

Holocene changes in vegetation, treeline location and climate at the Khatanga region, northern Siberia

- Derived from a lacustrine pollen record -

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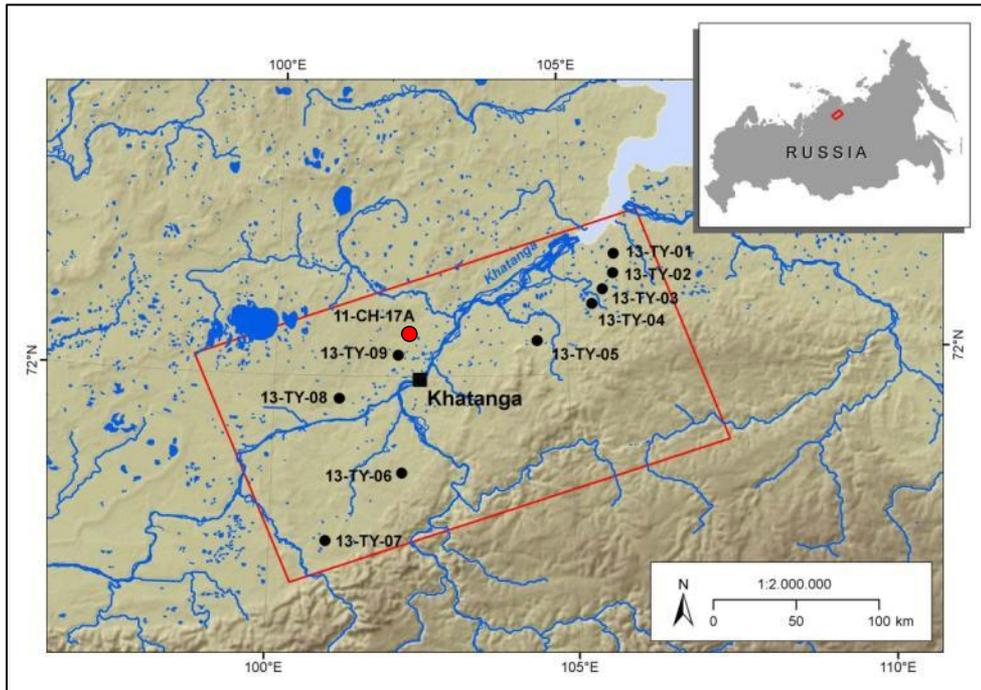


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Location

- Treeline ecosystem
 - Data gathering since 2011
 - About 20 lakes for comparison



Lake 17A is located at $72^{\circ} 14' 32.46''$ N $102^{\circ} 14' 44.3394''$ E



Lake and its surrounding vegetation

Why to study treeline and *Larix*?

- Some properties are vague
 - Time lag of „movement“
 - Age of trees
 - Rejuvenation
 - Unclear inhibiting/strengthening factors
 - **Distance of tree movement unclear**
- Dominant element at the treeline
 - General composition of landscape
 - Underrepresented pollen in lake sediments
 - Value of pollen production not known
 - **Pollen dispersal widely unknown**



Arctic treeline overview



Example of Larch trees



Vegetation survey and monitoring



Gravity coring



→ Lakesediments, Vegetation surveys, Polygons, Diatoms, Simulations

Pollen diagram: Lake 17

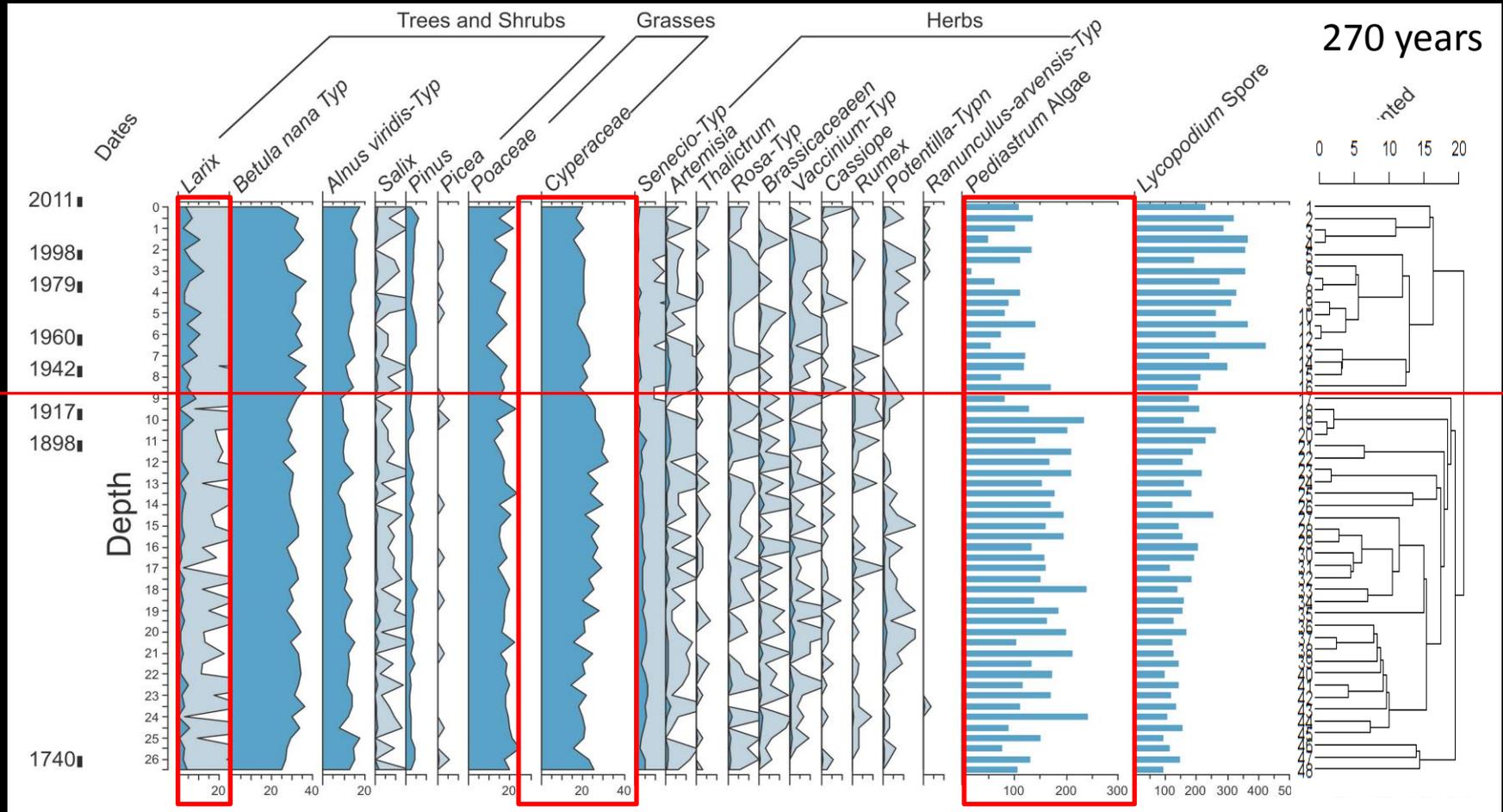


Diagram of pollen percentages (blue) with exaggeration (factor 10; light blue) and results of Cluster Analysis

Pollen influx

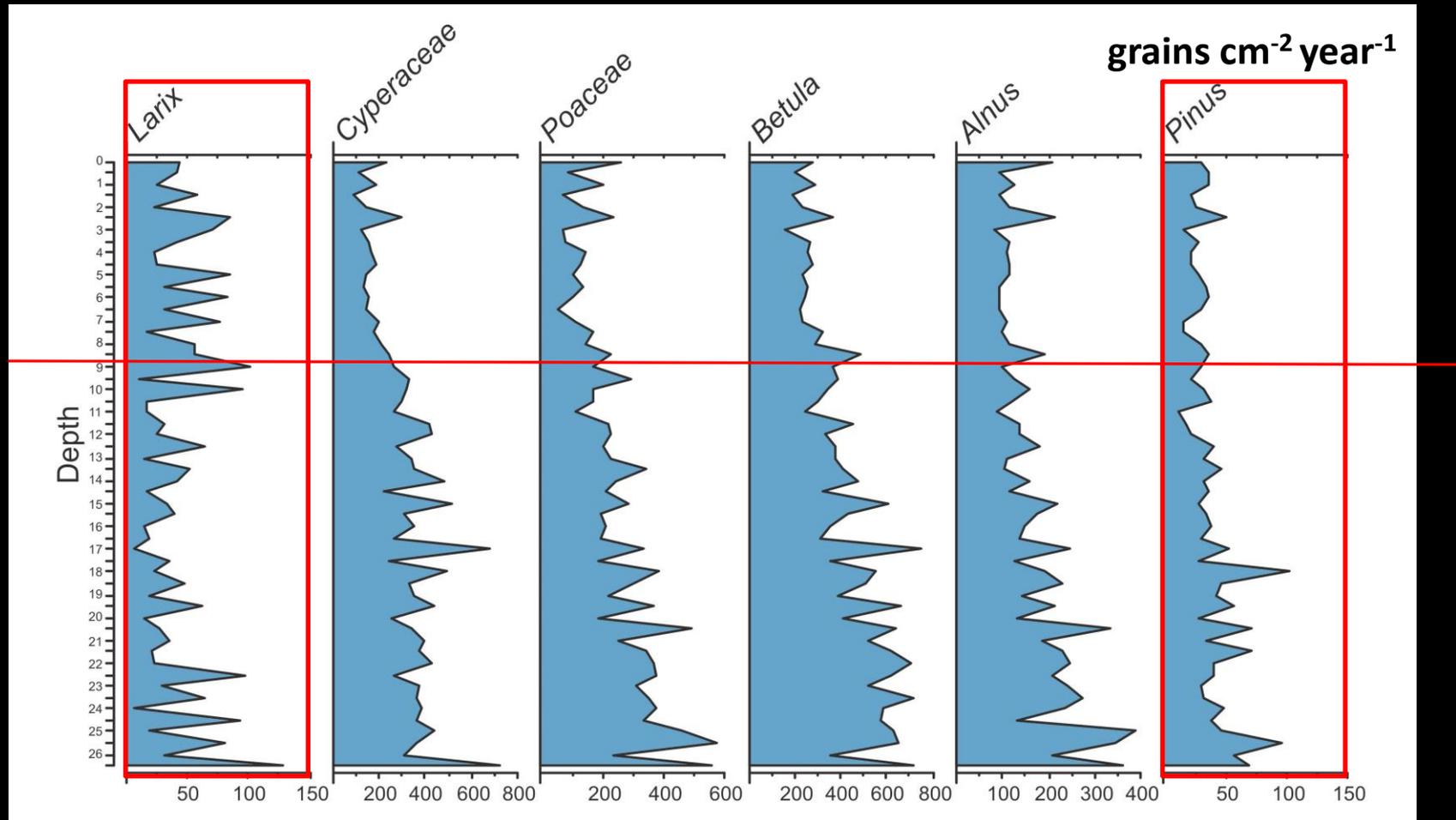
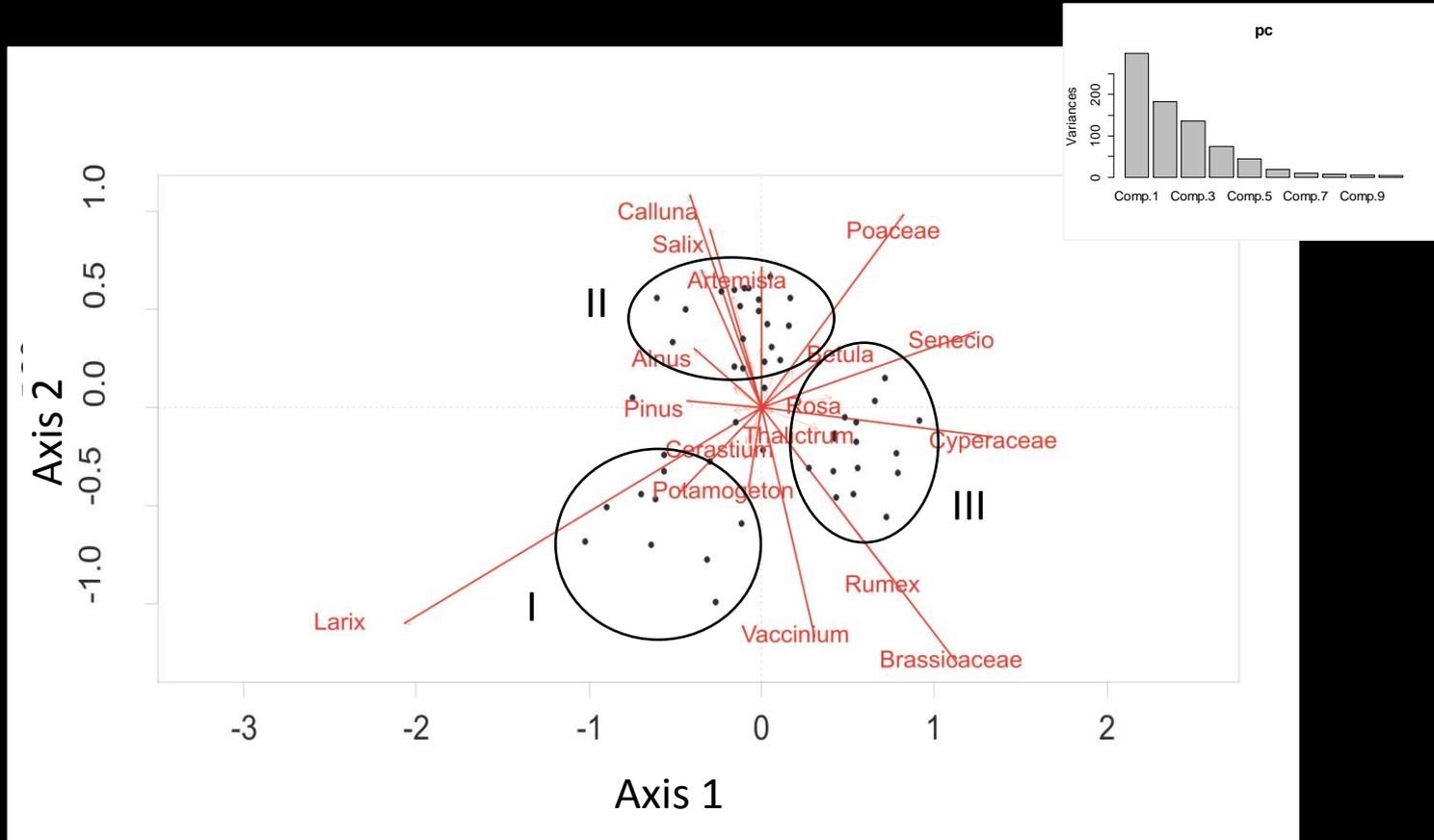


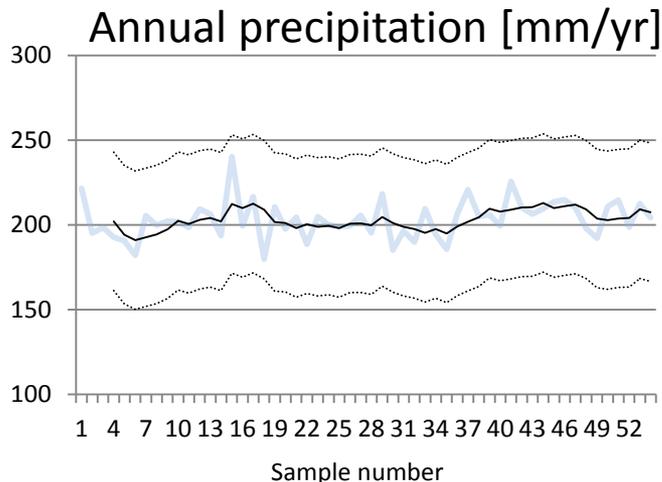
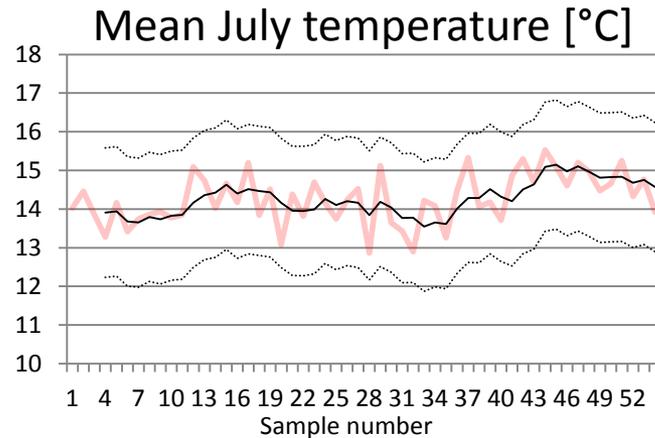
Diagram of influx rates [grains cm⁻² year⁻¹]

Statistical information



PCA overview with principal component taxa (red) and samples correlated to these (black dots)

Transferfunction: WA-PLS model



- Reconstruction model
 - Temperature
 - Precipitation
- Changes are slight
 - Based on pollen data set

Recap of results

- High resolution of Late Holocene
- Zonation is visible
 - Last 70 years show a variations in composition of taxa
 - Increase of *Larix* pollen
- Statistics reveal changes in vegetation composition
 - Within the last 270 years
 - Climate changes assumed to be small (WA-PLS)
 - Pollen influx does show trend → **Where does it come from?**

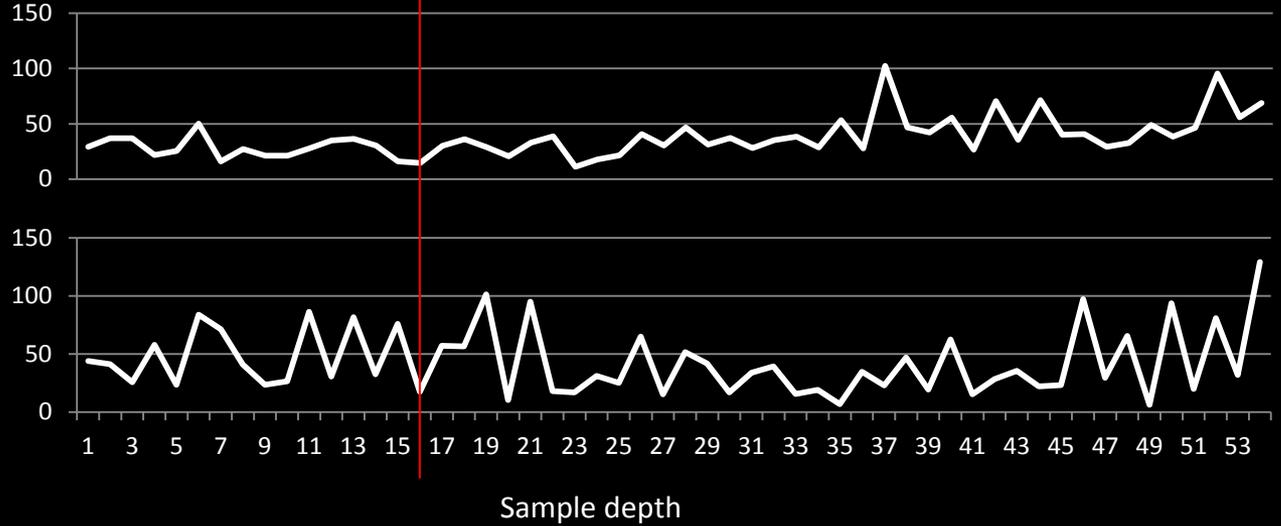


Pinus



Larix

grains cm-2
years-1



Impression of Larix at the Lake 11-CH-17

(R.Zibulski, 2011)

Outlook

- Dispersal of *Larix* pollen
 - Flight distance
 - Sink rate
 - Pollen productivity estimates
- Landscape reconstruction
 - More analyses of other cores/regions
 - Correlation with climate factors
 - Local features inhibit the analysis
- Combination of methods
 - Palynology, vegetation analyses and genetics

→ Reveal the accurate composition of vegetation

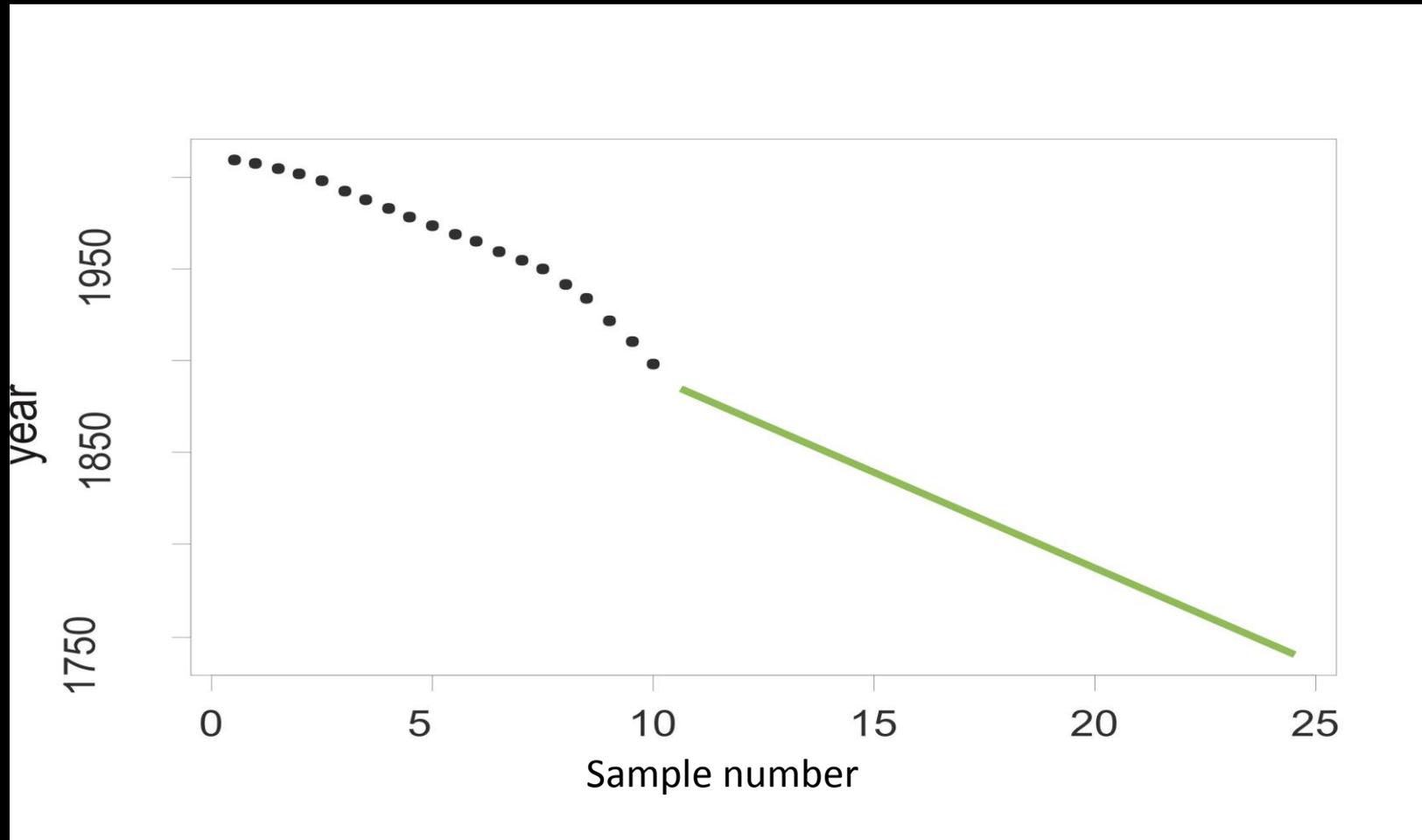
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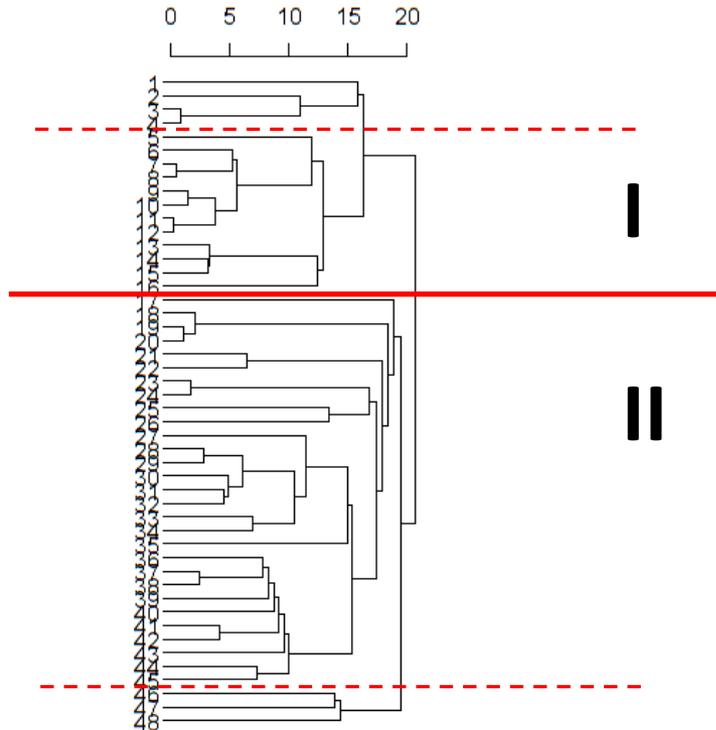


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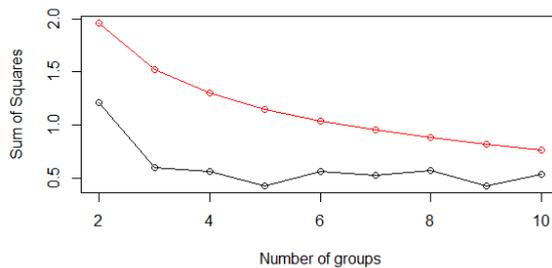
Any Questions?



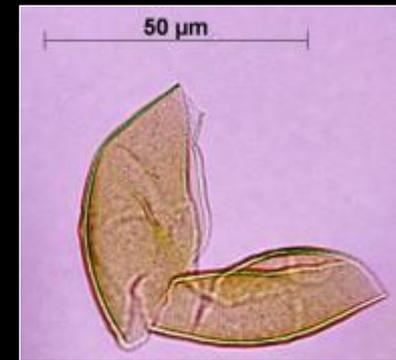
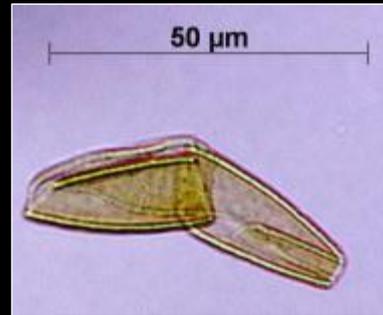




- 54 samples, 0,5 cm each
 - 27 cm core length in total
- 2 main zones (I & II)
 - Optical ly
 - A third and fourth one can be assumed



- Broken Stick
 - core does not show high variation, nor further zonation



13-TY-04-I



13-TY-04-II



References

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