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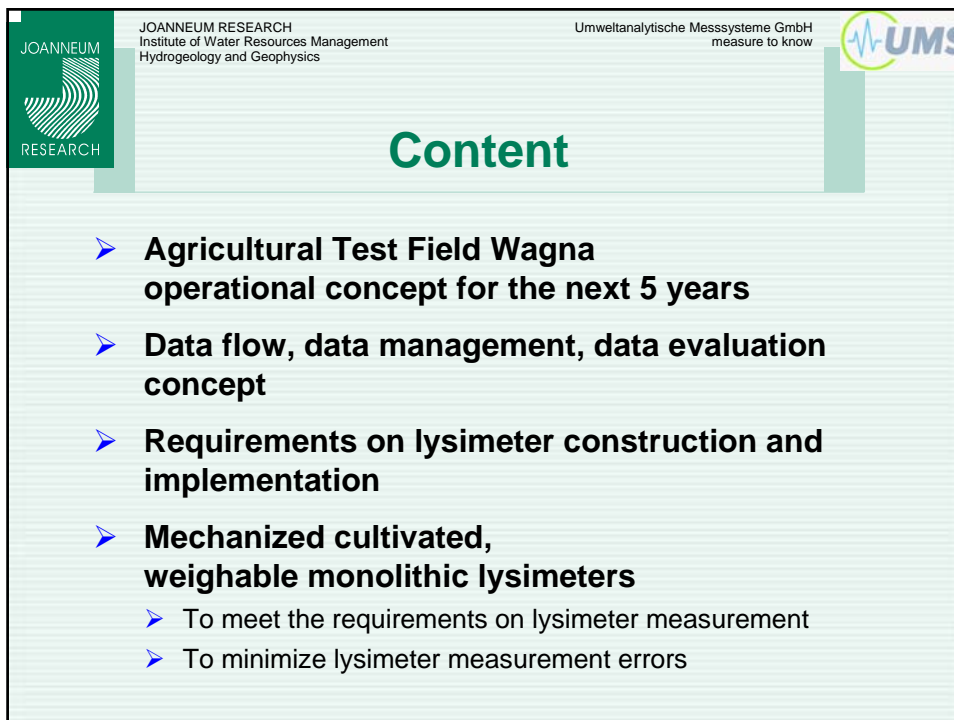
**Research station
Wagna – Austria**

UMS

**Mechanic Cultivated, Weighable
Monolithic Lysimeters**

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Dipl. Ing. (FH) Georg v. Unold**

11th Gumpensteiner Lysimeter Conference **Irdning, April 5th 2005**



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Institute of Water Resources Management
Hydrogeology and Geophysics

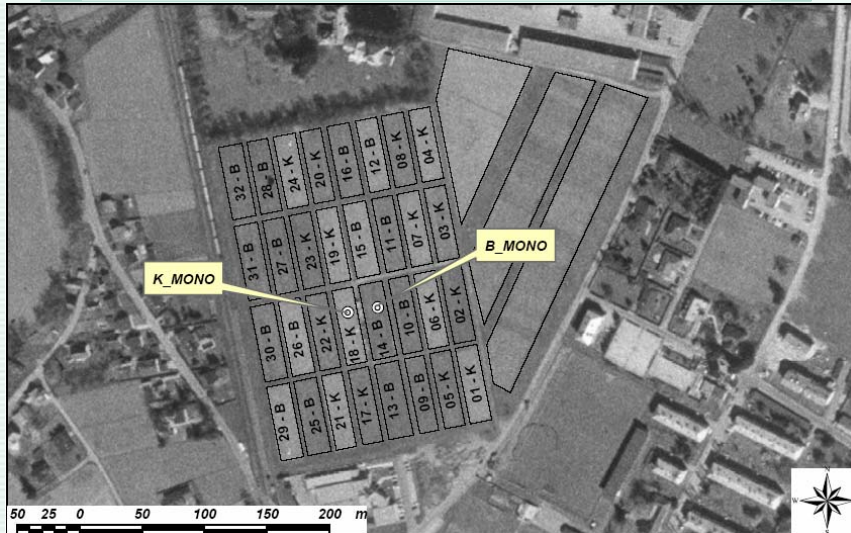
Umweltanalytische Messsysteme GmbH
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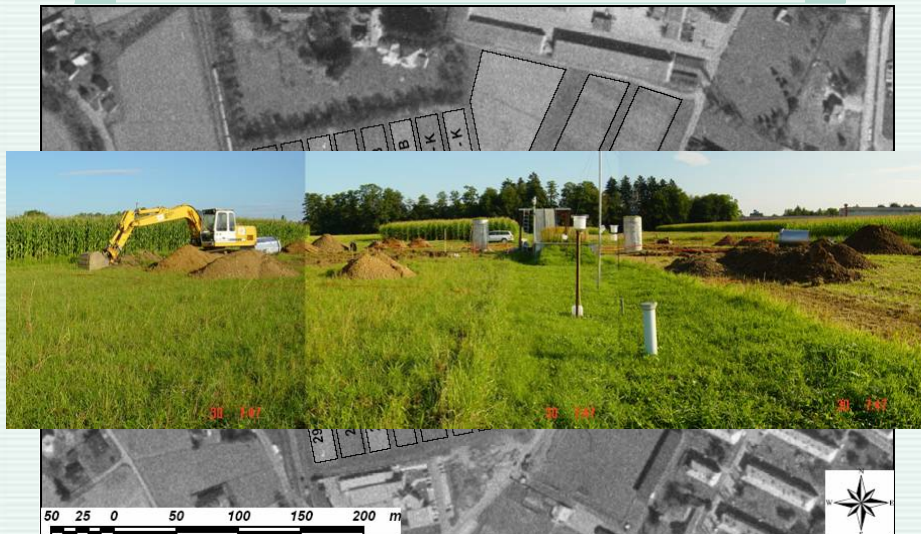
Content

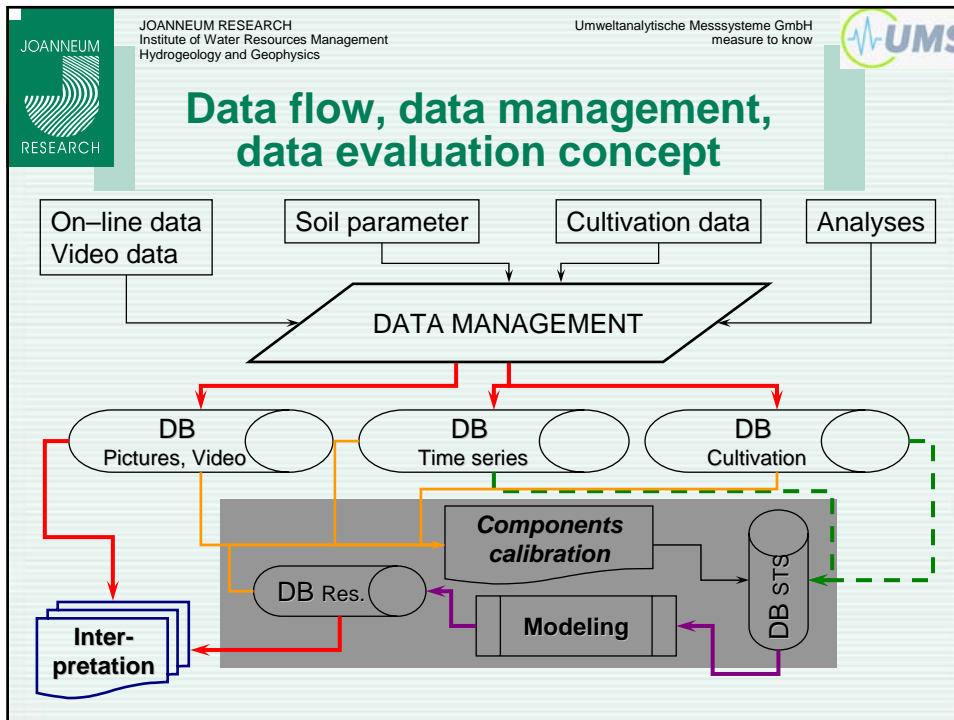
- **Agricultural Test Field Wagna
operational concept for the next 5 years**
- **Data flow, data management, data evaluation
concept**
- **Requirements on lysimeter construction and
implementation**
- **Mechanized cultivated,
weighable monolithic lysimeters**
 - To meet the requirements on lysimeter measurement
 - To minimize lysimeter measurement errors

Agricultural Test Field Wagna operational concept



Agricultural Test Field Wagna operational concept





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A new type of Lysimeters has to be developed

- **Precise weighing lysimeters installed in the field allowing mechanized cultivation**
- **Monolithic extraction (to a depth deeper than the hydraulic devide)**
- **For exact measurement: the lysimeter must reach the surface**
- **Parallel data acquisition in the lysimeter and in natural soil profiles**
- **Suction power has to be adapted to hydraulic potential in the natural soil profile**
- **Soil sampling in short distances in the soil profile for soil physics investigations to get initial conditions for modeling**
- **Exact measuring of precipitation as the most important system-input**
- **Detailed logging of the ground water table fluctuation in time**
- **Checking data validity by on-line control of measuring equipment (video control)**

Mechanized Cultivated, Weighable Monolithic Lysimeter

Details on construction, implementation and mechanized cultivation you will get at the [UMS – exhibition in the hall](#)



SHMP: soil hydrologic measurement profile

MONO: monolithic lysimeter 200 cm deep

removeable ring

soil sensors

rods for fine tuning

precision – load cells

cables
suction cups
drainage

Minimize Lysimeter Measurement Errors

➤ The lysimeter that is built in best is the one you don't see



Minimize Lysimeter Measurement Errors

- **Prevent Oasis/Island effects on**
 - Hydrology
 - Micro-climatology
 - Soil
 - Cultivation
 - Vegetation



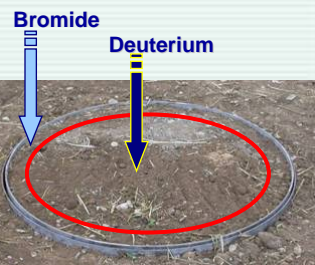
Minimize Lysimeter Measurement Errors

- **Prevent bypass fluxes and boundary effects at the borders**
- **Tests on their existence will be done by tracer experiments**



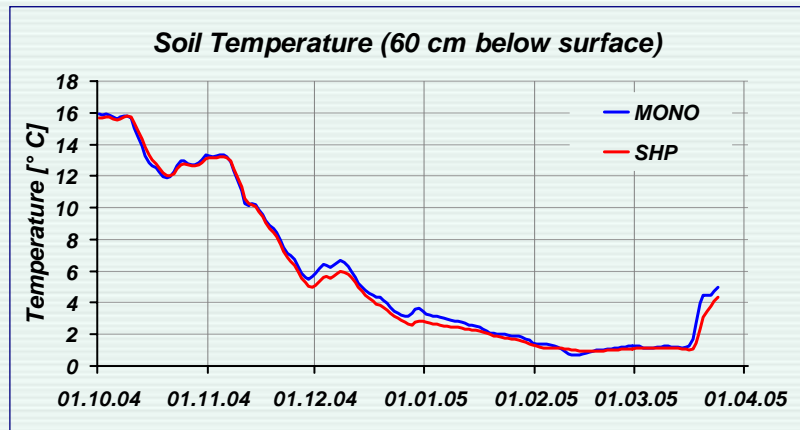
**Tracing experiment
April 12th, 2005**

Double tracer injection



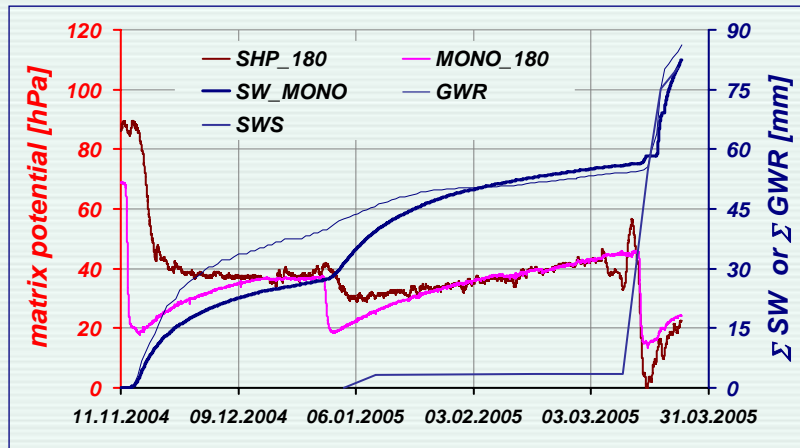
Minimize Lysimeter Measurement Errors

- Prevent temperature differences between lysimeter and the natural soil profile



Minimize Lysimeter Measurement Errors

- Prevent hydraulic differences between lysimeter and the natural soil profile at the lower boundary condition



Summary and Conclusions

- **Monitoring the lysimeters weight enables balancing in very short time intervals (i.e. 10 Minutes)**
- **Mechanized cultivation of the lysimeter and the surface above the soil hydrologic profile as usual is possible**
- **Two-dimensional projection of matric potential from surrounding soil into the lysimeter**
 - For true flow conditions at the lysimeters bottom plate
 - To prevent backwater
- **Minimization of oasis/island effects by implementation in the field**

*We hope, we are as close to nature
as possible*

Thank you for your attention