0,01 g
Measurement range for ku value:	< 10 cm/d
Measurement range for tensiometer::	+100 ... -85 kPa
Accuracy of tensiometer:	±0,1 kPa



Hoodinfiltrometer
Is used to measure the hydraulic conductivity





Multilyzer

Is an online measurement system for the detection of selective groups of substances in the soil water in low concentration. NO_3^- , NO_2^-

Run off measurement system





Wind erosion measurement system



Thank you for your attention

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