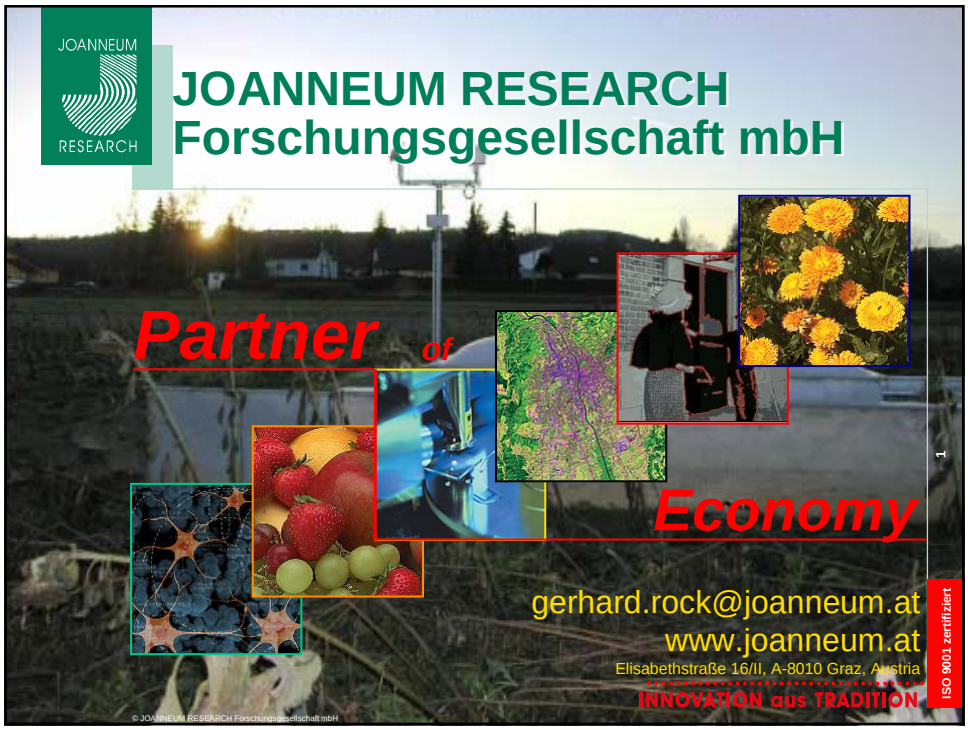
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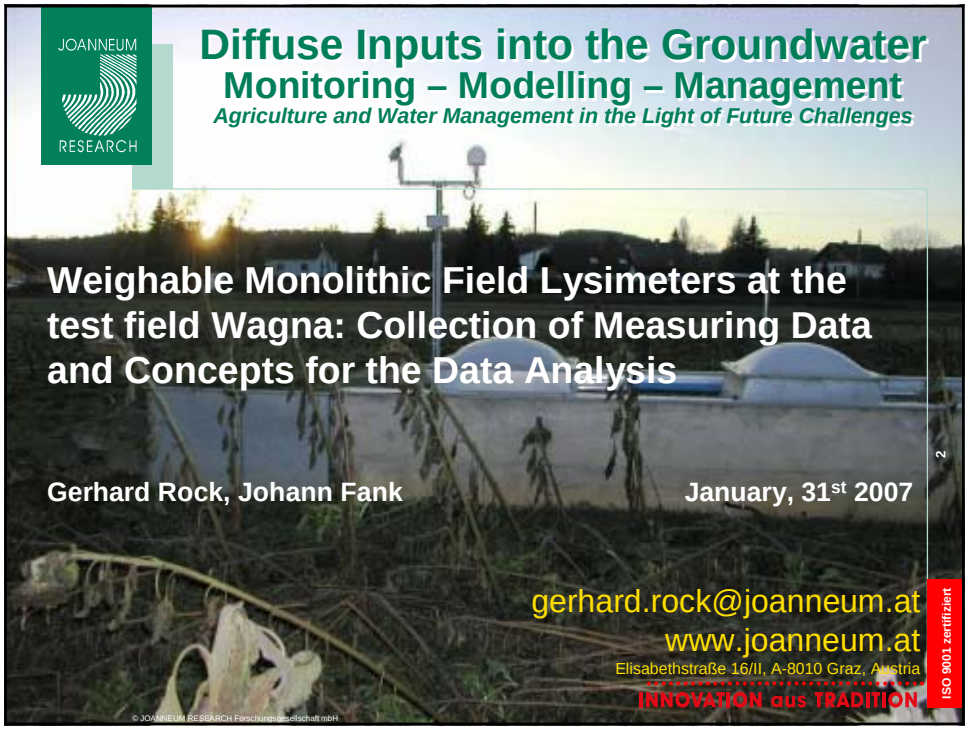
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Diffuse Inputs into the Groundwater
Monitoring – Modelling – Management
Agriculture and Water Management in the Light of Future Challenges
Weighable Monolithic Field Lysimeters at the test field Wagna: Collection of Measuring Data and Concepts for the Data Analysis
Gerhard Rock, Johann Fank
January, 31st 2007
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Introduction

- **Lysimeters at Wagna agricultural test field**
  - 2 “Scientific-Lysimeters” (organic + conventional farming)
  - 1 “Hydro-Lysimeter” + 1 “Meteo-Lysimeter”
  - Weather station “Leibnitz” (Austrian meteorological survey)
  - Main goal is to acquire data for validation and calibration of soil water and solute transport models in the unsaturated zone
- **A lot of data has to be managed and validated**
  - We need efficient methods for data collection, management and validation
  - Waste of time for this job should be minimized
  - There is no standard-software available

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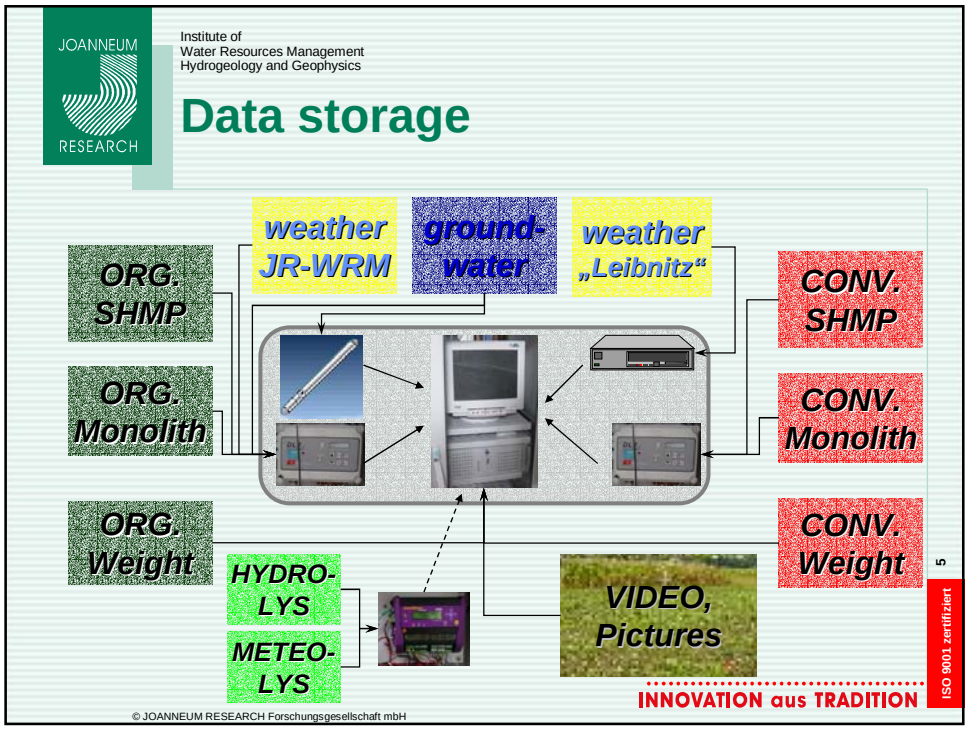
Data collection
On-line sensors (>100)

Monolith ORG + CONV	SHMP ORG + CONV	Weather	GW	Hydro + Meteo
WL RNET SW - 2x TDR - 4x TEN - 6x TSOIL - 4x	TDR – 4x TEN – 6x TSOIL - 4x	T rH Wv - 2x N - 2x R ZAMG – 16x	PGW – 2x TGW ECGW	WL SW VaPu – 2x TEN – 2x T rH Wv R
2x 18 sensors	2x 14 sensors	23 sensors	4 sensors	10 sensors

1 value / 10min interval
-> 52.560 values/year *100 sensors
-> 5.256.000 values/year * 5 years
-> 26.280.000 values in 5 years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Data storage
weather JR-WRM
ground-water
weather „Leibnitz“
ORG. SHMP
ORG. Monolith
ORG. Weight
CONV. SHMP
CONV. Monolith
CONV. Weight
HYDRO-LYS
METEO-LYS
VIDEO, Pictures
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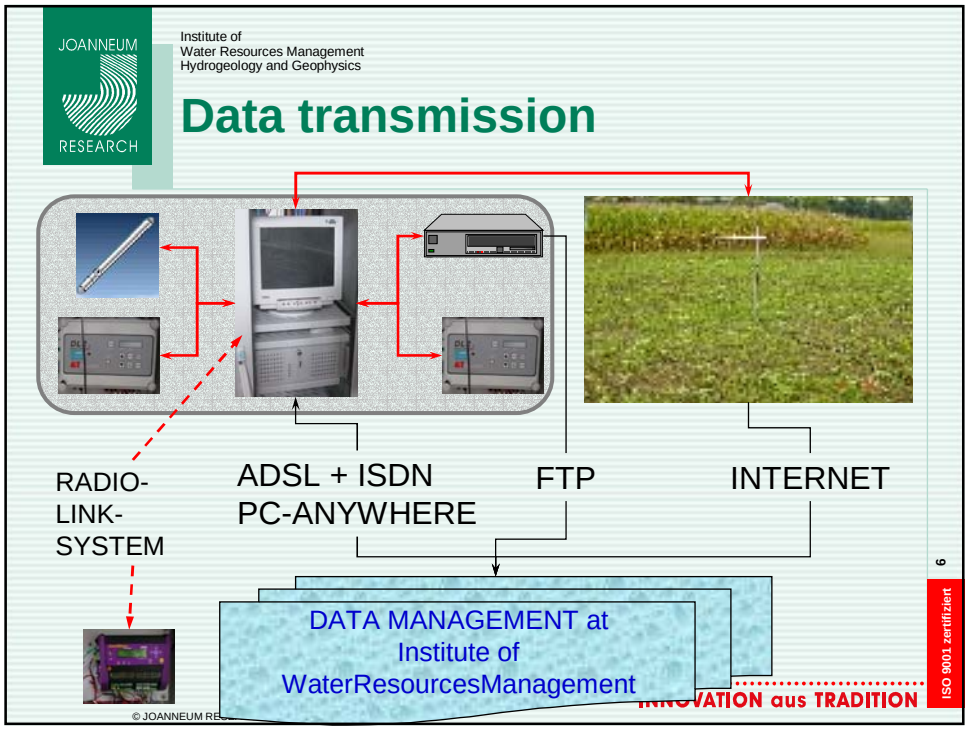
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Data transmission
RADIO-LINK-SYSTEM
ADSL + ISDN
PC-ANYWHERE
FTP
INTERNET
DATA MANAGEMENT at Institute of WaterResourcesManagement
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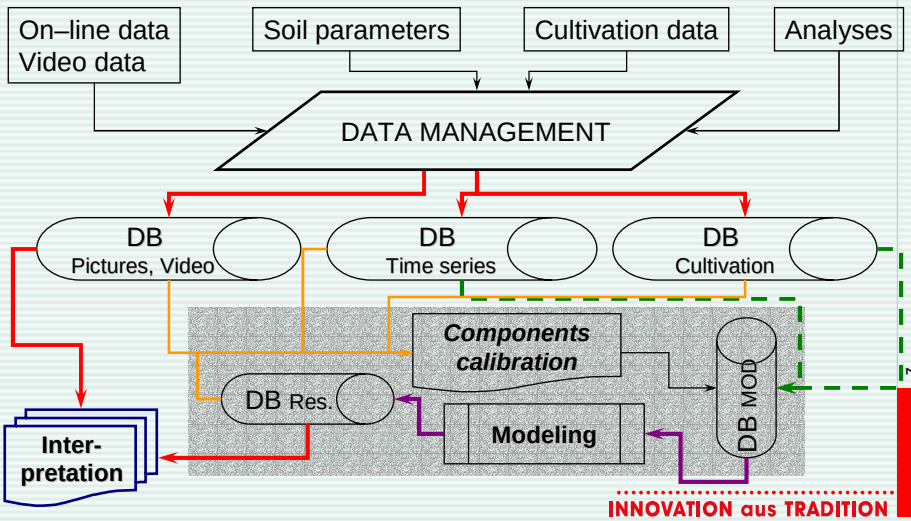
Data management, data flow



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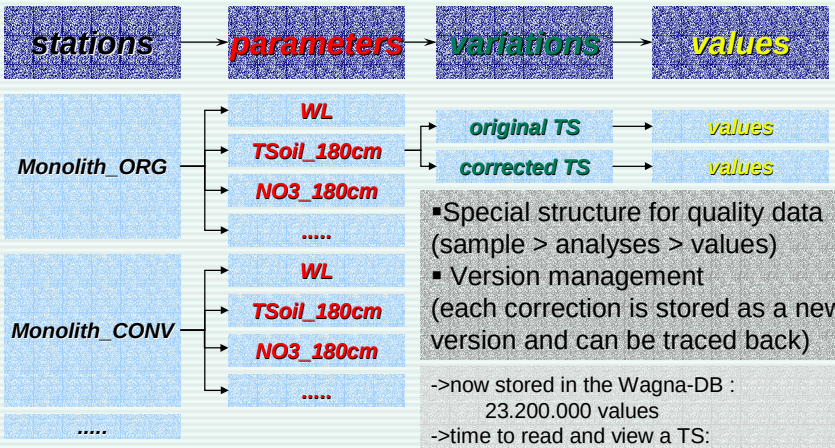
Hierarchical structure of Time-series DB



- Special structure for quality data (sample > analyses > values)
- Version management (each correction is stored as a new version and can be traced back)

->now stored in the Wagna-DB :
23.200.000 values
->time to read and view a TS:
with 170.000 values : 15sec

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Time-series DB
Technical informations

- **Developed for relational databases**
  - For „Wagna“ realized as a MS-Access-DB
  - Transfer to a Server-DB (e.g. MS-SQL-Server) possible
- **Data-Access by software components „ActiveX-DLLs“**
  - Software components use only SQL-commands
  - Software components are reusable in other applications
- **Existing software components**
  - Basic data-access-components („ActiveX-DLLs“)
  - Main application „ZrDB“ (basic DB-functions)
  - Standalone Import-modules for special data-formats
  - GIS-Extension for “ESRI - ArcMAP“
  - Time-series-explorer (graphical representation of TS)

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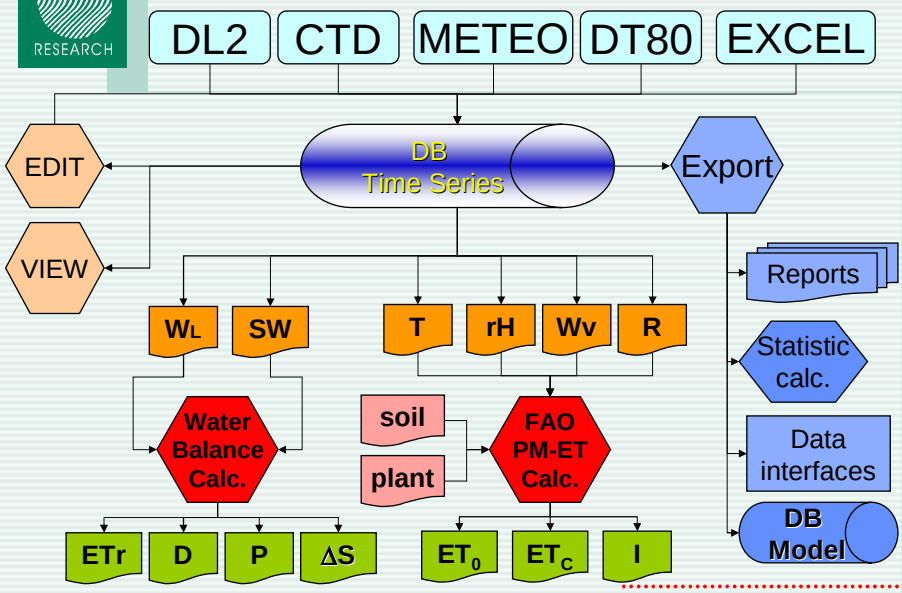

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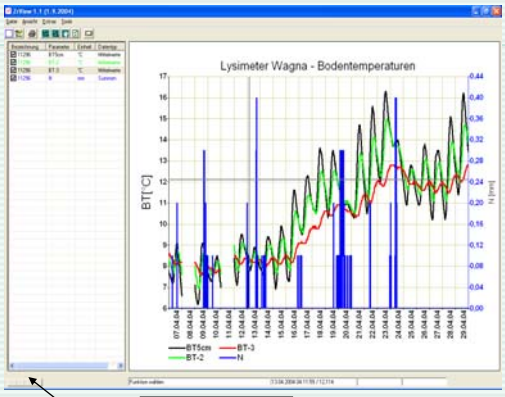
View-module



Visualization:

Formatting
2 value scales

Mean values
(day, month, year)

Statistic values

Analyses:

Statistic values
gaps
documentation
-> XLS

Export:
min, mean, max
(day, month, year)

summaries
(day, month, year)

Formats:
BZR, GWD, XLS

scrolling
day
month
year

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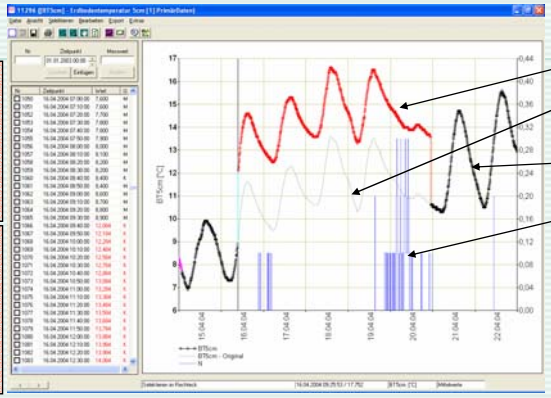
Edit-module



Selection :
Graphically
Value list
Query

Edit :
Add
Move
Delete
Calculate

Value list :
Synchronized with graphics
Numerical change
Value selection

Visualization :
Same as in View-module
Regression analyses

Colors :
Red: changed
Green: added
Magenta: selected

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Conclusions

- **The solution developed for Wagna allows to handle the data collection, management and validation efficiently**
  - ➔ Data is up to date within one week
  - ➔ Need of time for data acquisition, management and evaluation is minimized by using the presented software-tools
  - ➔ Only about 3h a week are needed for updating and checking the data of Wagna