

Bavarian Forest Ecosystem Monitoring Programme: A useful Tool to Analyze the Drought 2003 and its Effects on Forests

Stephan Raspe, Hans-Peter Dietrich, Günter Dobler,
Georg Gietl, Winfried Grimmeisen, Frank Kroll,
Bernd Schultze, Christoph Schulz, Alfred Schubert

Structure

- Bavarian Forest Ecosystem Monitoring Program
 - History
 - Objectives
 - Programme
- Effects of drought 2003 on:
 - Meteorology
 - Water budget
 - Phenology
 - Litterfall
 - Growth
- Conclusion

History

Resolutions of the Bavarian federal state parliament:

- 1984 intensification of the forest meteorological research
- 1987 reinforcement of the research of effects of long-term global climate change
- 1991 establishing of a Bavaria-wide basic net of forest climate stations $\Rightarrow$ starting of the Bavarian Forest Ecosystem Monitoring Station Programme (Waldklimastationen) since 1992

European community:

- 1992 regulation for the establishment of level II plots



UNECE

United Nations Economic Commission for Europe

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Convention on Long-range Transboundary Air Pollution Working Group on Effects

International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests)

International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests)

Chairman: Mr.T. Haußmann

Head of Programme Centre: Mr. M. Lorenz

ICP Forests was set up to monitor the effects of air pollution on Europe's forests. The mandate of ICP Forests is :

to monitor effects of anthropogenic (in particular air pollution) and natural stress factors on the condition and development of forest ecosystems in Europe and

to contribute to a better understanding of cause-effect relationships in forest ecosystem functioning in various parts of Europe



Bayerische Landesanstalt
für Wald und Forstwirtschaft

ICP Forests

International Co-operative Programme on Assessment
and Monitoring of Air Pollution Effects on Forests

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The main objectives of ICP Forests include the monitoring of forest condition on a representative, systematic grid net throughout Europe (Level I) and the intensive monitoring on a number of selected permanent plots (Level II). In detail the objectives are:

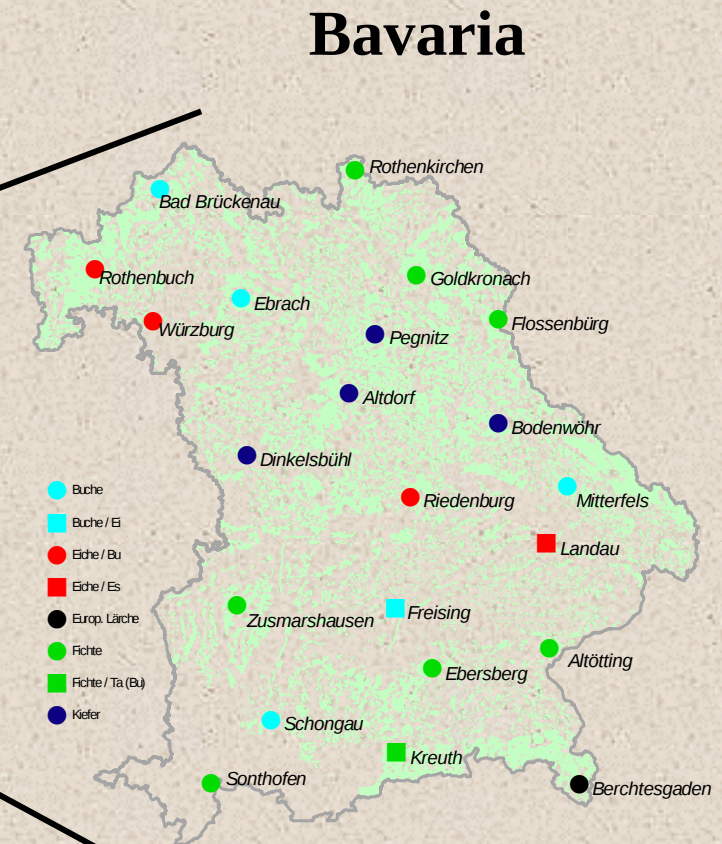
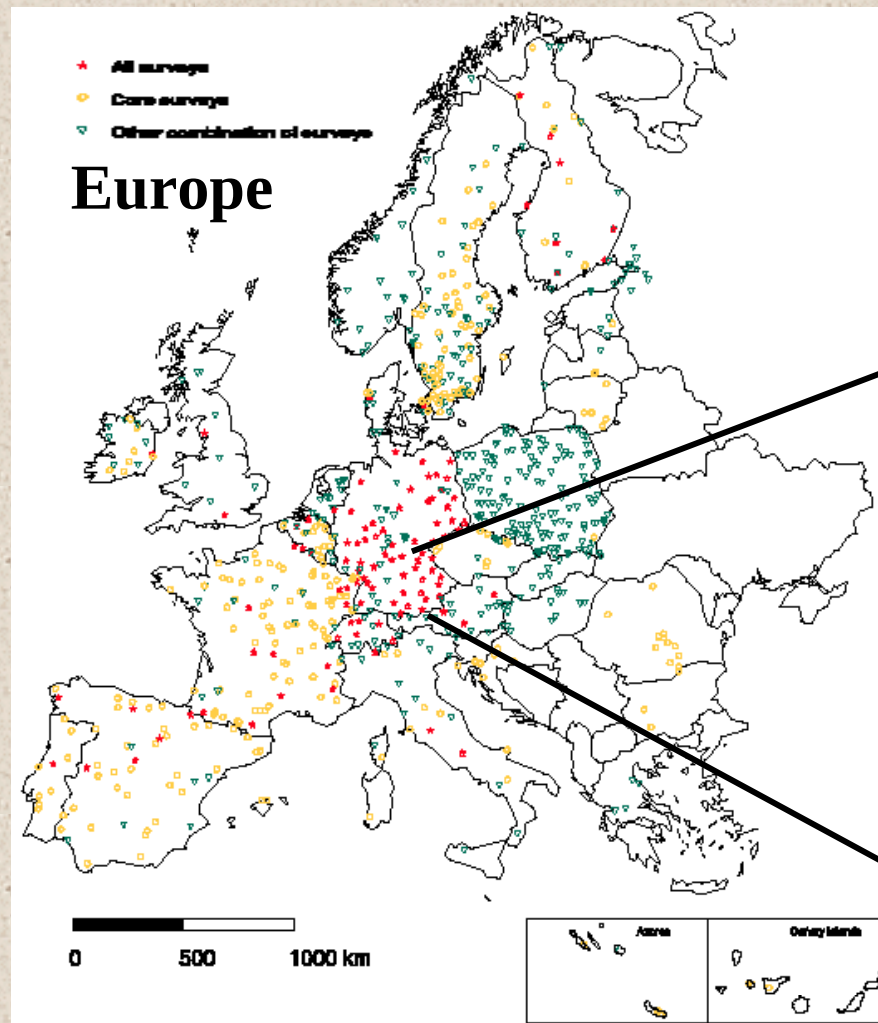
1. to provide a periodic overview on the spatial and temporal variation in forest condition in relation to anthropogenic **(in particular air pollution)** as well as **natural stress factors** on an European and national large-scale systematic network (Level I),
2. to contribute to a better understanding of the relationships between the condition of forest ecosystems and anthropogenic **(in particular air pollution)** as well as **natural stress factors** through intensive monitoring on a number of selected permanent observation plots spread over Europe (Level II) and to study the development of important forest ecosystems in Europe,
3. to provide a deeper insight into the interactions between the various components of forest ecosystems by compiling available information from related studies,
4. to contribute in close co-operation with the ICP on Modelling and Mapping to the calculation of **critical levels/loads** and their exceedances in forests and to improve collaboration with other environmental monitoring programmes inside and outside the CLRTAP,
5. to contribute by means of the monitoring activities to other aspects of relevance for forest policy at national, pan-European and global level, such as **effects of climate changes** on forests, sustainable forest management and biodiversity in forests,
6. to provide policy-makers and the general public with relevant information.

Objectives

Bavarian Forest Ecosystem Monitoring Programme

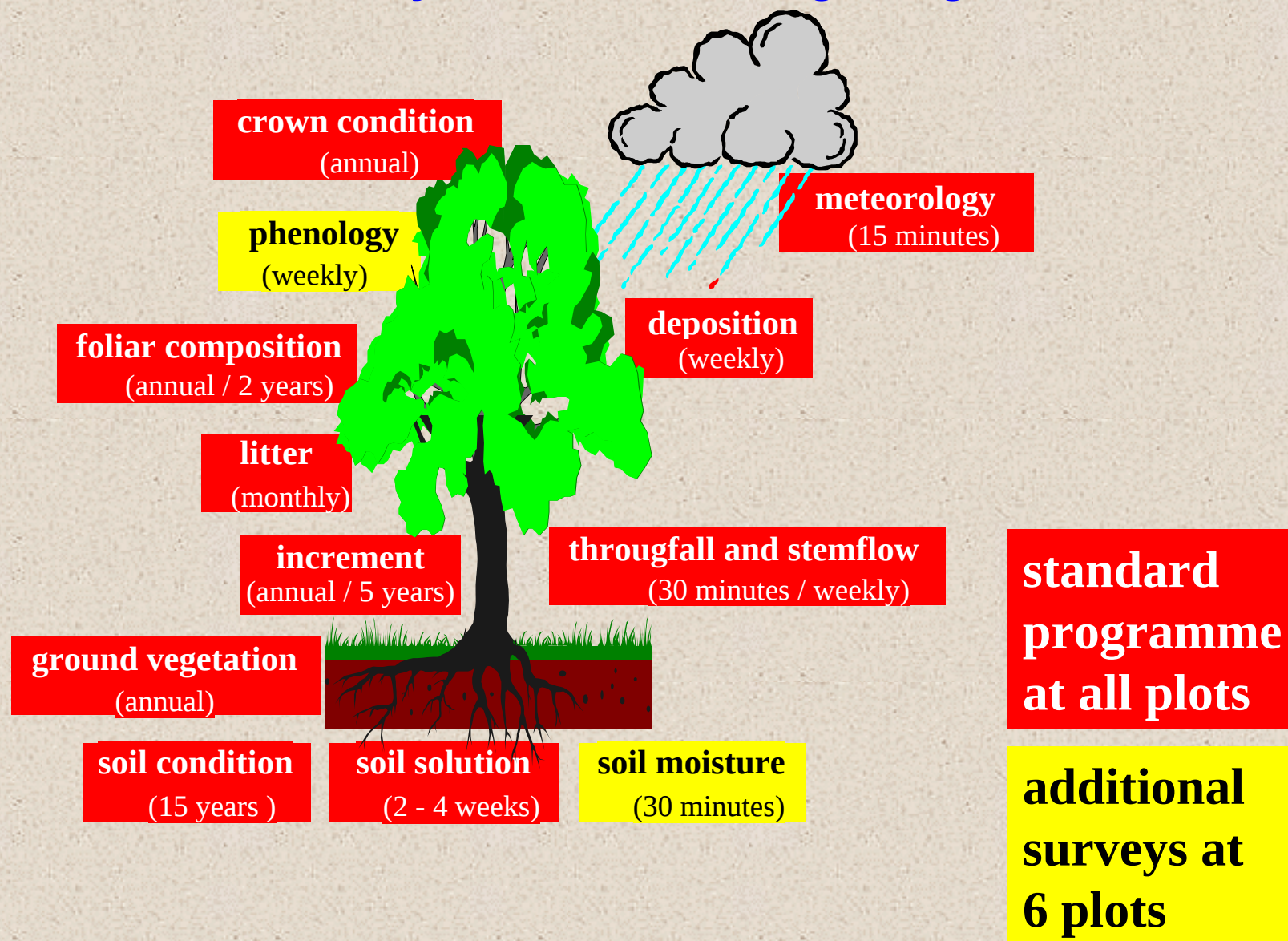
- Characterization of the Condition and Dynamic of
 - the Forest Stands
 - Soils
 - Water
- Effects of
 - Air Pollution
 - Climate Change
 - ...

Forest Ecosystem Monitoring Programme Level II Plots in 2002



➤ 22 plots all over Bavaria

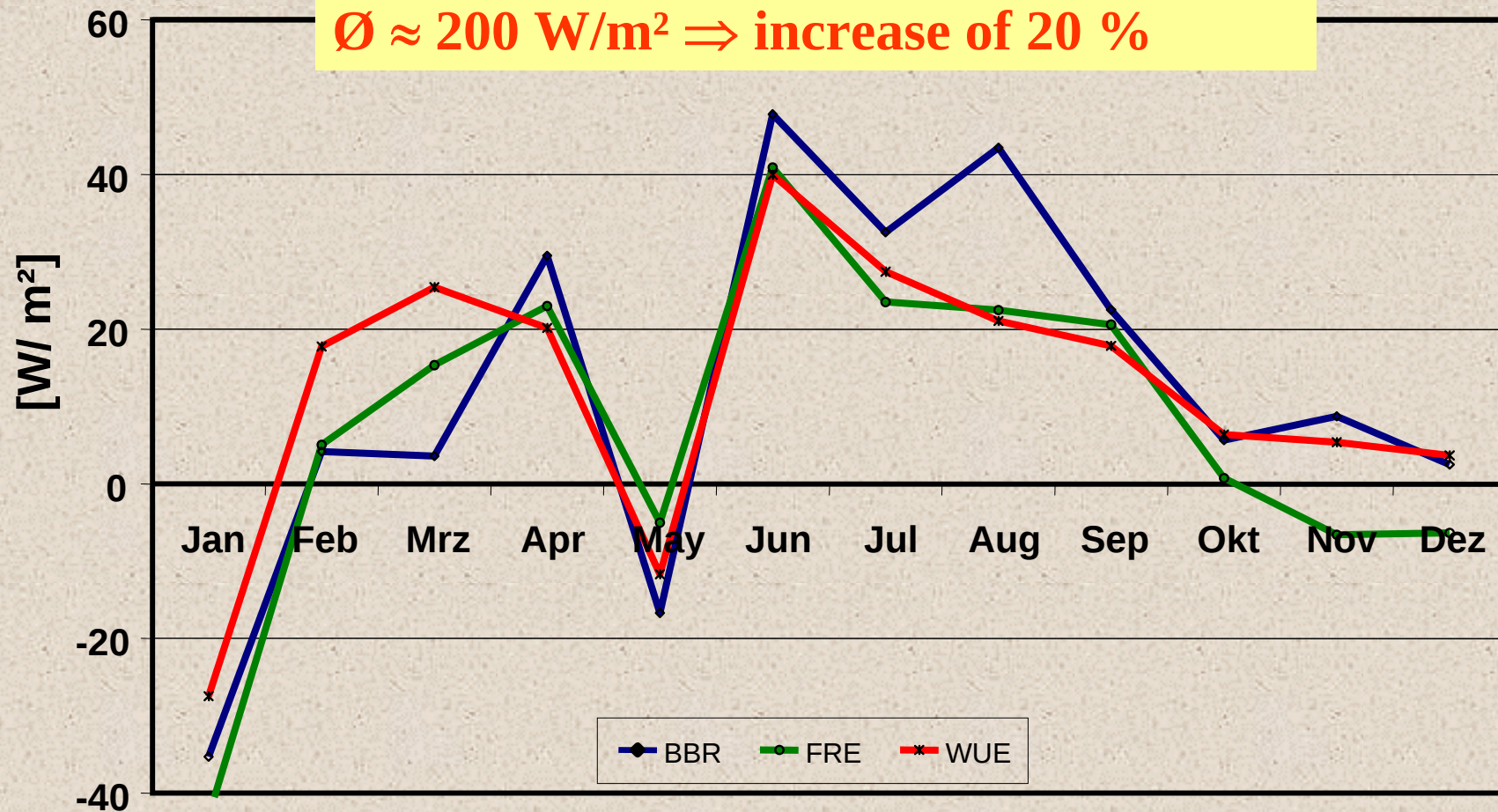
Bavarian Forest Ecosystem Monitoring Programme



Results from the Drought 2003

Global Radiation 2003

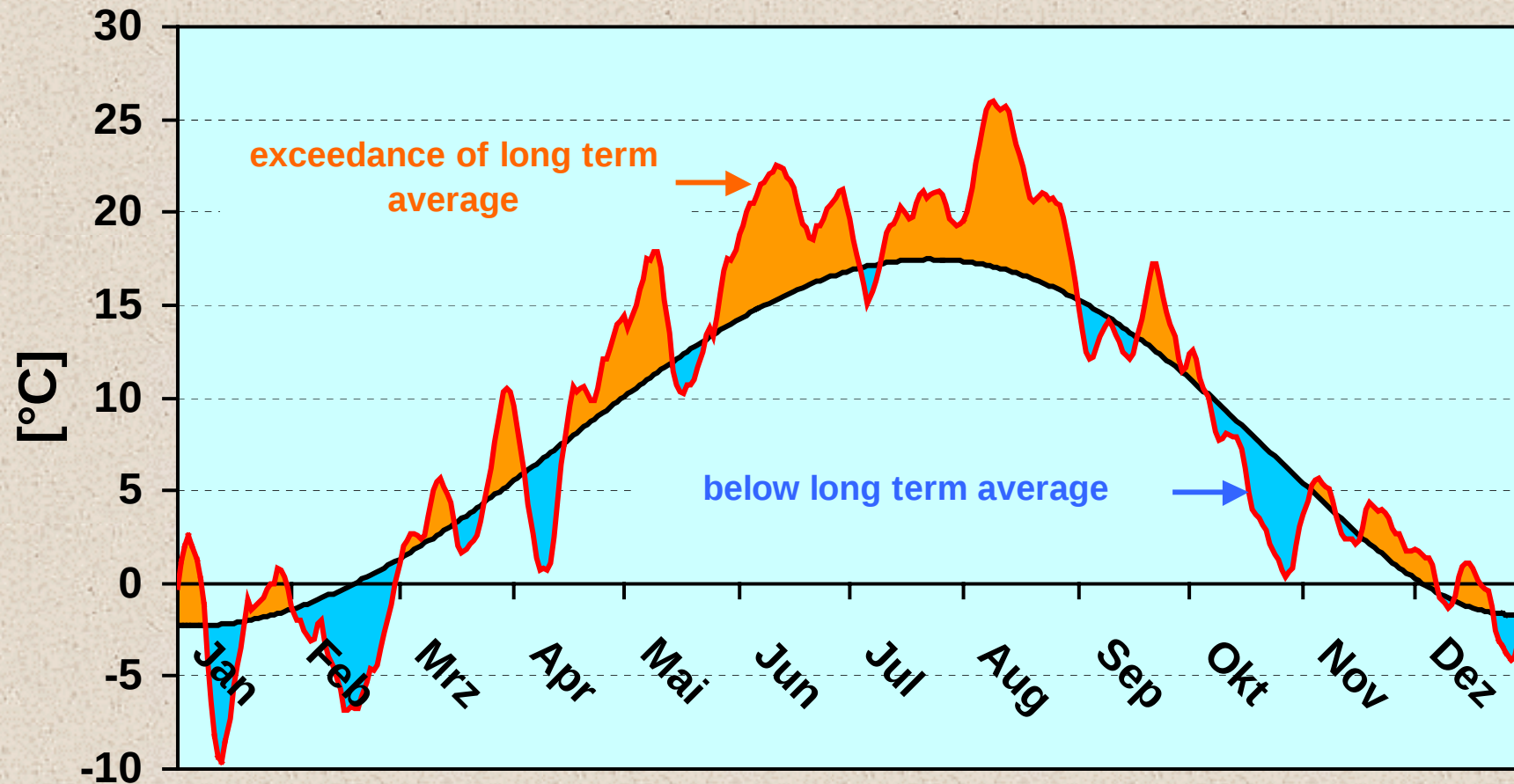
deviation from long term average



Temperature 2003

deviation from long term average

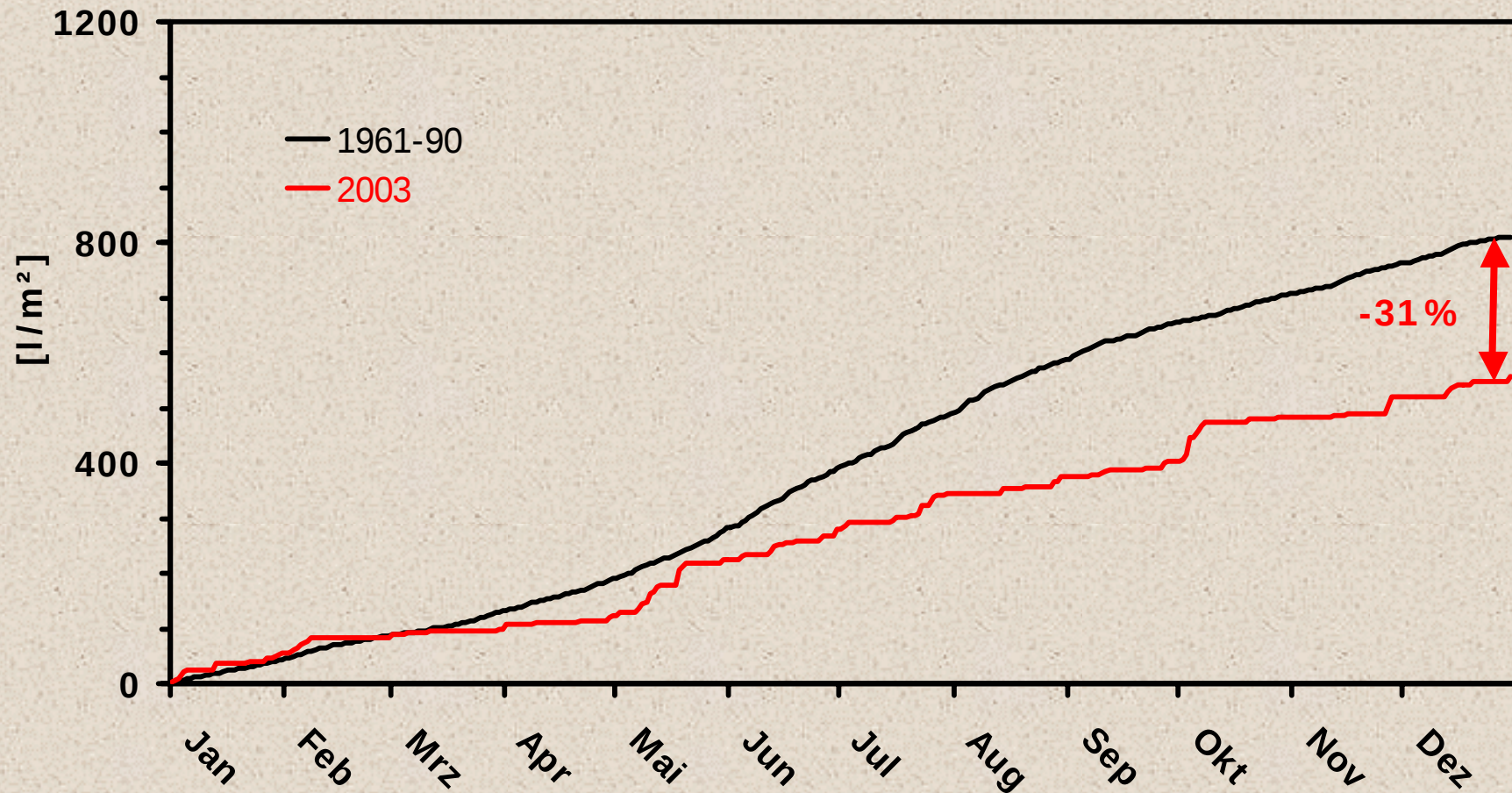
WKS Freising



Precipitation 2003

cumulative sum

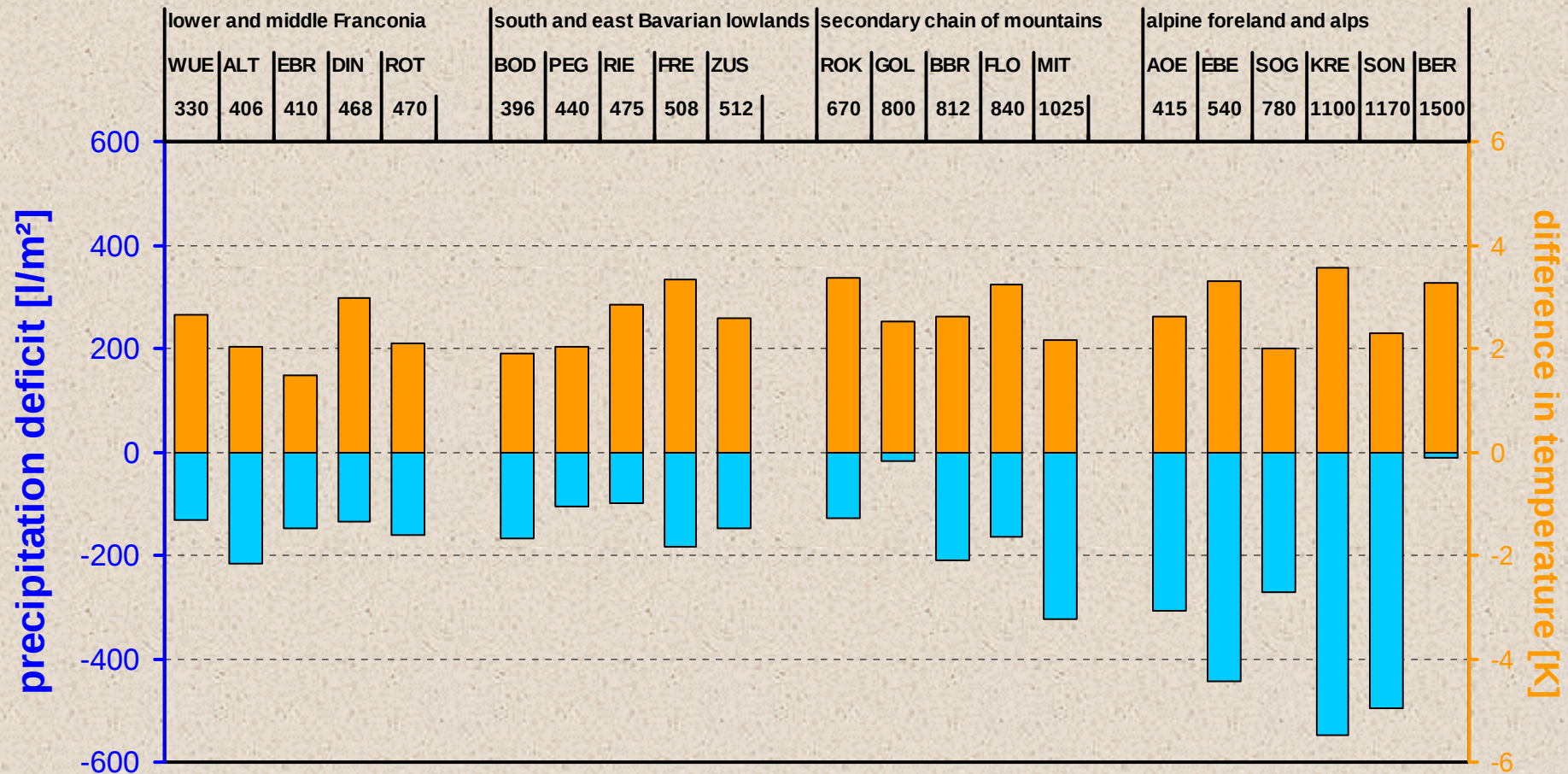
WKS Freising



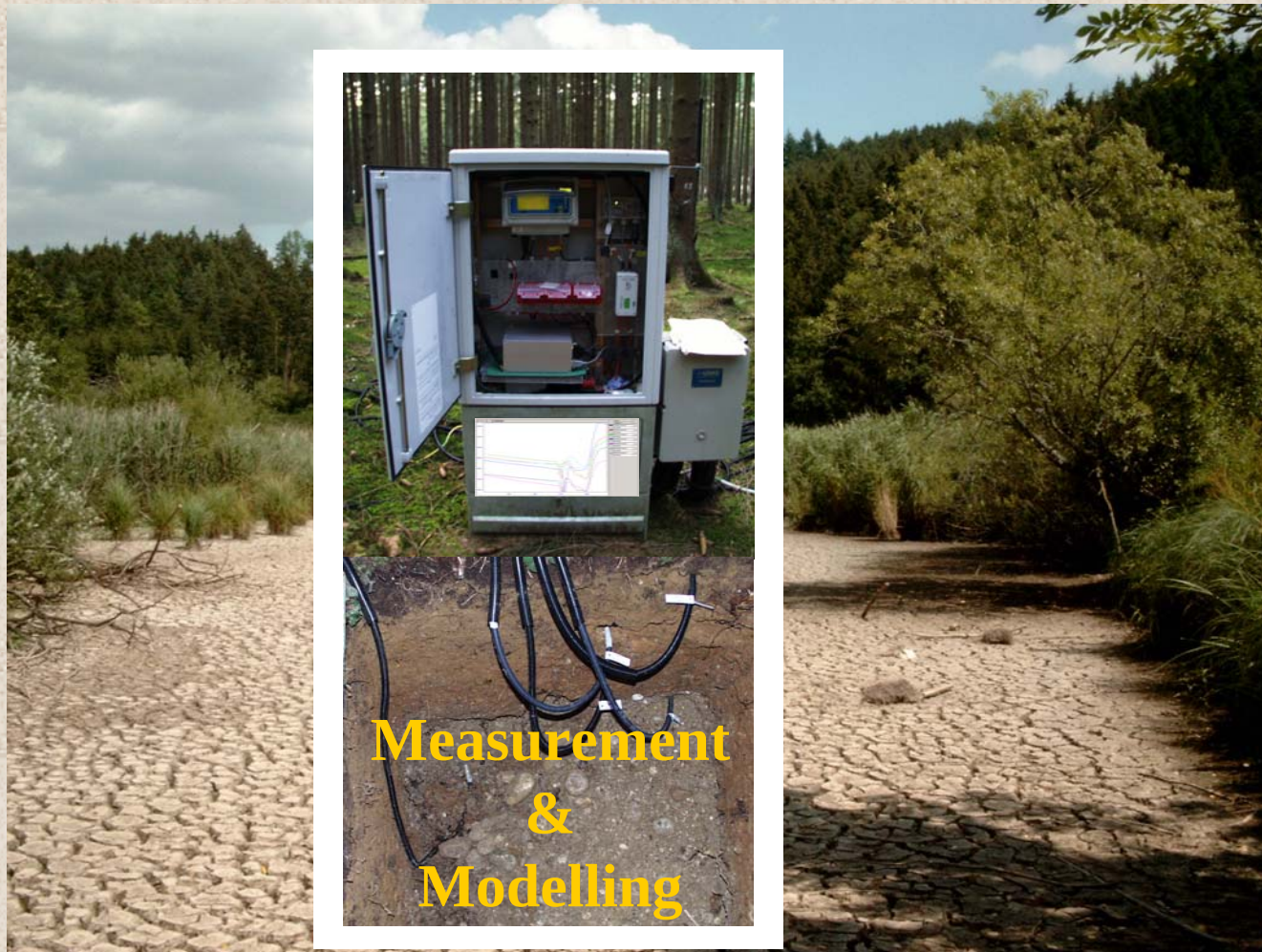
Temperature and Precipitation

deviation from long term average (1961 – 1990)

May - September

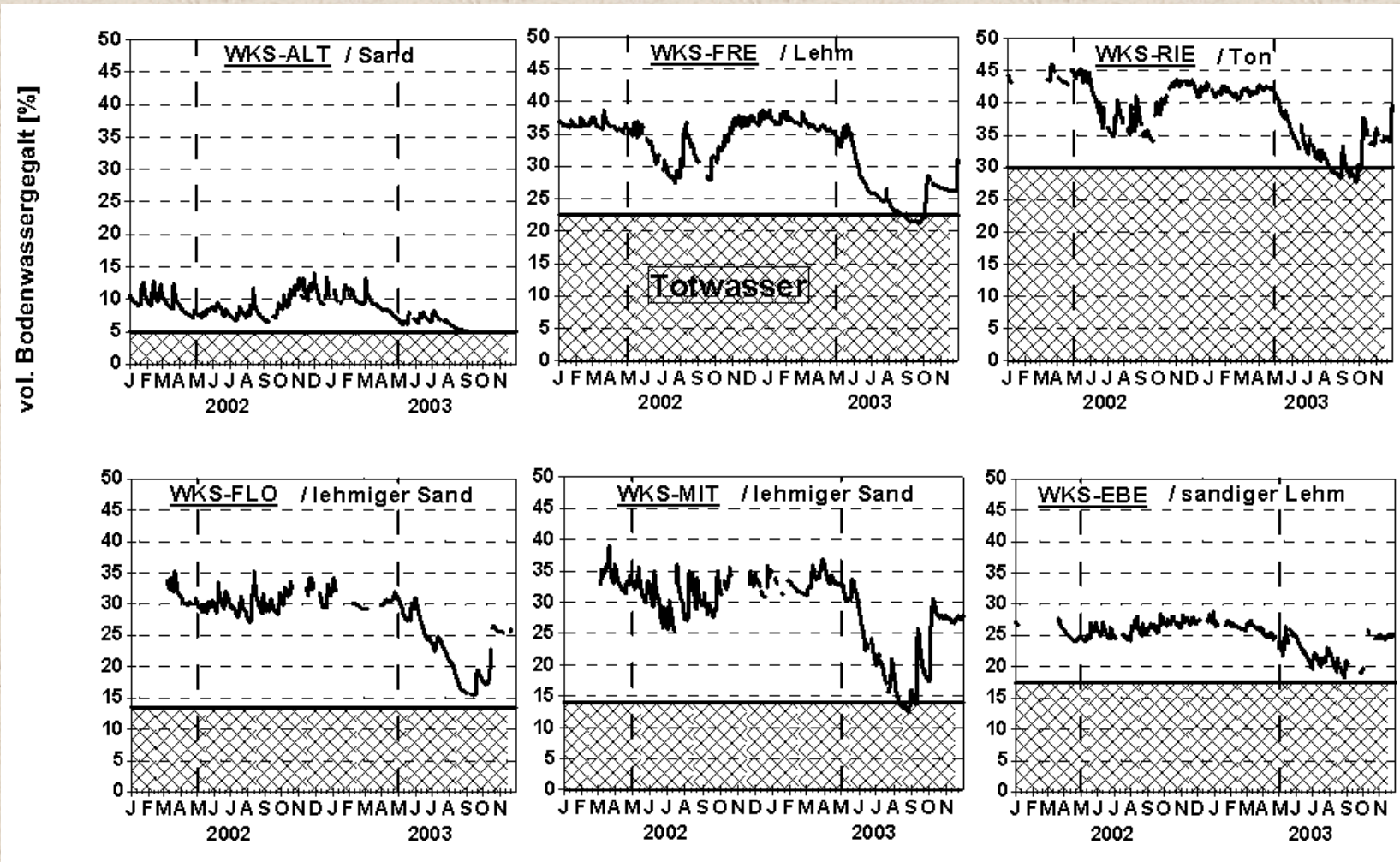


Soil Water Reservoir

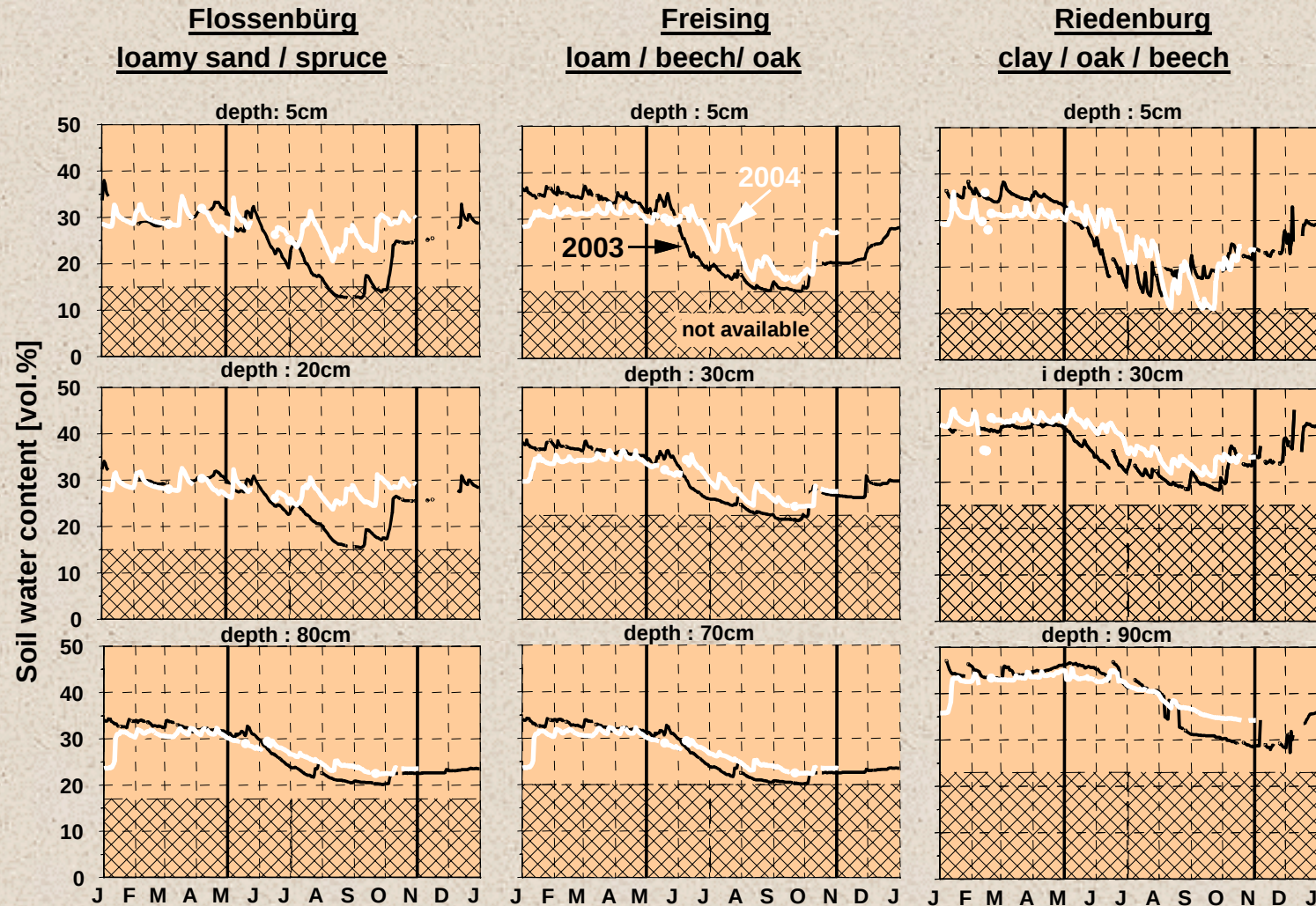


Soil Water Content Measurement

30 cm depth



Soil Water Content Measurement 2003 and 2004

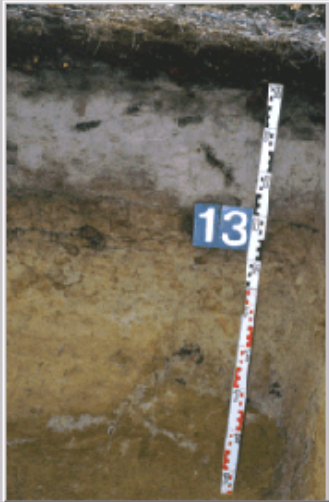


InDB_WKS_BroIn_V12 - [Brook90 Simulation Database]
Datei Bearbeiten Ansicht Einfügen Format Datensätze Extras Fenster ?

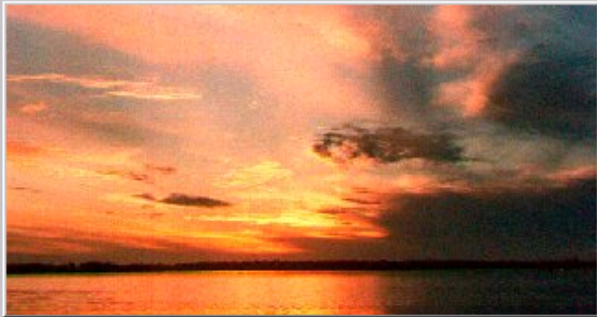


Vegetation

LWF-Brook90 V 11



Soil



Climate

Heat parameter
Snow parameter
Flow parameter
Numerical parameter
Defaults
Update Database



Bavarian State
Institute of Forestry

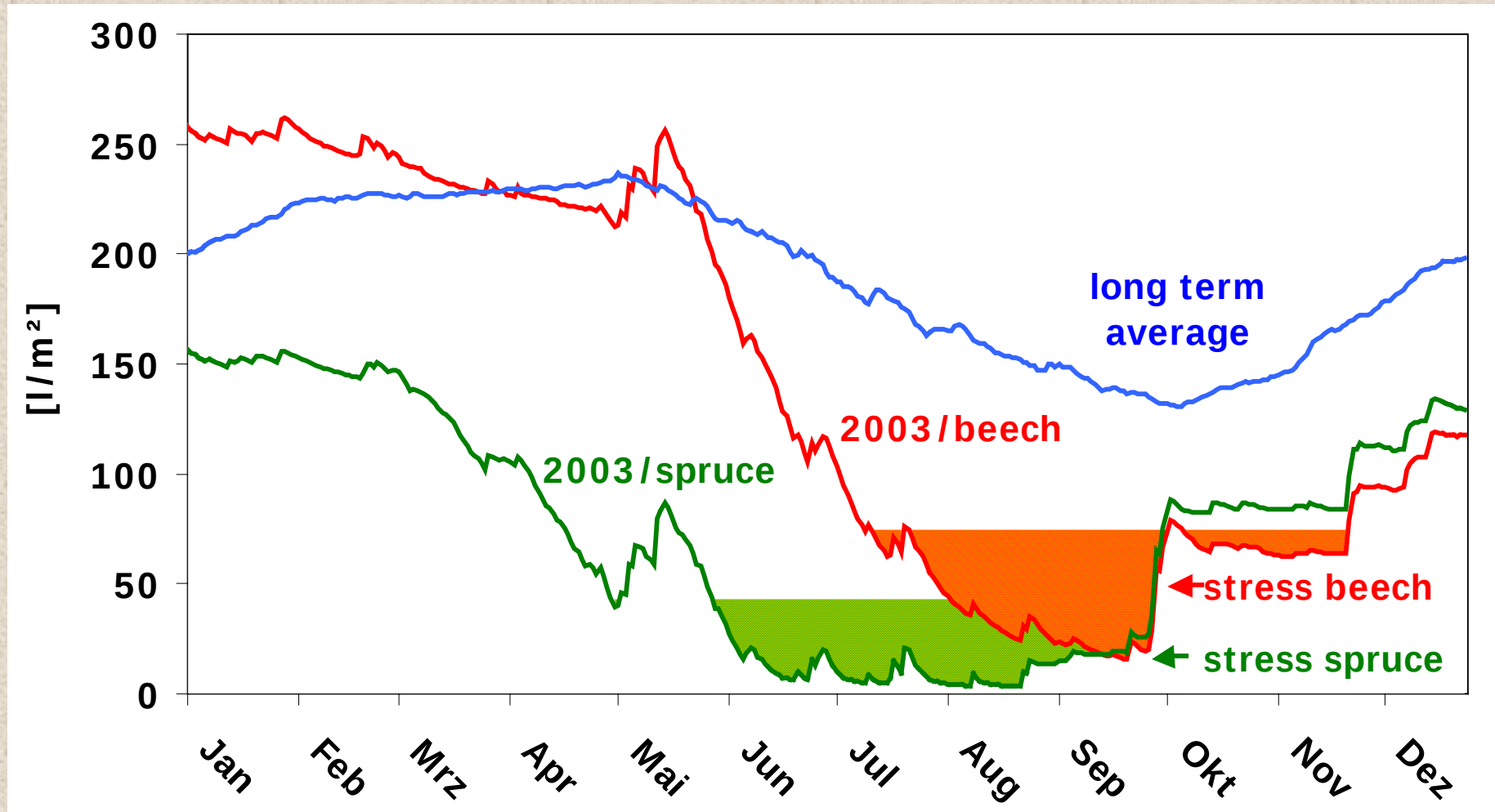


Input Database for Brook90
Water Balance Simulation

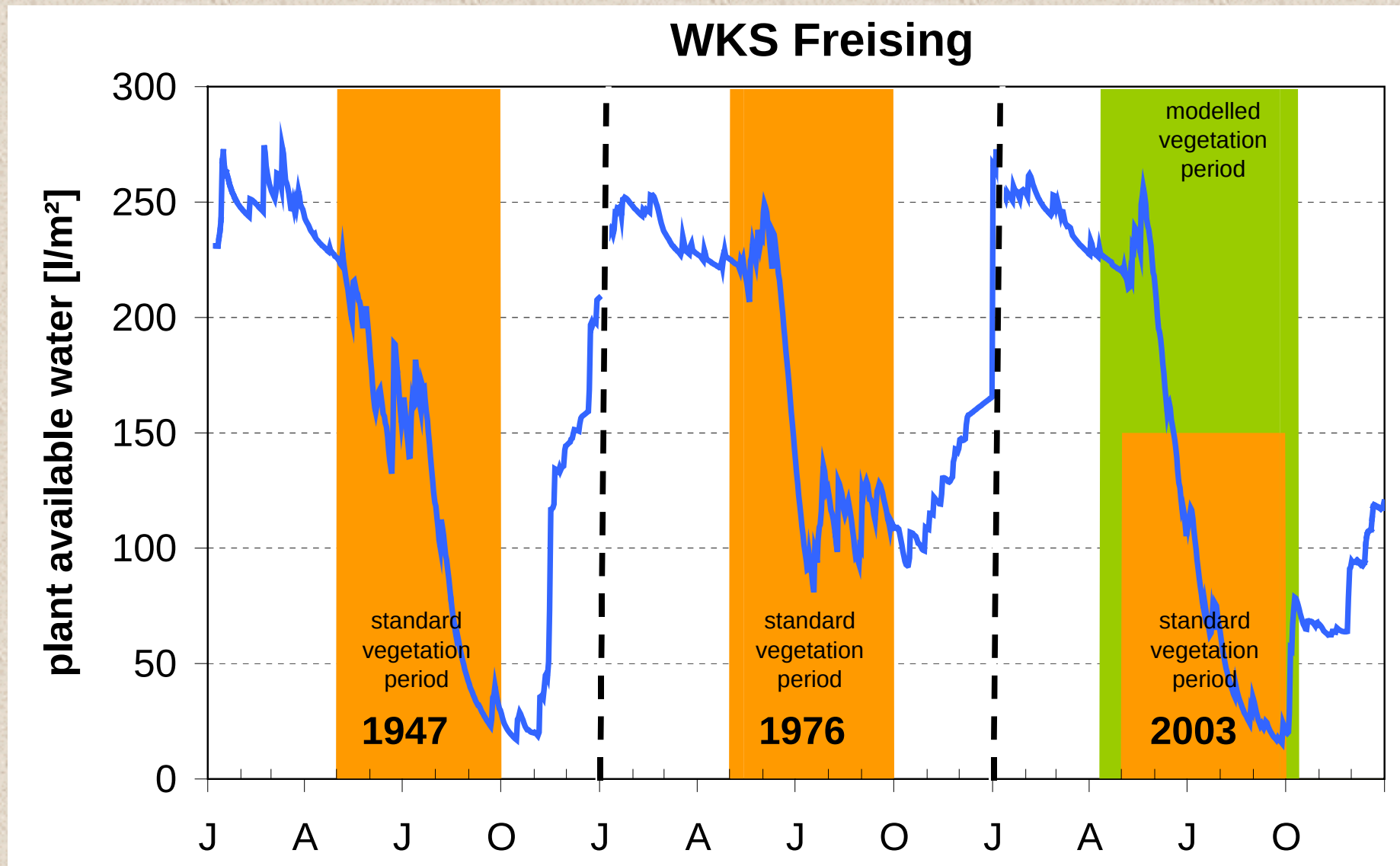


Design: Klaus Hammel

Modelling of Plant Available Soil Water 2003



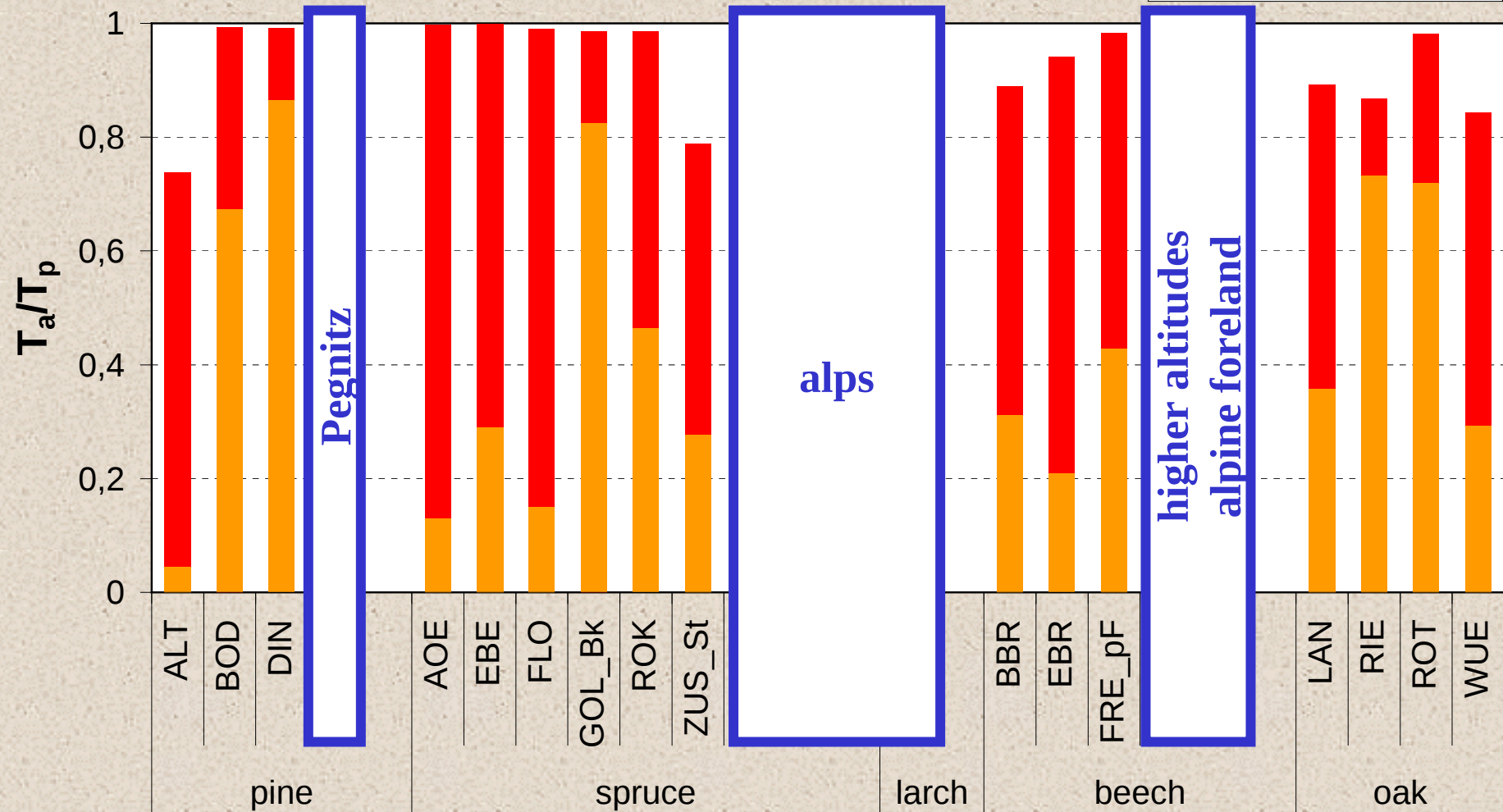
Modelling of Plant Available Soil Water



Transpiration Index

August 2003

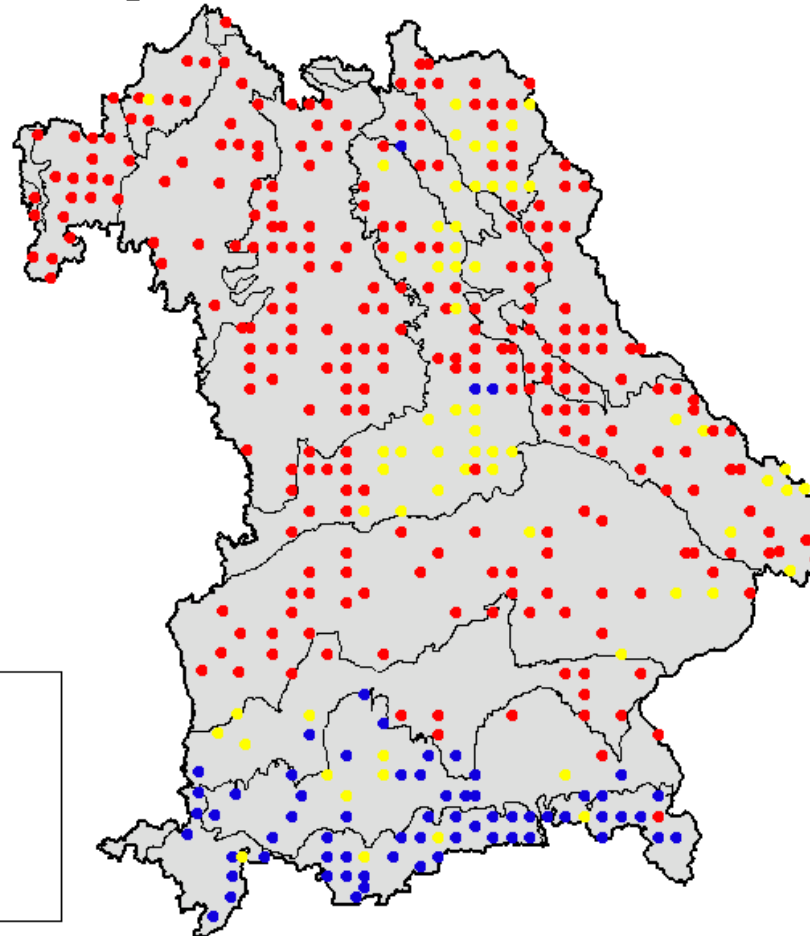
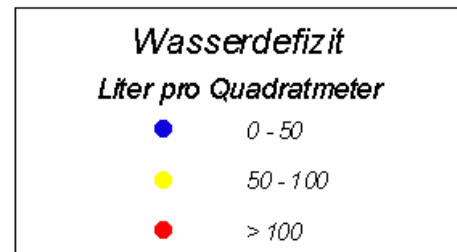
■ long term average
■ 2003



Water deficiency in Bavaria

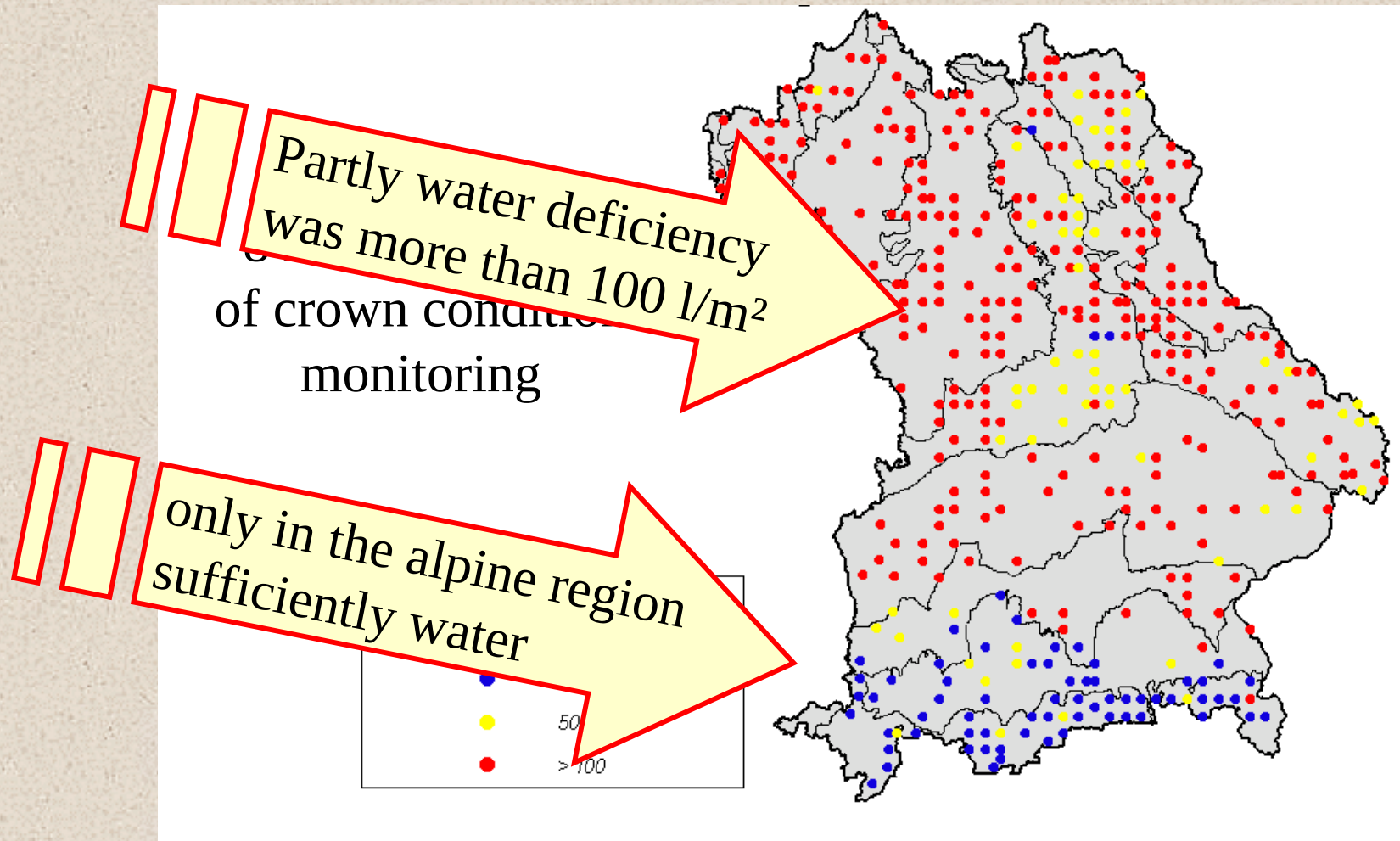
August / September 2003

8 x 8 km pattern
of crown condition
monitoring



Water deficiency in Bavaria

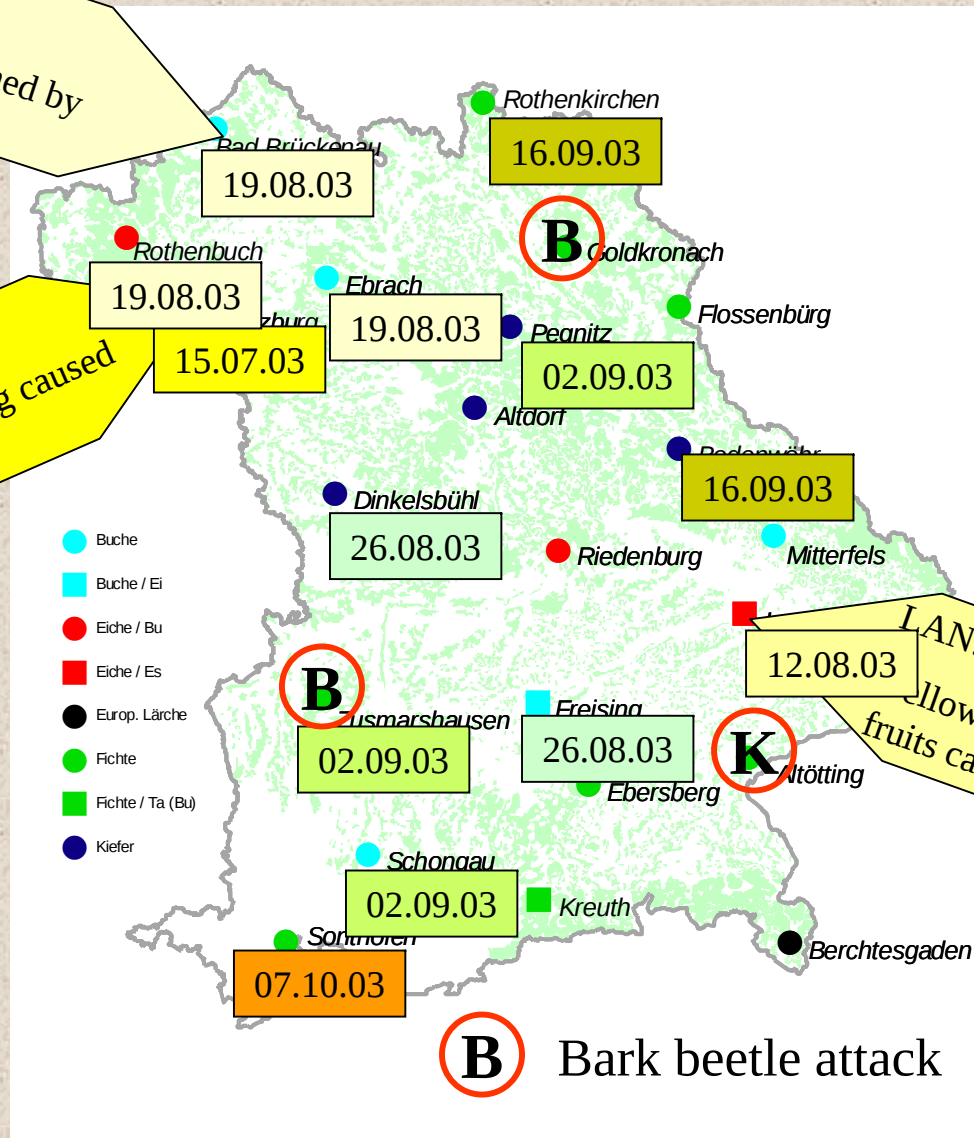
August / September 2003



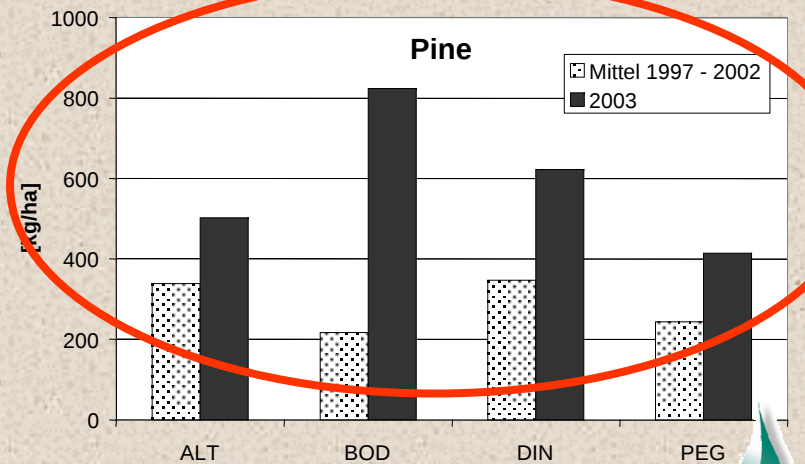
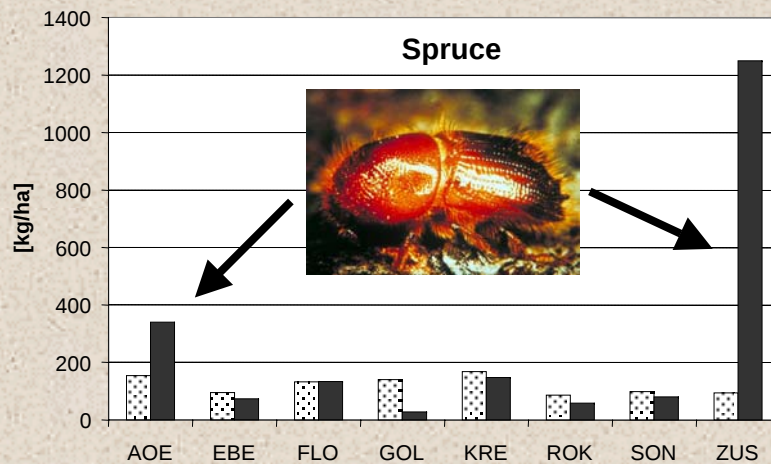
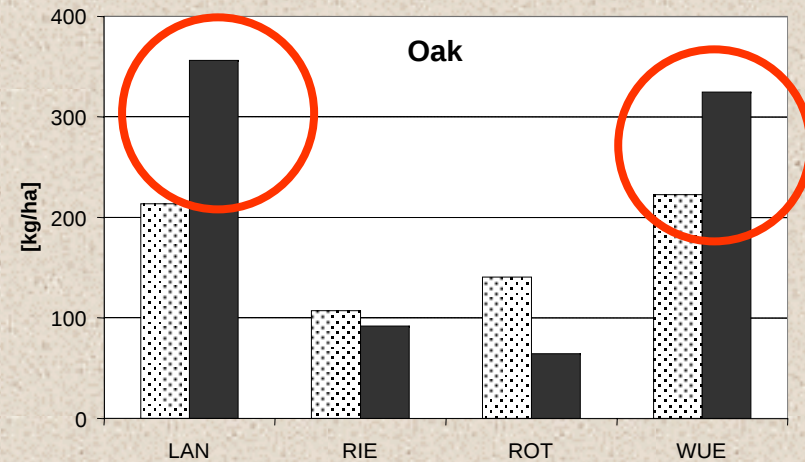
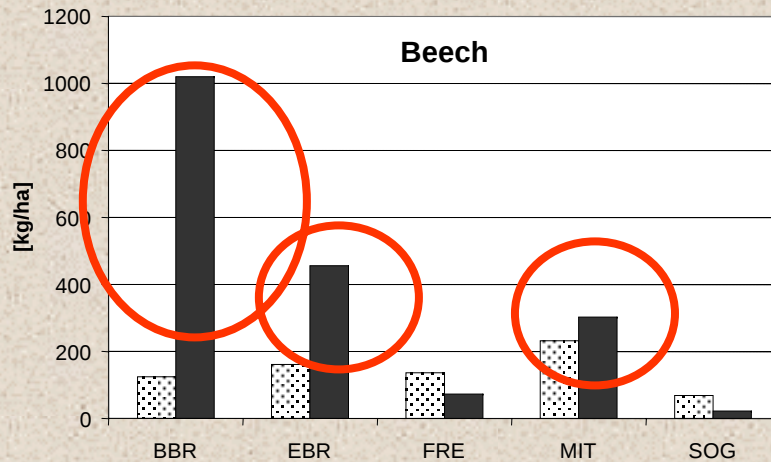
Observation of Drought Damages

BBR: 19.08.03
strong leaf fall (assumed by drought)

WUE: 15.07.03
Green leafes are falling caused by drought

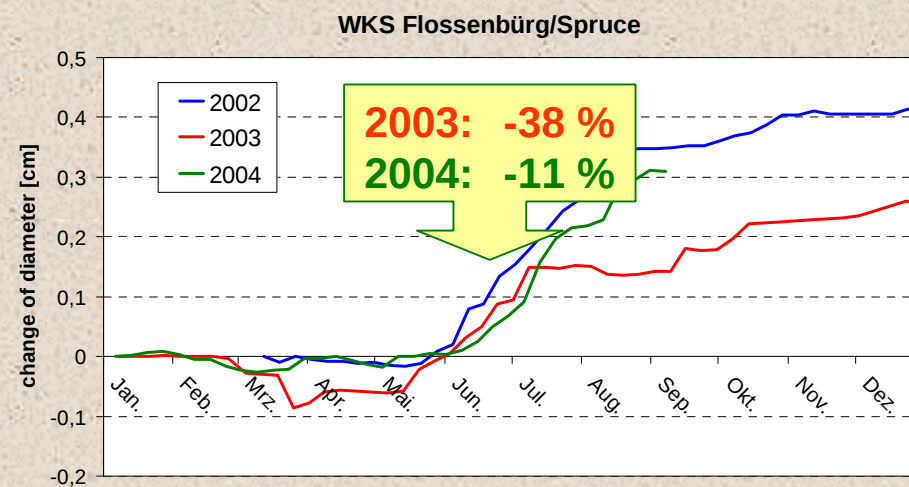
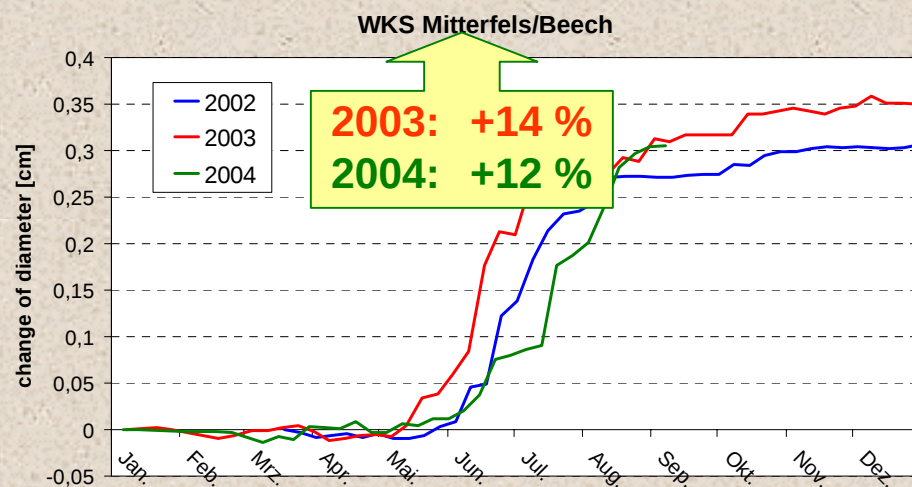
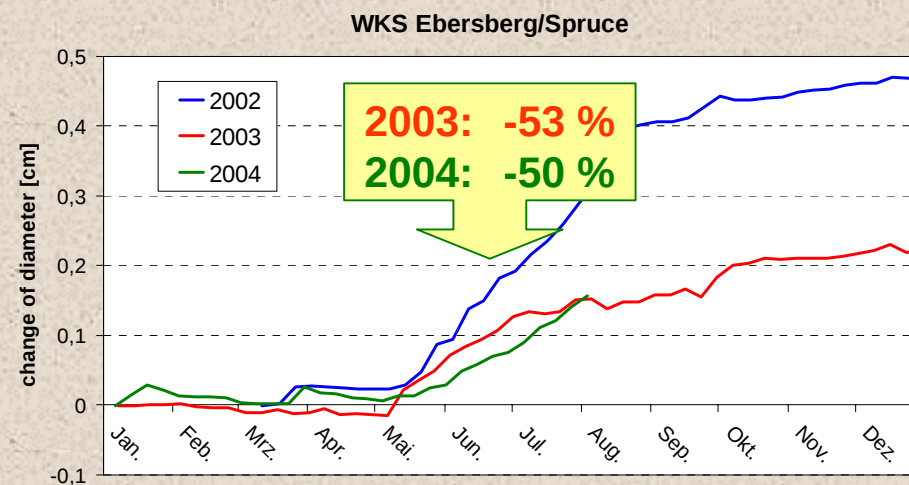
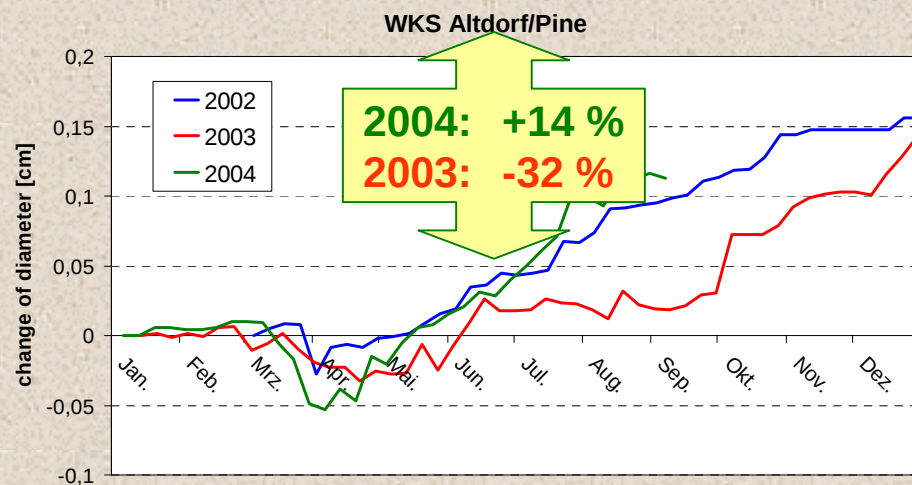


Litterfall August + September



Change of diameter

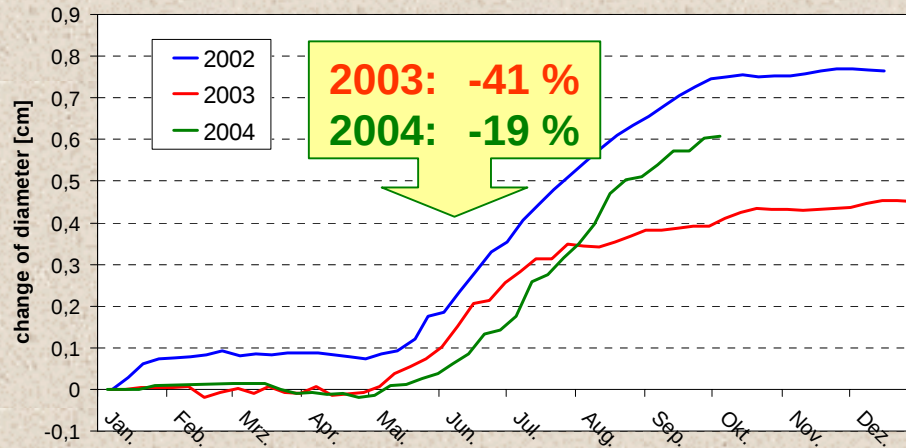
Pure Stands



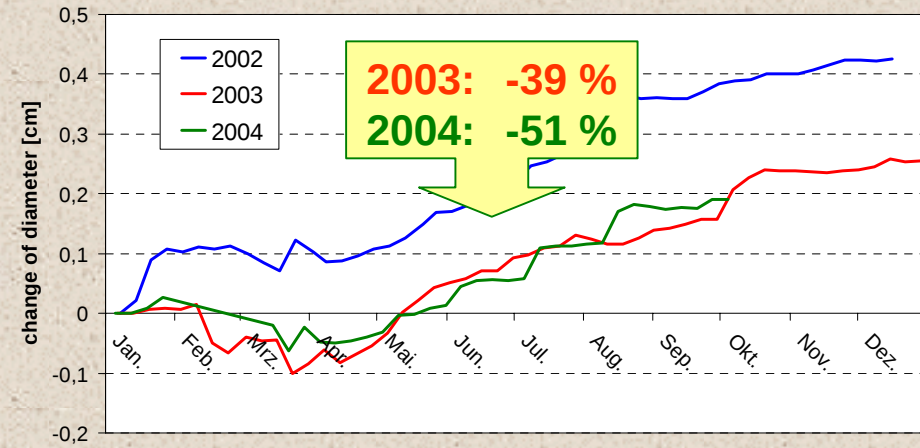
Change of Diameter

Mixed Stands

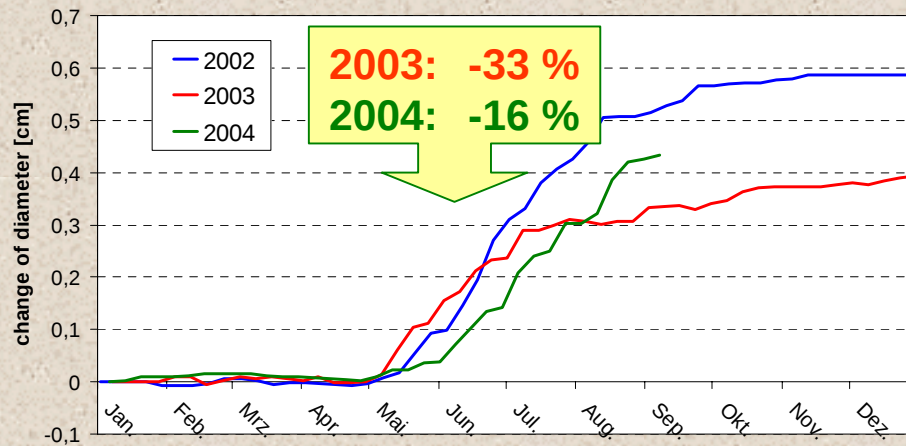
WKS Freising/Beech



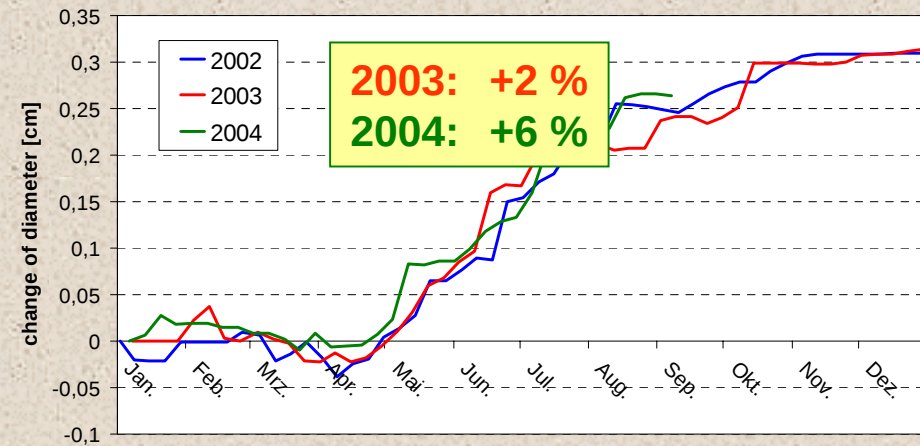
WKS Freising/Oak



WKS Riedenburg/Beech



WKS Riedenburg/Oak



Conclusion

- Bavarian Forest Ecosystem Monitoring Programme started in 1992
- meteorology at all 22 plots
- cause and effect measurements in direct proximity
- effects of drought 2003 clearly documented
- level II programme is a useful tool for the foreseeing environmental protection