Bundesministerium
für Bildung
und Forschung

TERENO
TERRESTRIAL ENVIRONMENTAL OBSERVATORIES

TERENO CT Palaeoclimate

The role of palaeoclimate data for future projections

The Geoarchive Team

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Human perception of time

> few decades

< few seconds

→ limits process understanding

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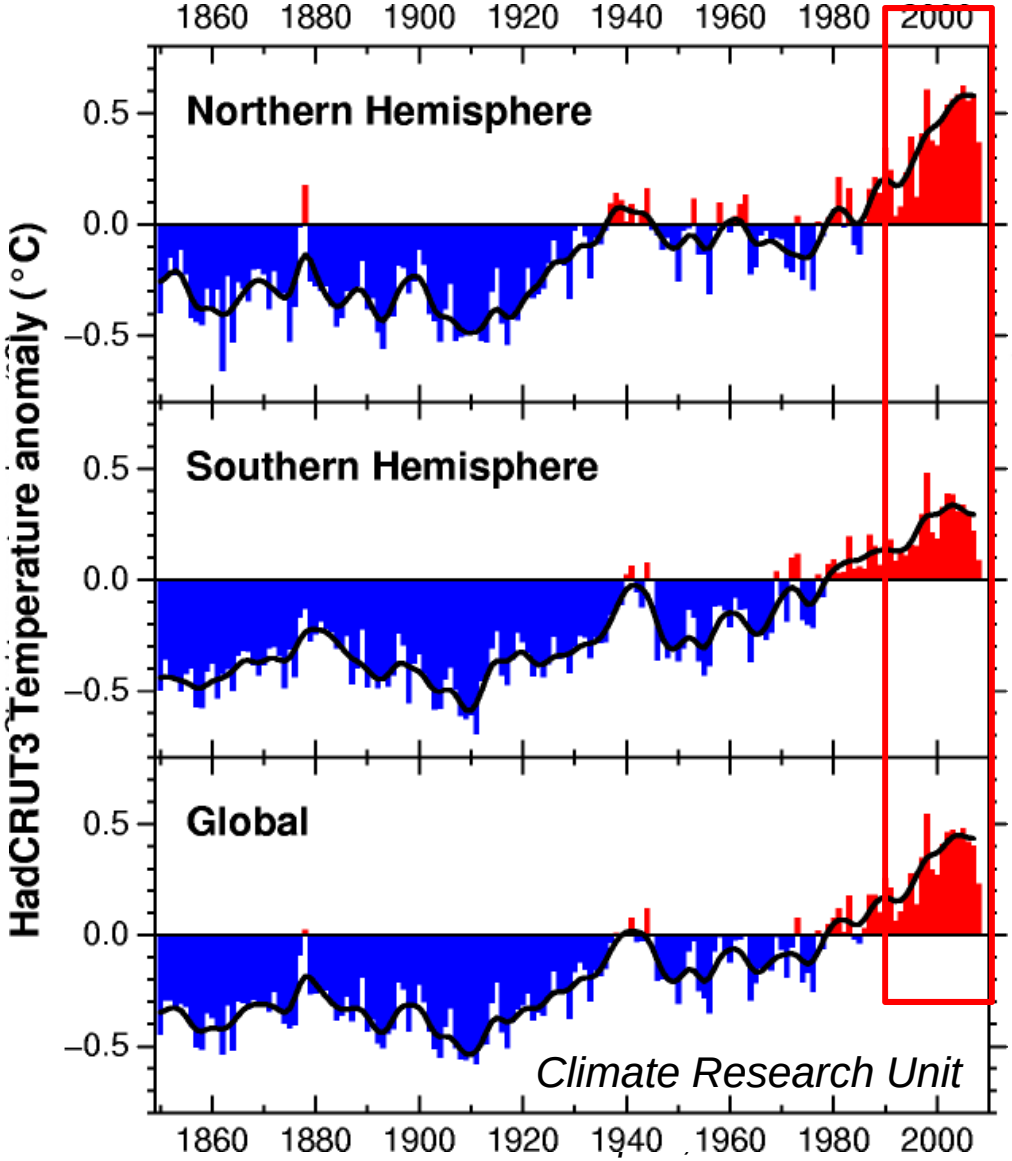
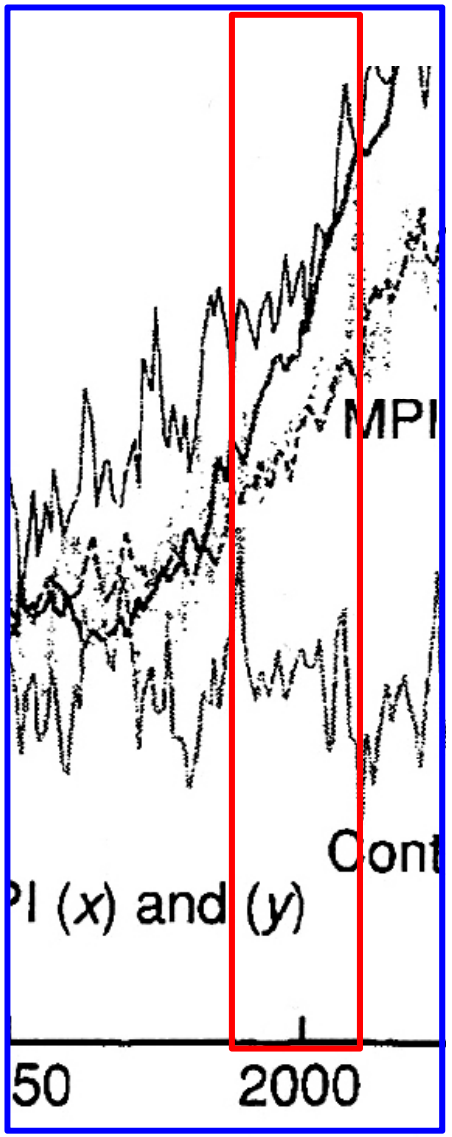
Future Climate Projections





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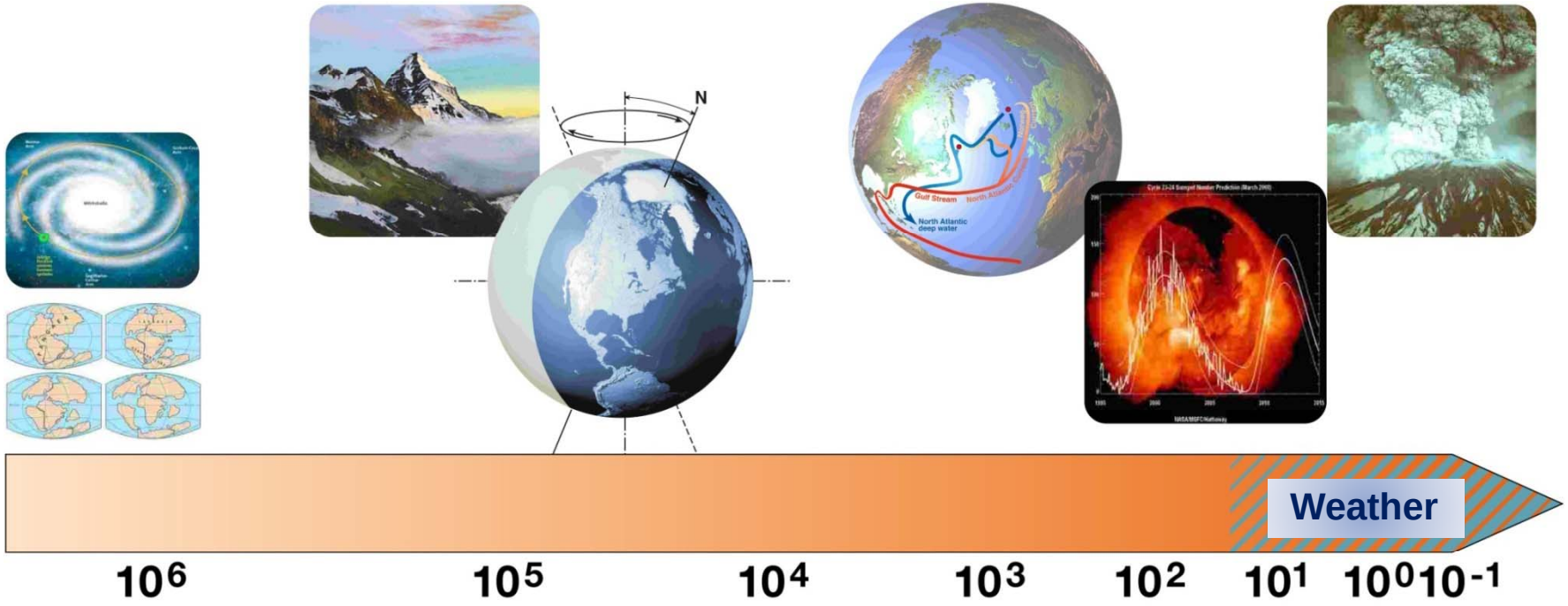
Processes and time scales



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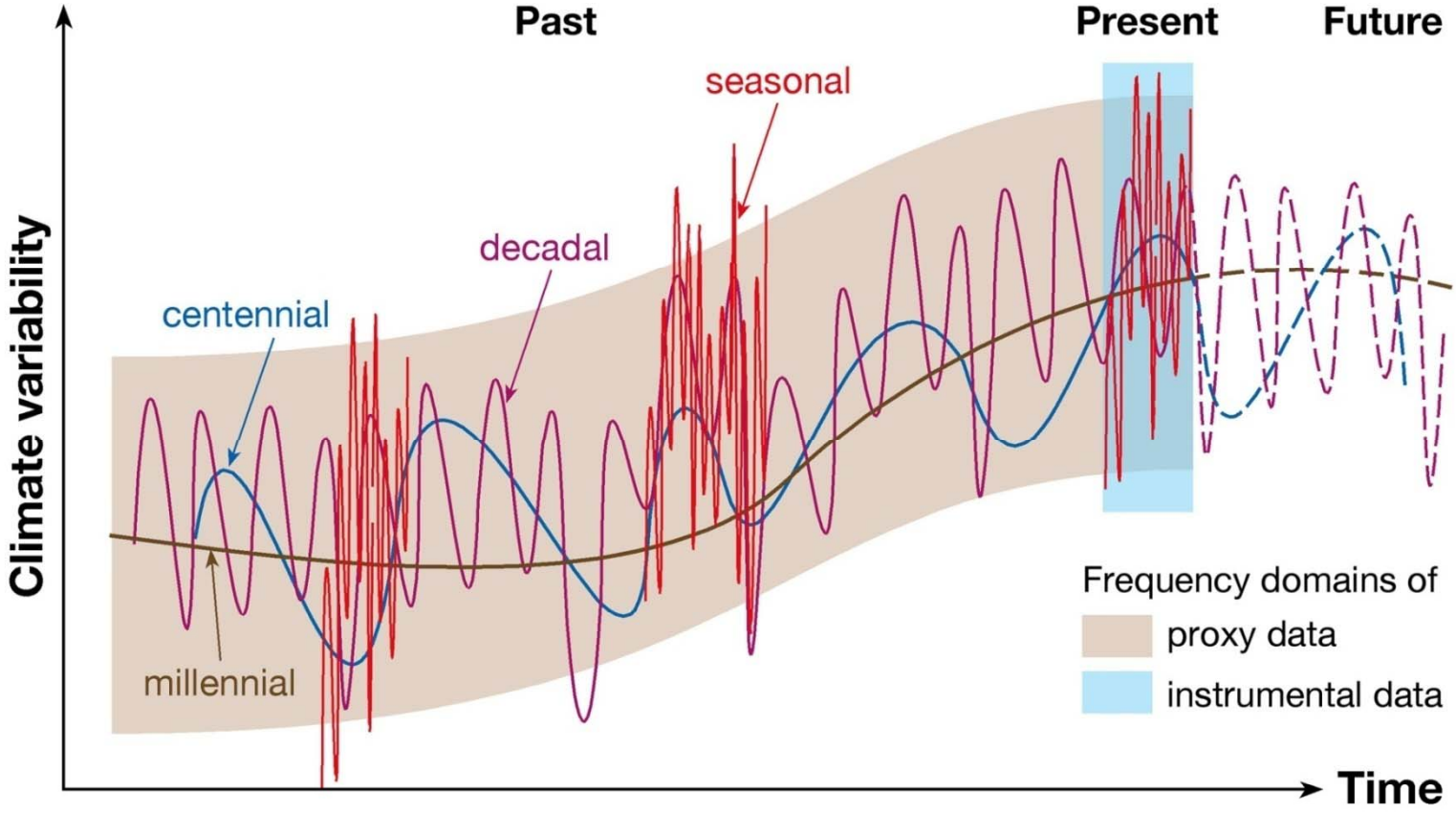
The role of time scales



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Sources for palaeoclimate data

A multi-archive approach:

Lake Sediments, Tree Rings, Soils, Peat Bogs, Morphology

in combination with monitoring hydrology, lakes, trees

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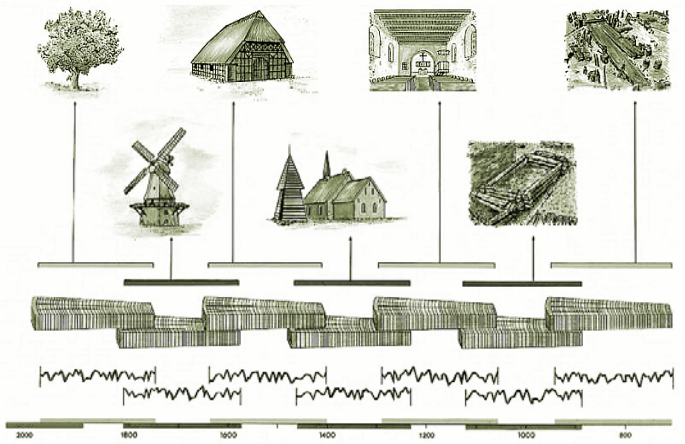
Reading palaeoclimate information

Old living trees

Crossdating of tree ring time series



Historical Buildings

Long and well-dated tree ring chronologies from archaeological sources available for the last 1000 years from our cooperation partner DAI (German Archaeological Institute)

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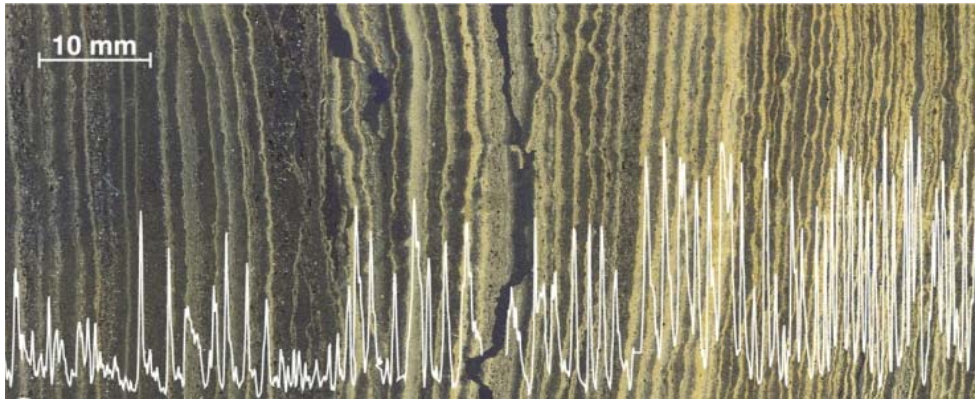
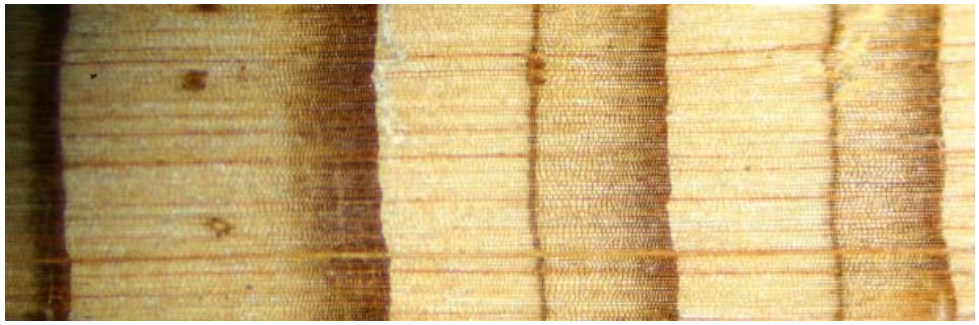
Merging Instrumental and Geological Times



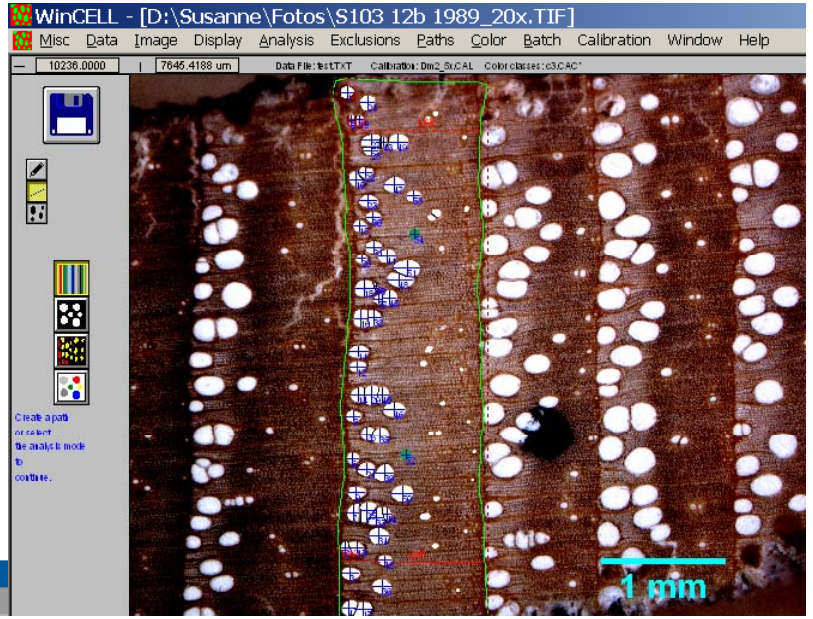


Novel Concept:

Reducing Time Resolution in Geoarchives:

Seasonal Resolution in Varved Lake Sediments and Tree Rings

Cell Sizes as Hydrological Proxy



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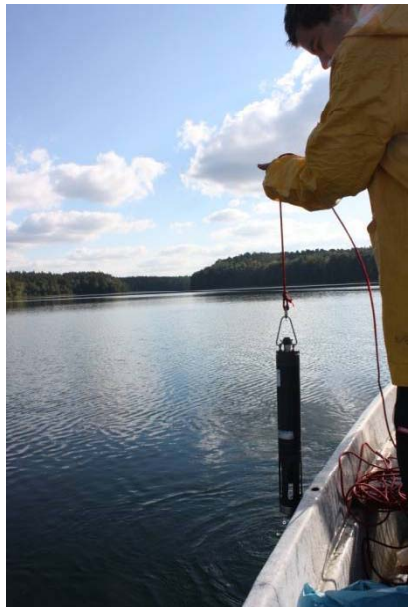
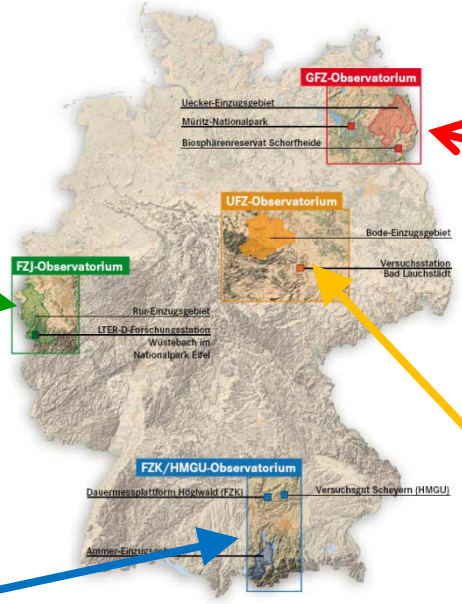
TERENO Network of ‚Palaeo-stations'

NE German Lakes



Eifel Maar Lakes



Ammersee

Jues-See, Harz

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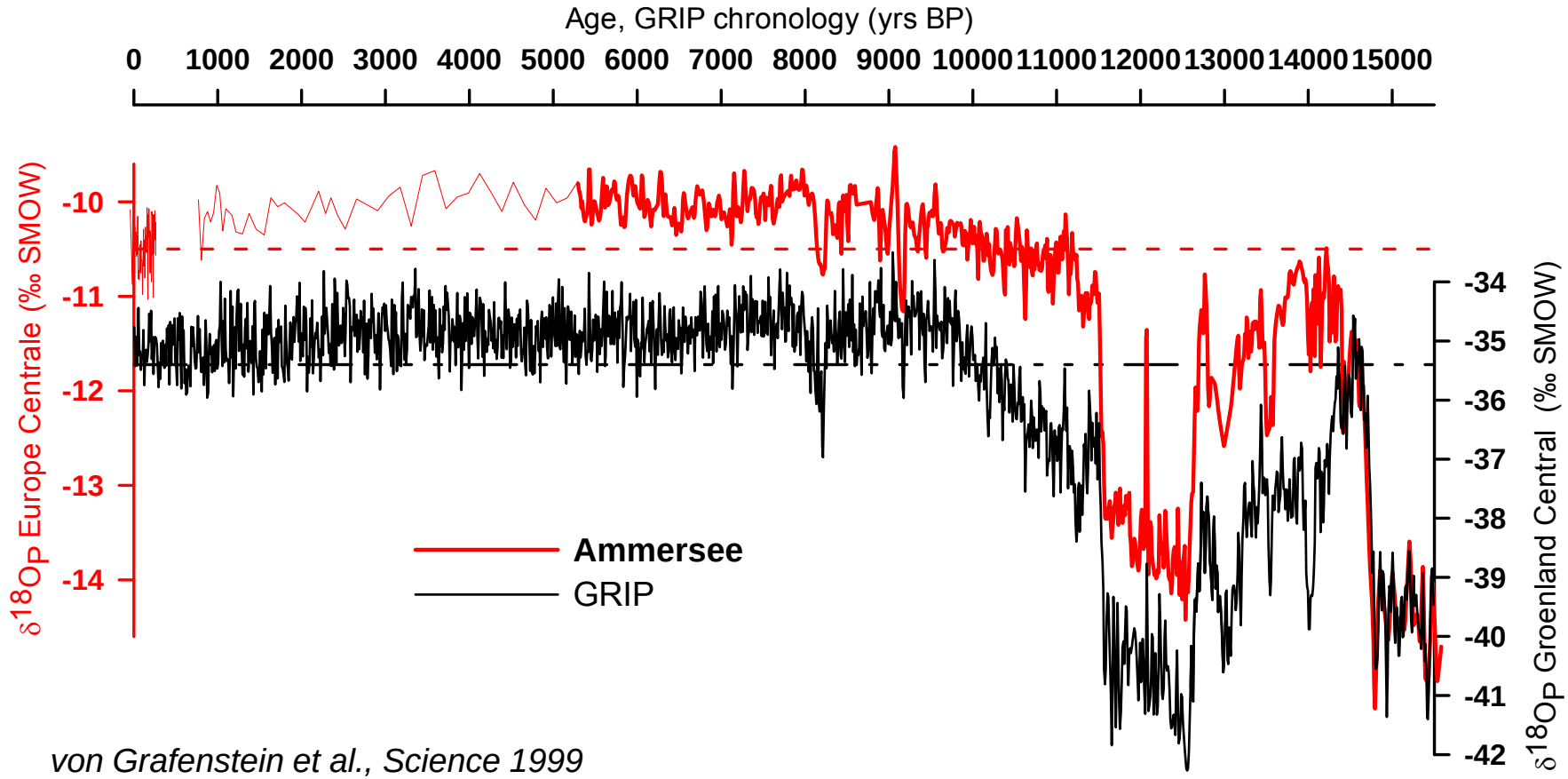
The Lake Ammersee Palaeotemperature Record



von Grafenstein et al., Science 1999

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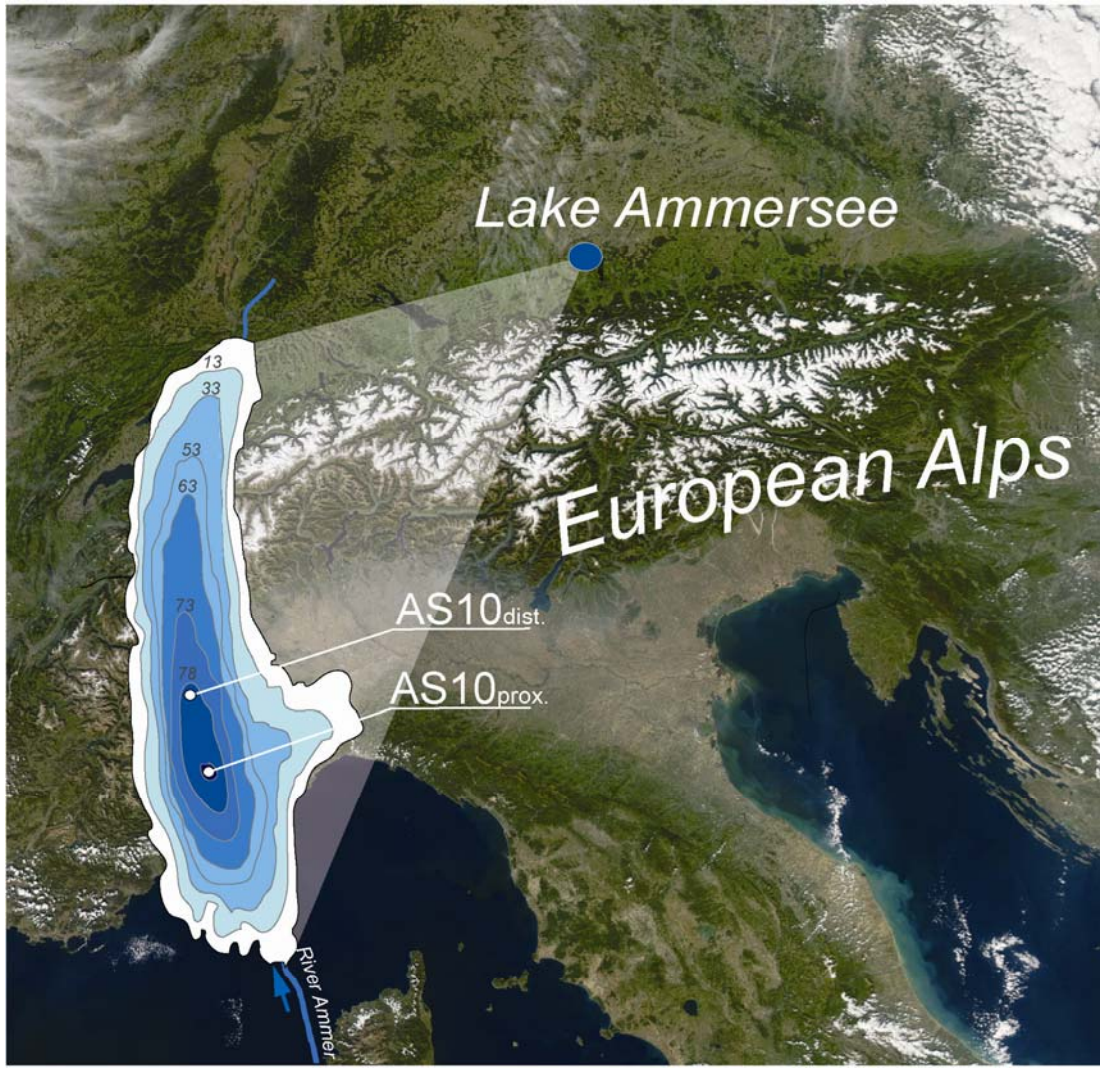
Lake Ammersee: An excellent Palaeoflood Archive



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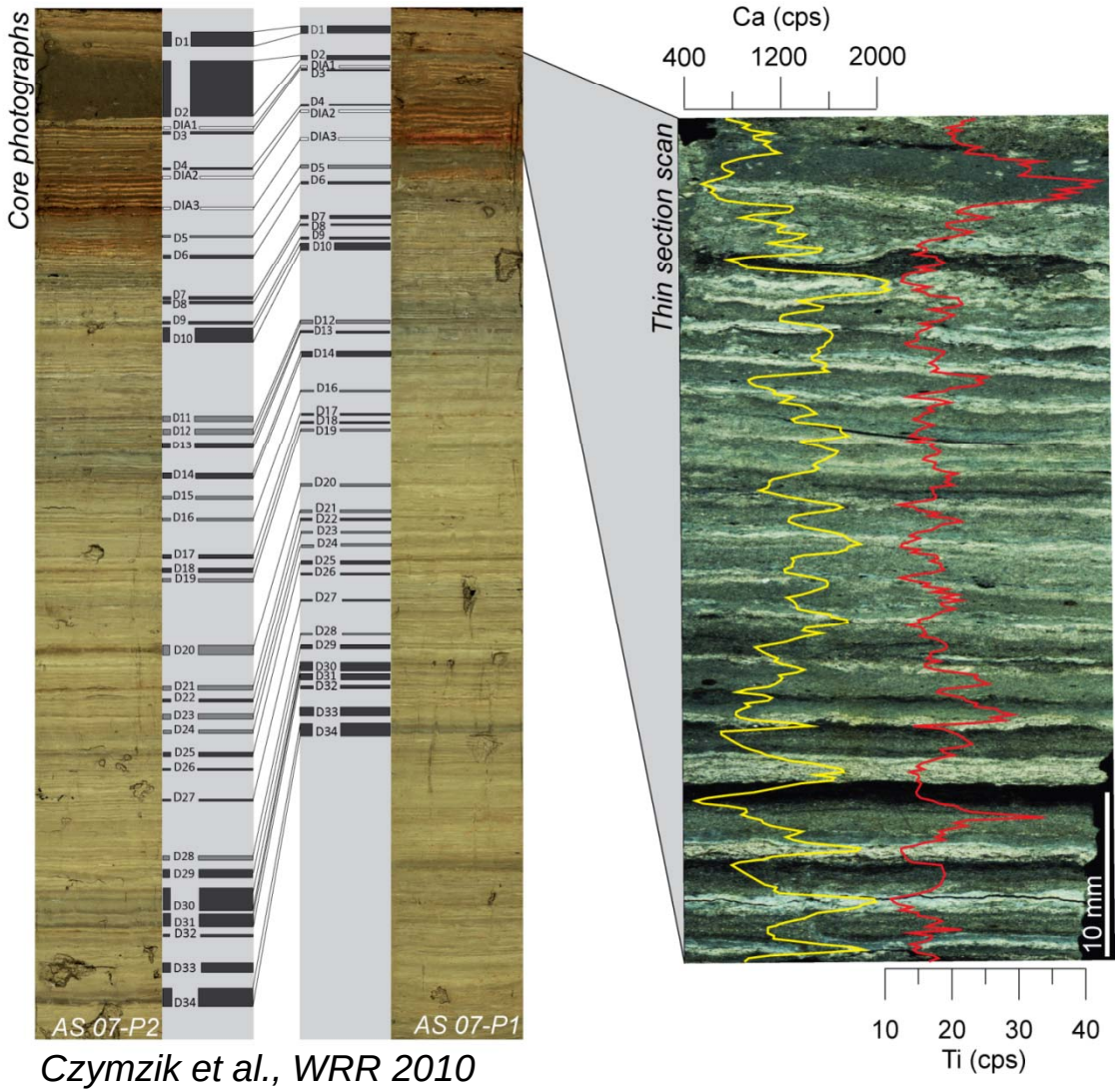

Czymzik et al., WRR 2010

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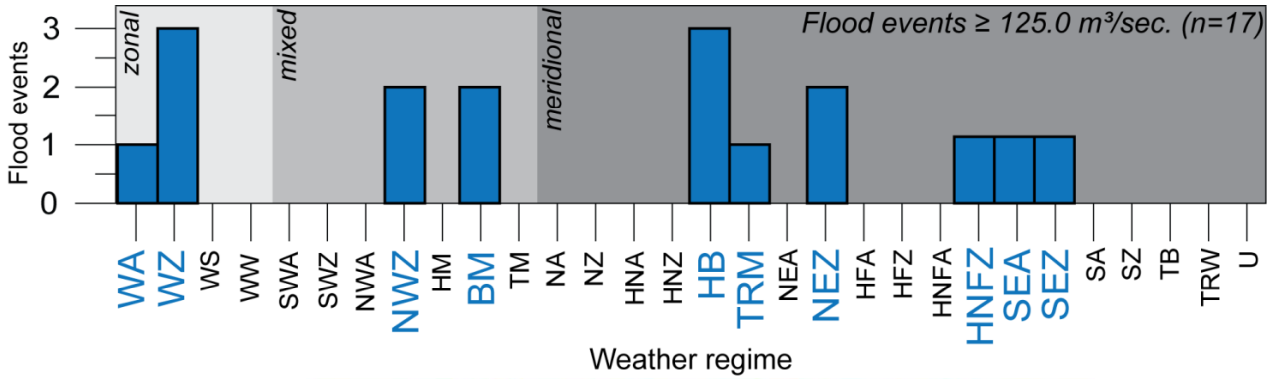
The Ammersee Palaeoflood Archive: Calibration



Czymzik et al., WRR 2010

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Links to the Eifel: Lake Meerfelder Maar sediment data

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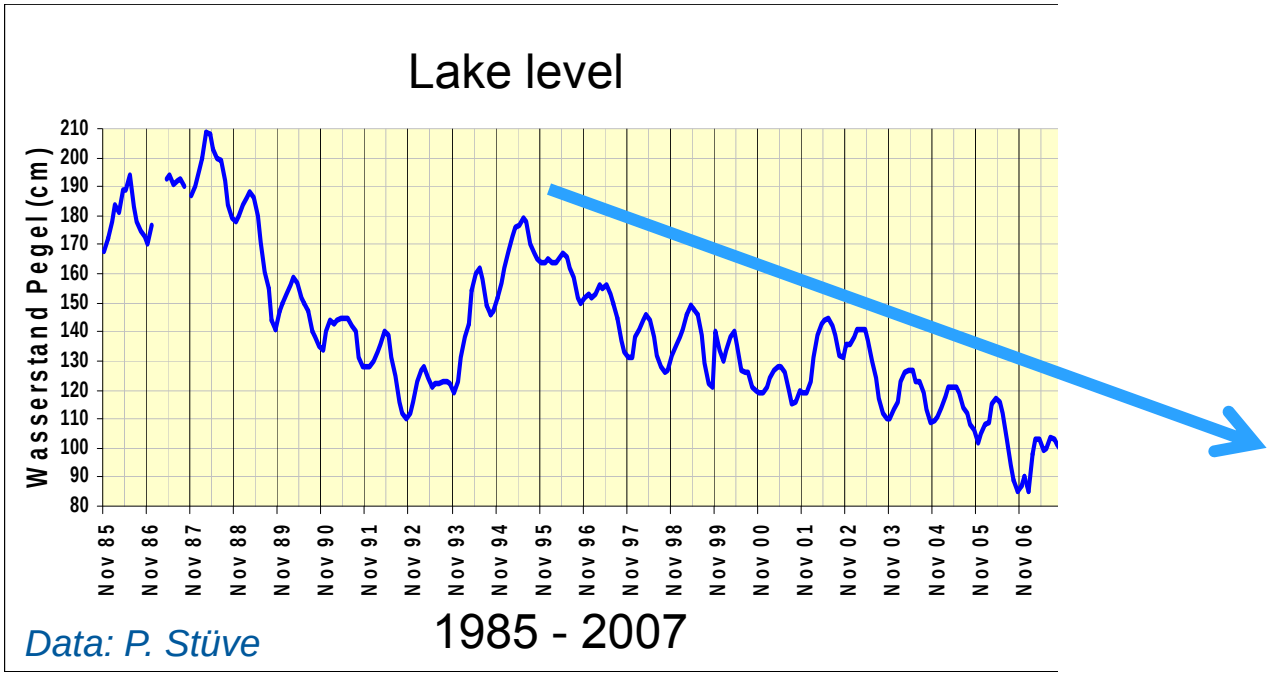
Lake Level Changes in TERENO NE

Lake Fürstenseer See



Data: P. Stüve

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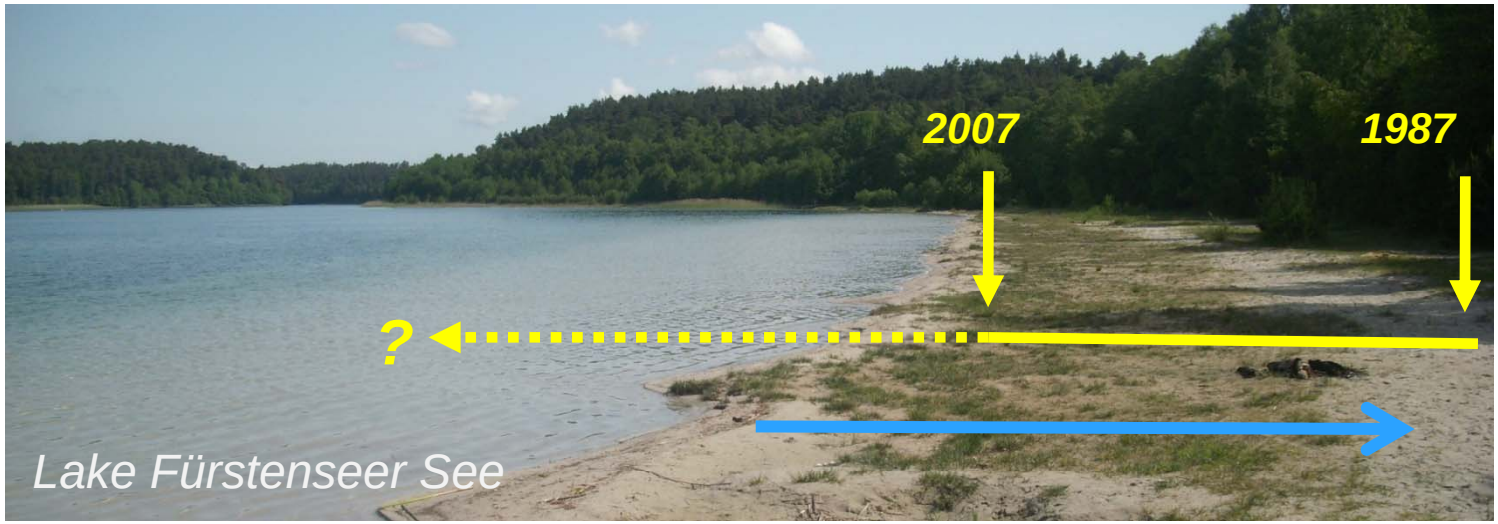
Lake Level Changes in TERENO NE



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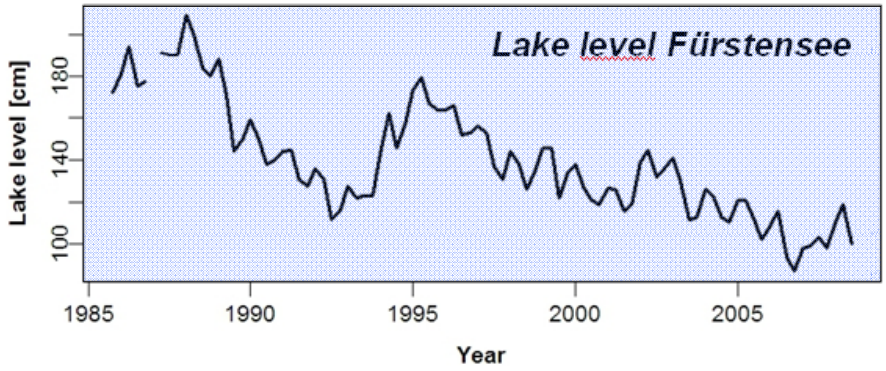
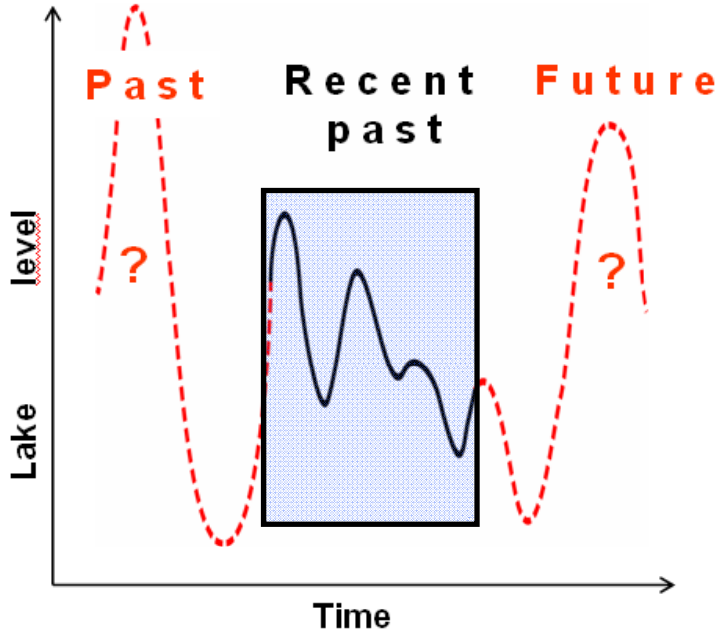
Lake Level Changes in TERENO NE





In order to provide

meaningful future projections

we must understand

the driving mechanisms

and the variability of the system

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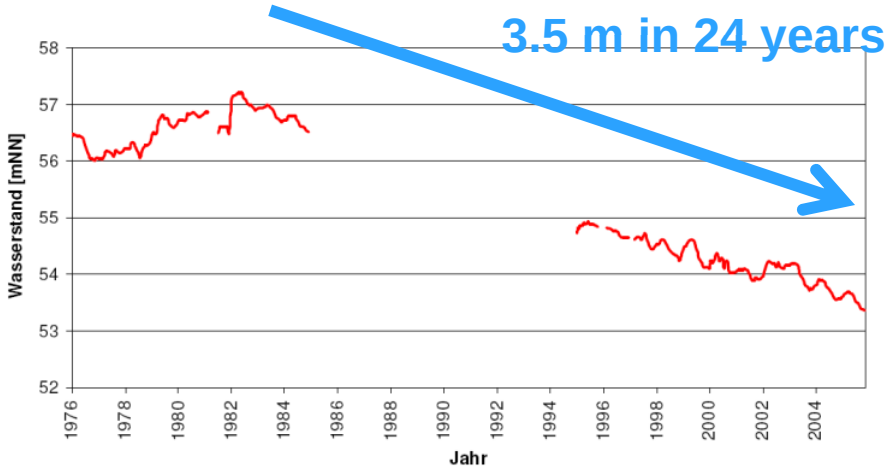
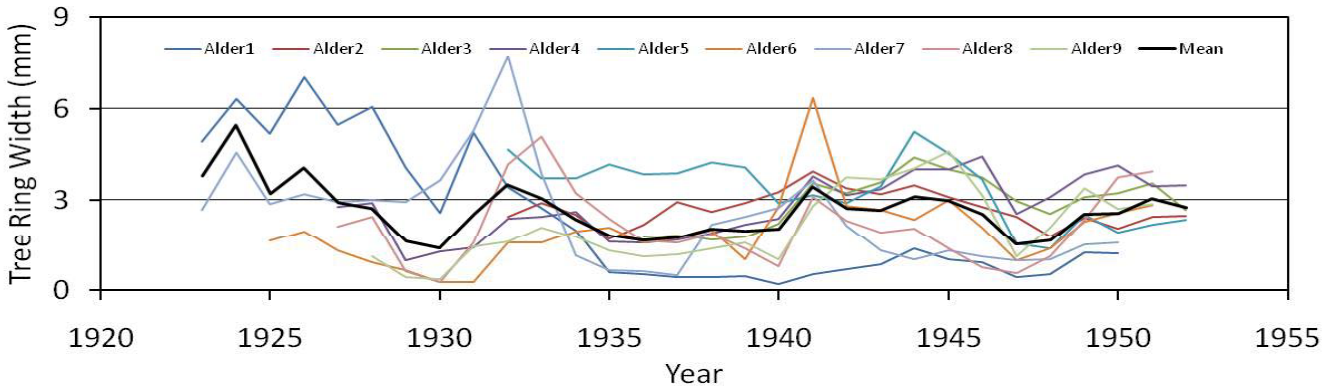
Lake Level Changes in TERENO NE





Tree ring ananlyses: Growth period (= life time) 1923 – 1952

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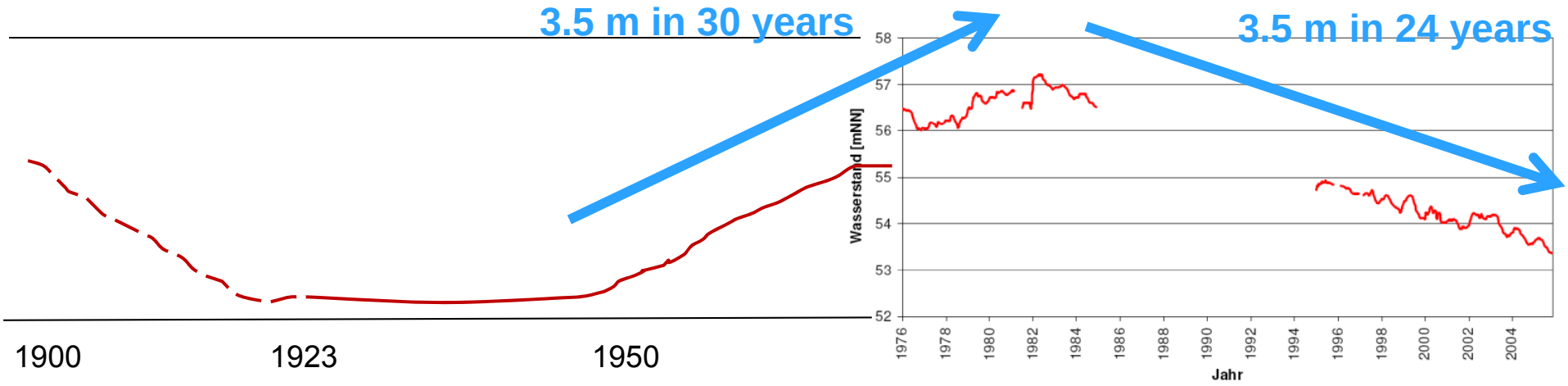
Lake Level Changes in TERENO NE

Extending the time series into the recent past



- Highly dynamic hydrological system: 3.5 m sea level rise and fall in 60 years!
- Mechanisms not understood
- Simple explanations are misleading

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Lake Level Changes in TERENO NE

Influencing factors: Working Hypothesis

- Climate/weather (precipitation, summer temperatures)
- Catchment vegetation
- Man-made hydrological changes (since 13th century)

Scientific Questions

- How do these factors interact?
- What are the dominating factors?
- What are the potential amplitudes of lake level changes?
- What is the potential dynamics/velocity of change?

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Contribution and goals of the CT Palaeoclimate

- to provide information about medium to long term processes
- to establish a palaeo-station network for all four TERENO sites
- to combine palaeo data with recent monitoring
  - *to extend time series into the past*
  - *to calibrate palaeo data*

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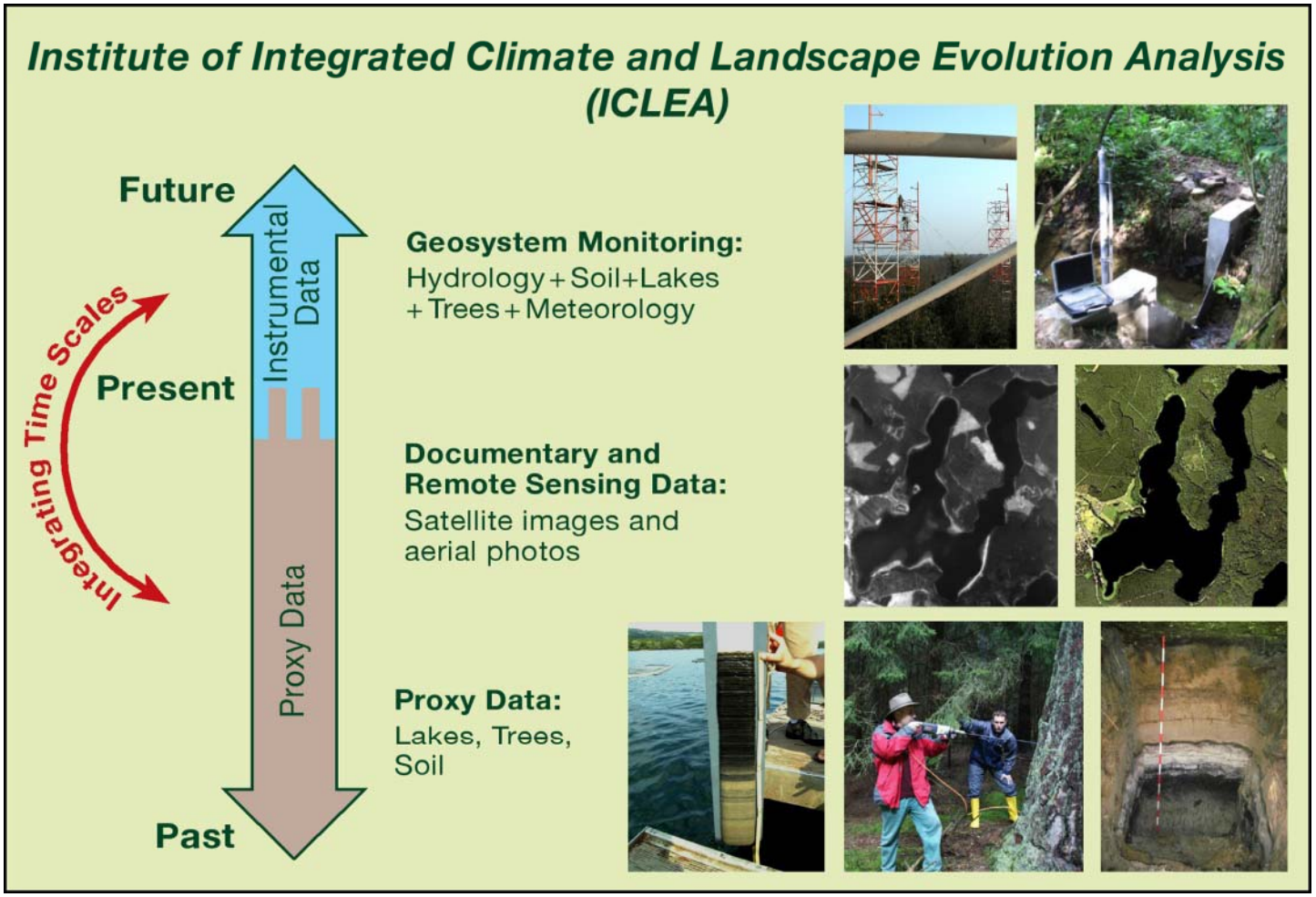
News from fund raising: HGF Virtual Institute 2012-2016



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Wissen lockt. Seit 1456
IG i PZ PAN
b-tu Brandenburgische Technische Universität Cottbus
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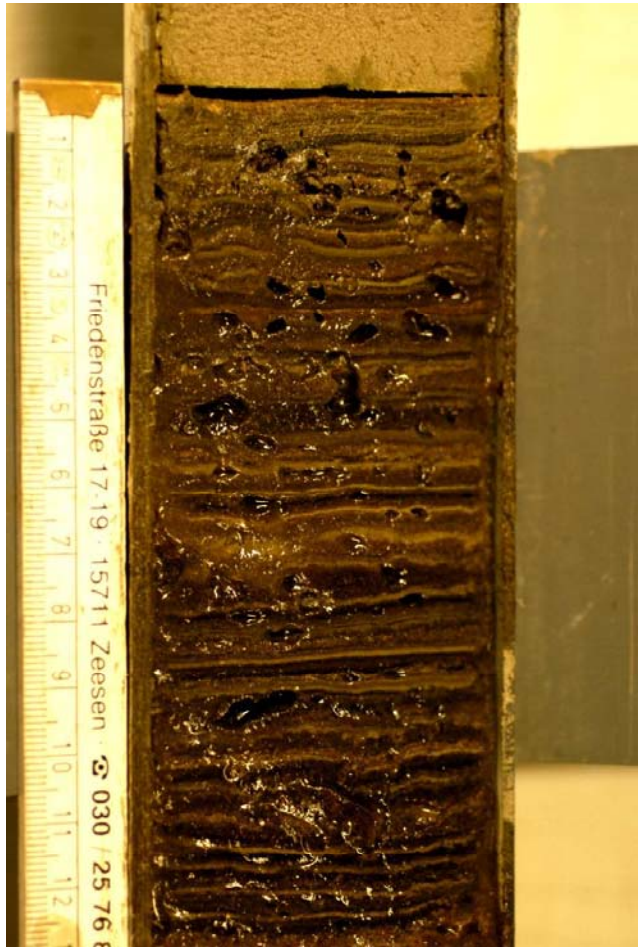
New Geoarchives

Discovery of 2 new lakes with annually laminated lake sediments



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Present coring campaign

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