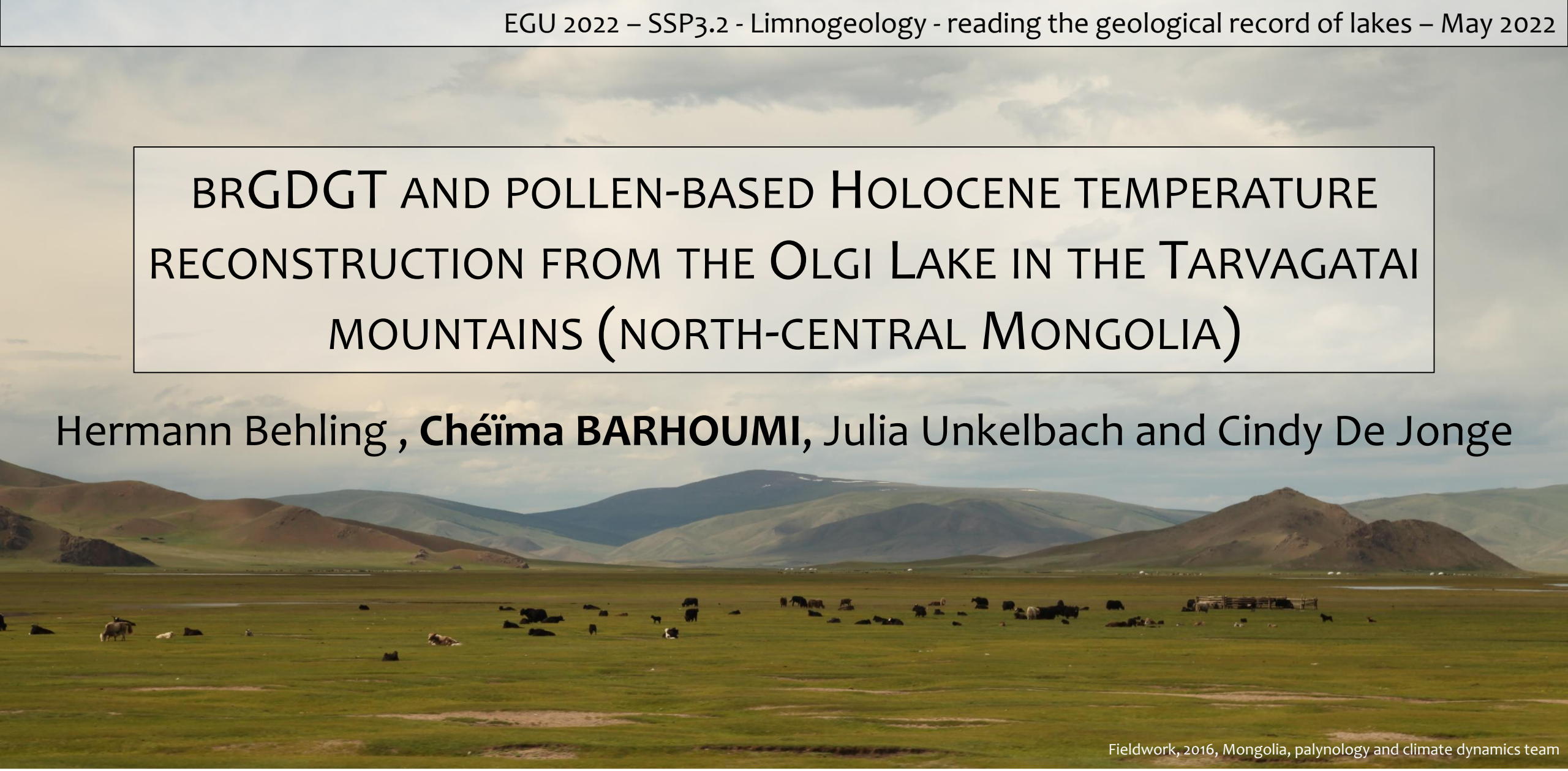
brGDGT and pollen-based Holocene temperature reconstruction from the Olgi Lake in the Tarvagatai mountains (north-central Mongolia)

Hermann Behling , **Chéïma BARHOUMI**, Julia Unkelbach and Cindy De Jonge



Fieldwork, 2016, Mongolia, palynology and climate dynamics team

EGU General Assembly 2022

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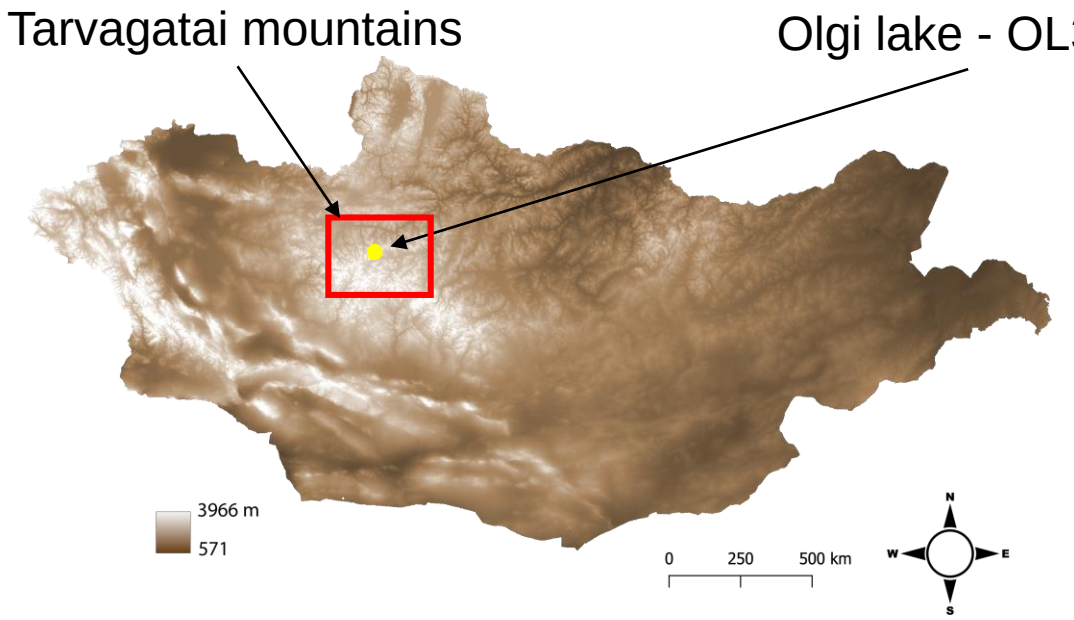
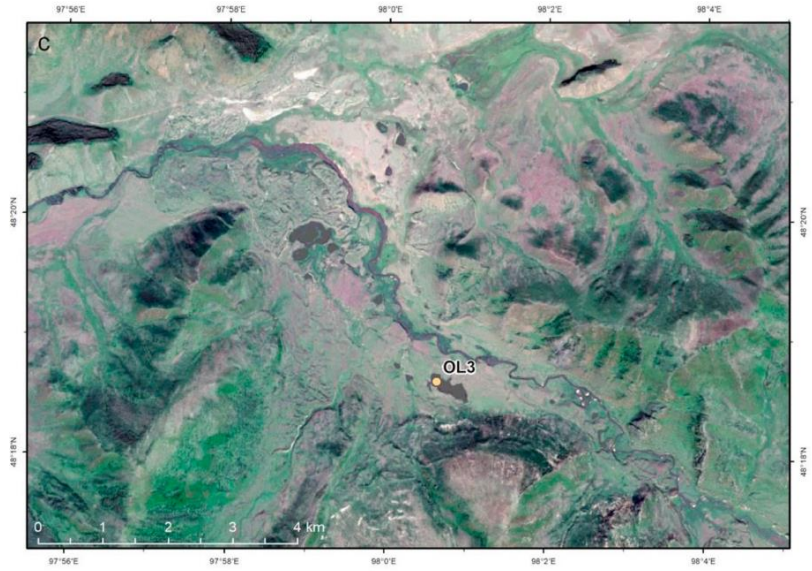
Palynology and Climate Dynamics University of Göttingen

ETH zürich

Tarvagatai mountains – Olgi Lake - OL3 core

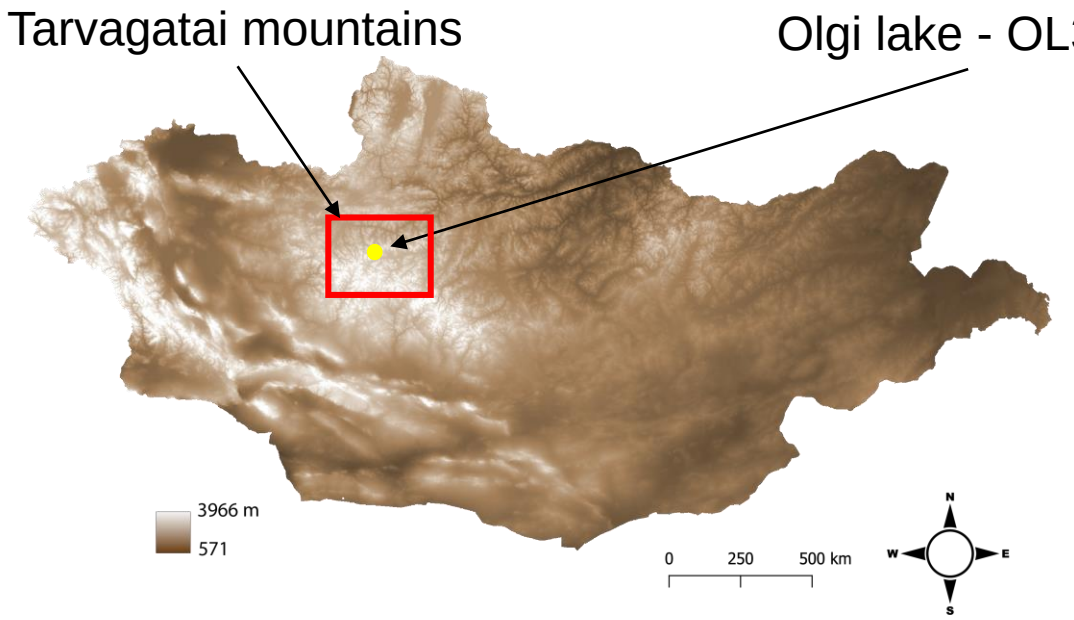


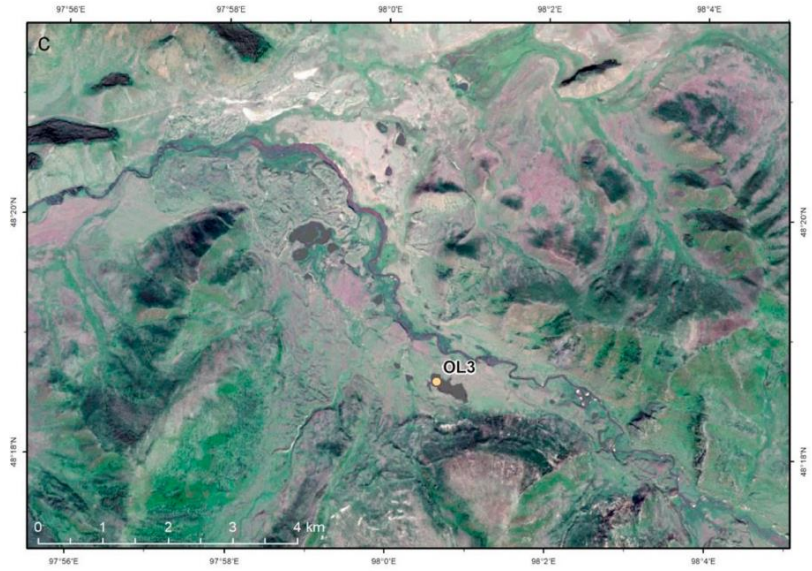


→ Tarvagatai Nuruu National Park, north-western part of the Khangai Mountains

→ Forest-steppe ecosystems (dry steppe / forest patches / meadow steppe)

Tarvagatai mountains – Olgi Lake - OL3 core





→ Tarvagatai Nuruu National Park, north-western part of the Khangai Mountains

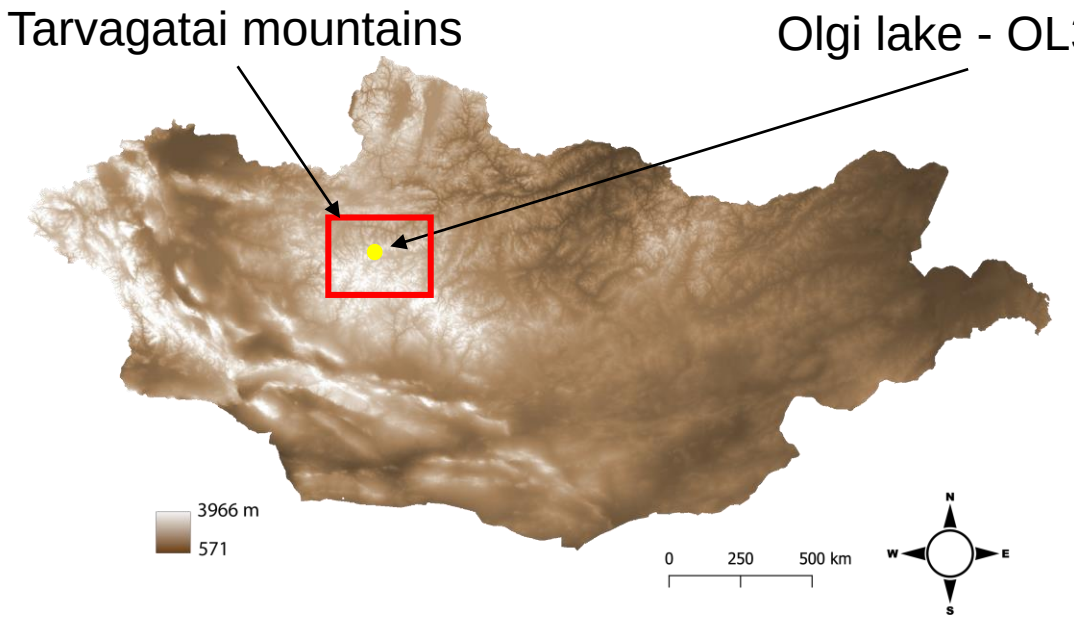
→ Forest-steppe ecosystems (dry steppe / forest patches / meadow steppe)

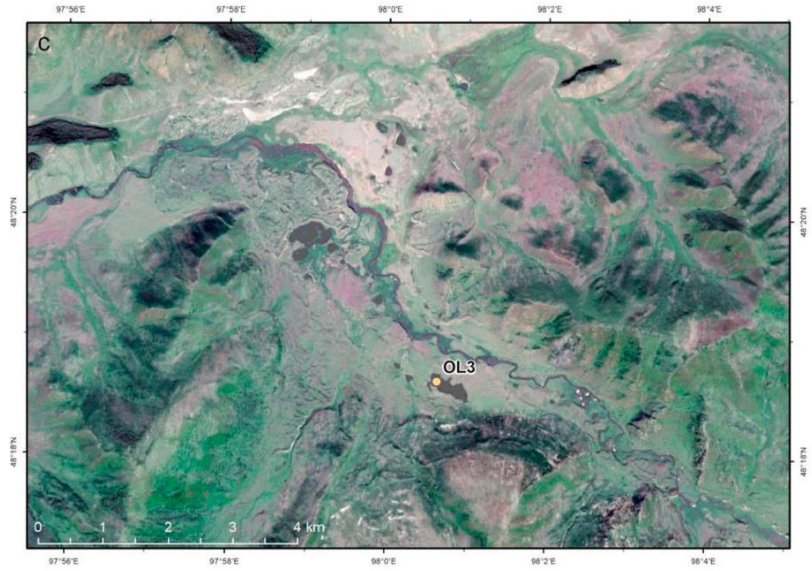
→ Fieldwork conducted in 2018

→ OL3 core = Olgi Lake (glacial lake), 238 cm, 2012 m a.s.l.

→ phD of Julia Unkelbach

Tarvagatai mountains – Olgi Lake - OL3 core





Quaternary Science Reviews 266 (2021) 107076

Contents lists available at ScienceDirect

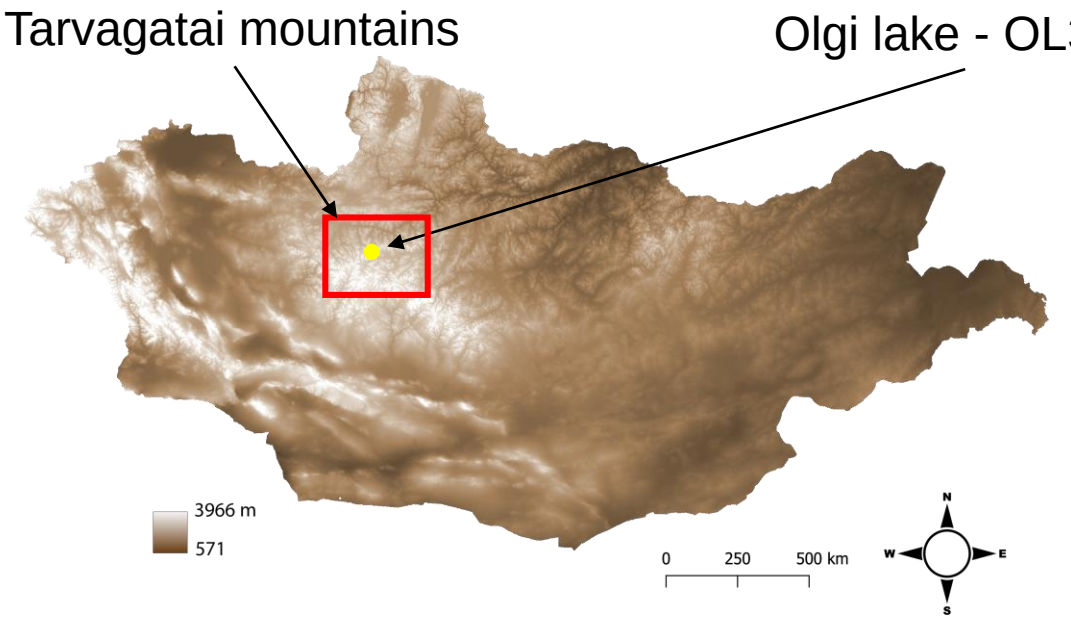
Quaternary Science Reviews

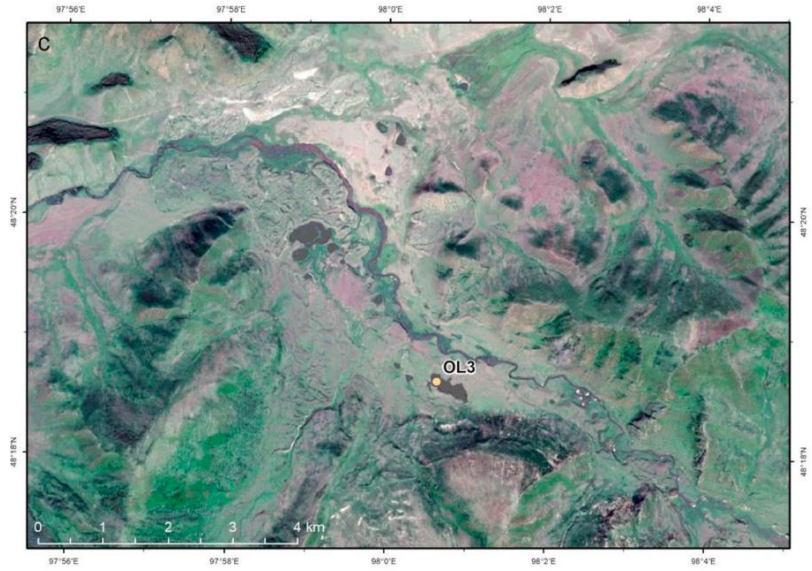
journal homepage: www.elsevier.com/locate/quascirev

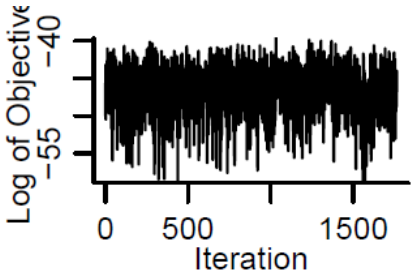
Holocene high-resolution forest-steppe and environmental dynamics in the Tarvagatai Mountains, north-central Mongolia, over the last 9570 cal yr BP

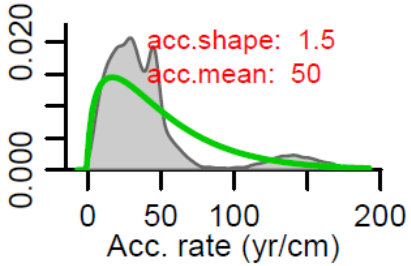
Julia Unkelbach [a, *], Choimaa Dulamsuren [b], Michael Klinge [c], Hermann Behling [a]

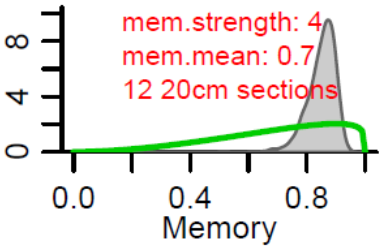
Tarvagatai mountains – Olgi Lake - OL3 core

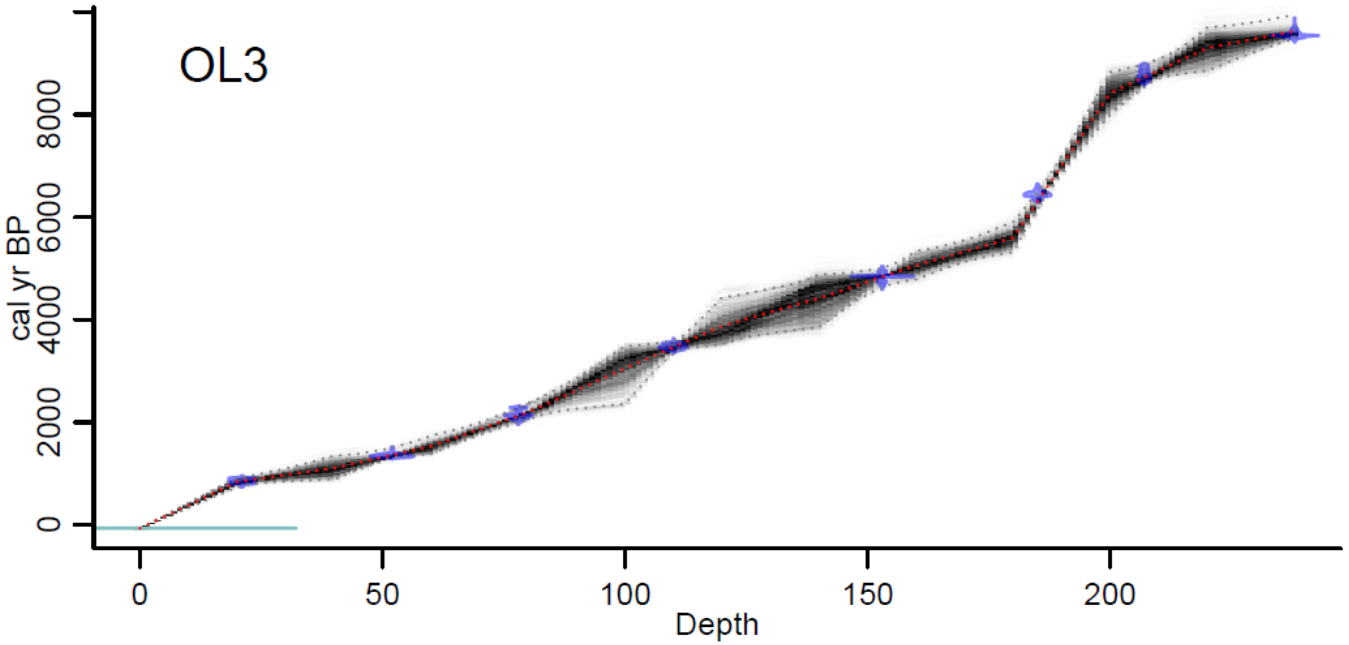




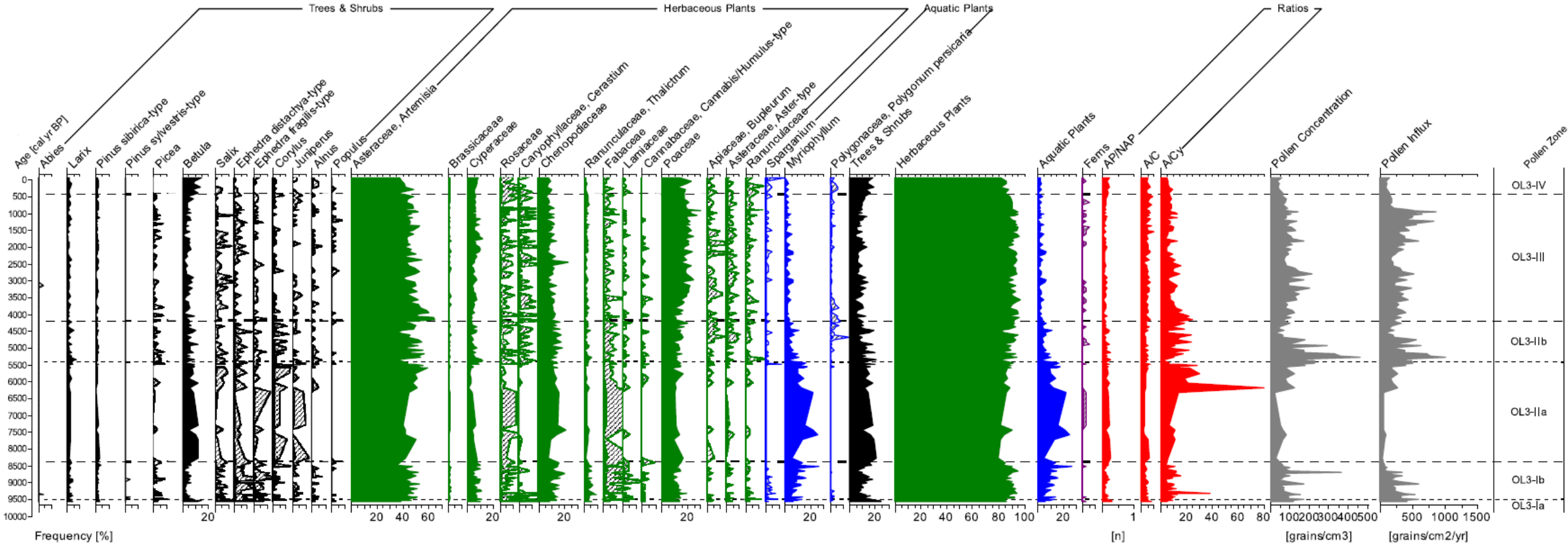








OL3 palynological results (Unkelbach *et al.*, 2021)



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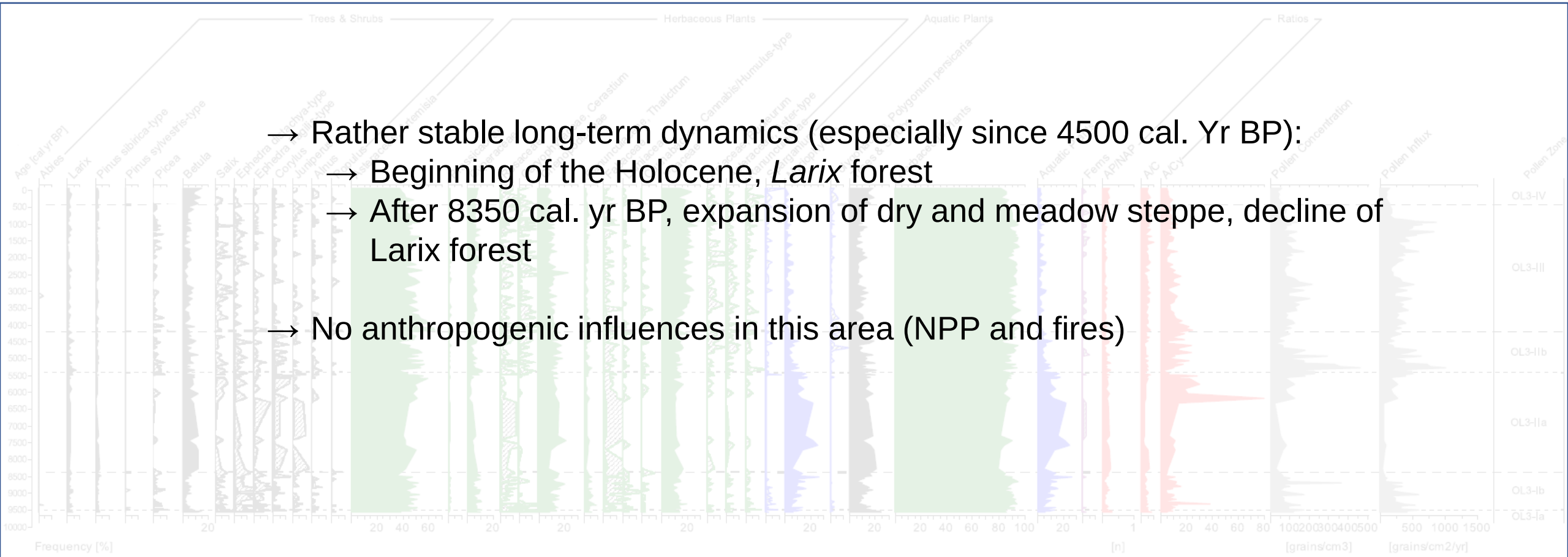
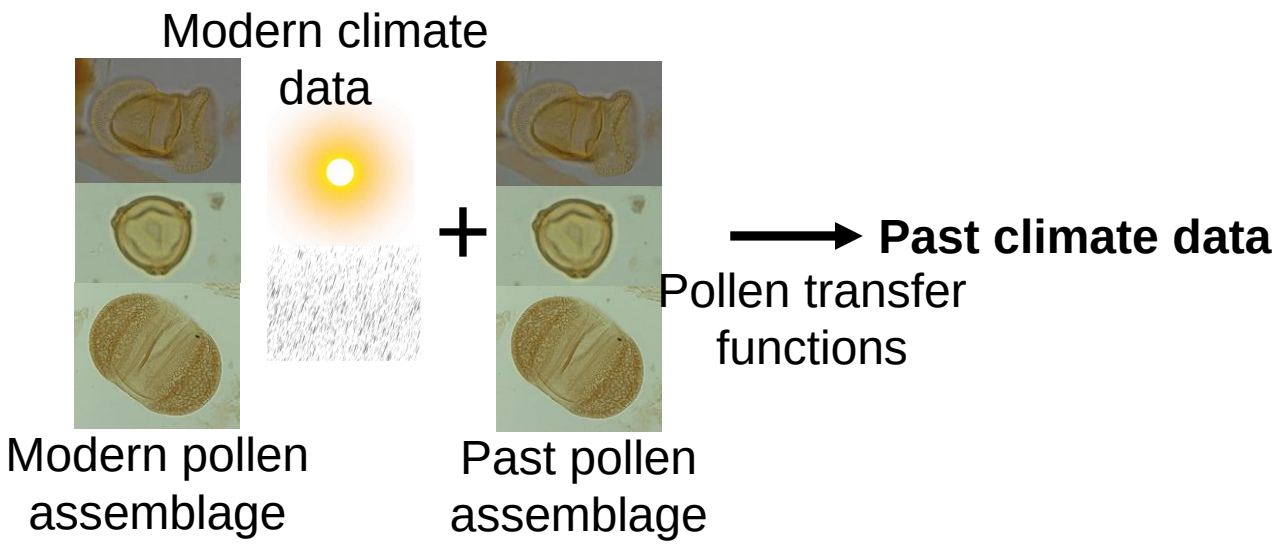


→ Rather stable long-term dynamics (especially since 4500 cal. Yr BP):
→ Beginning of the Holocene, *Larix* forest
→ After 8350 cal. yr BP, expansion of dry and meadow steppe, decline of Larix forest

→ No anthropogenic influences in this area (NPP and fires)

Temperature reconstructions

Pollen transfer functions



→ MAT (Modern Analogue Technique, Guiot, 1990)

→ WAPLS (Weighted Averaging Partial Least-Squares Regression, ter Braak & Juggings, 1993)

brGDGTs

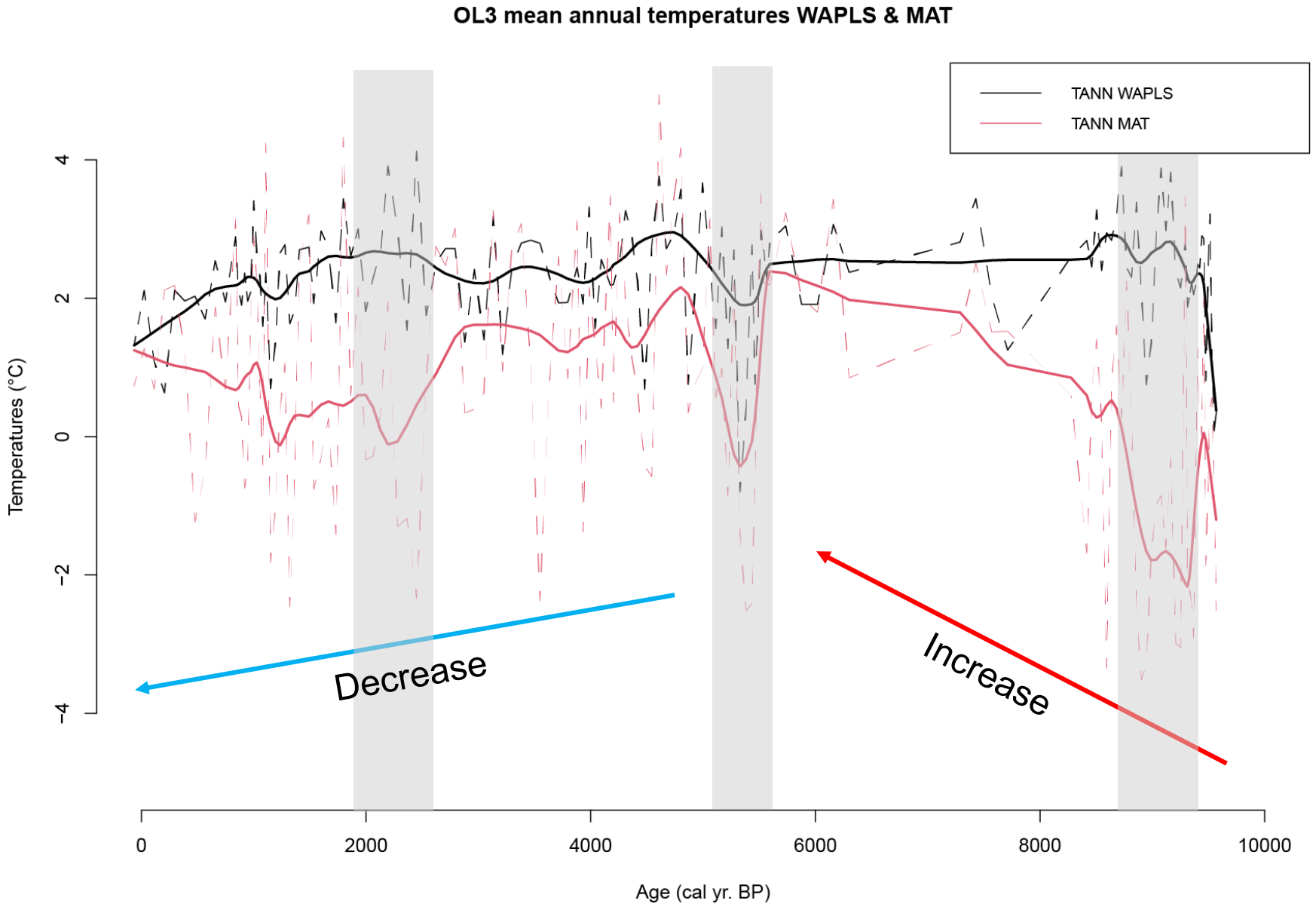
→ Glyceryl Dialkyl Glyceryl Tetraether

→ New molecular biomarkers

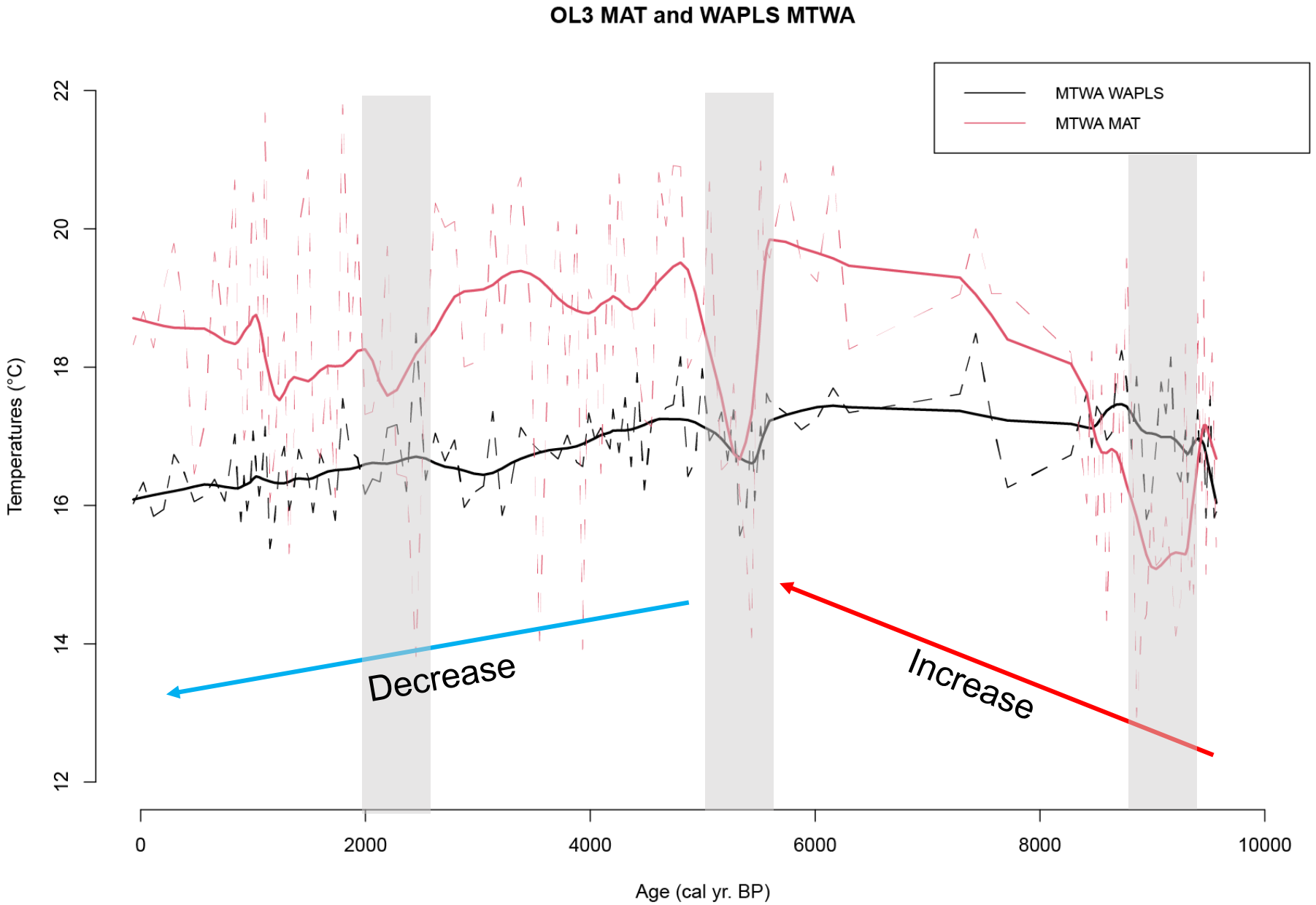
→ Associated with annual or summer temperature

Calibrations depending on the region and the origins of the sediments

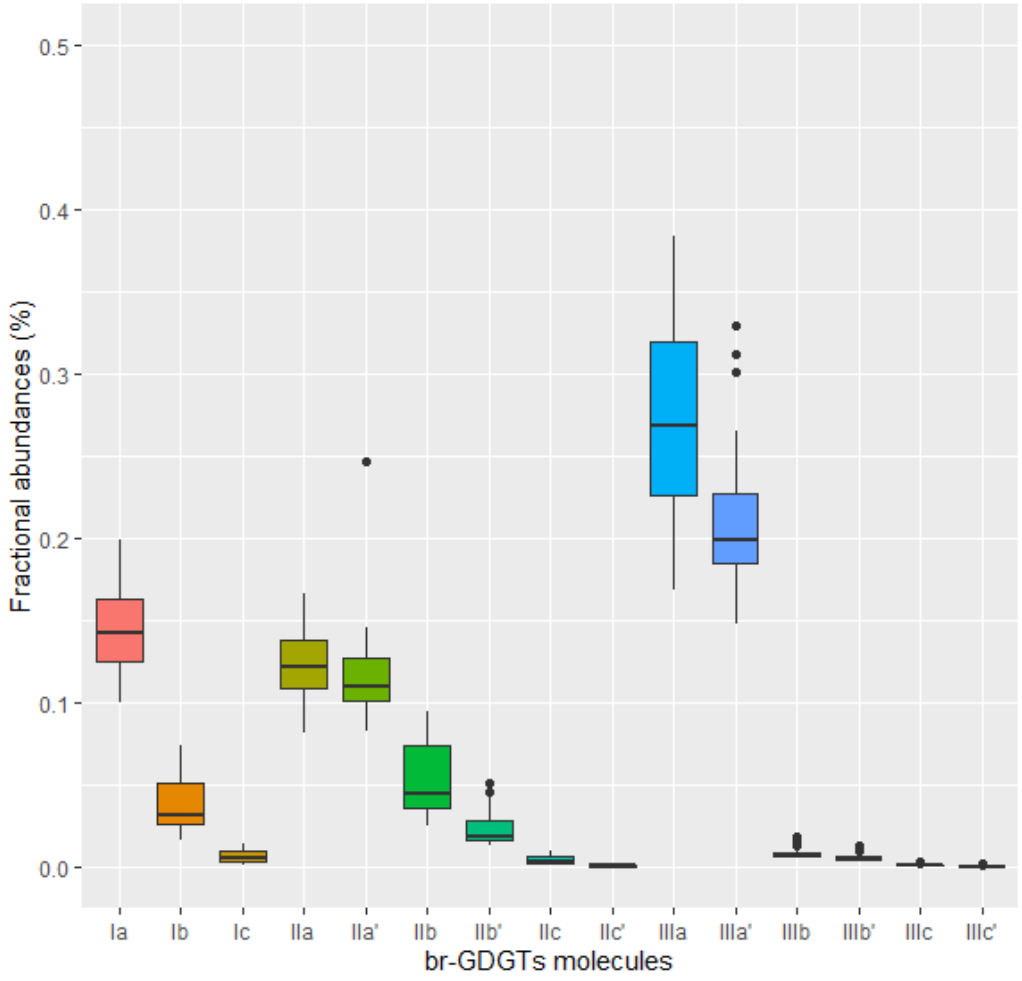
MAT & WAPLS TANN (mean annual temperatures)



MAT & WAPLS MTWA (mean warmest month temperatures)



br-GDGTs composition



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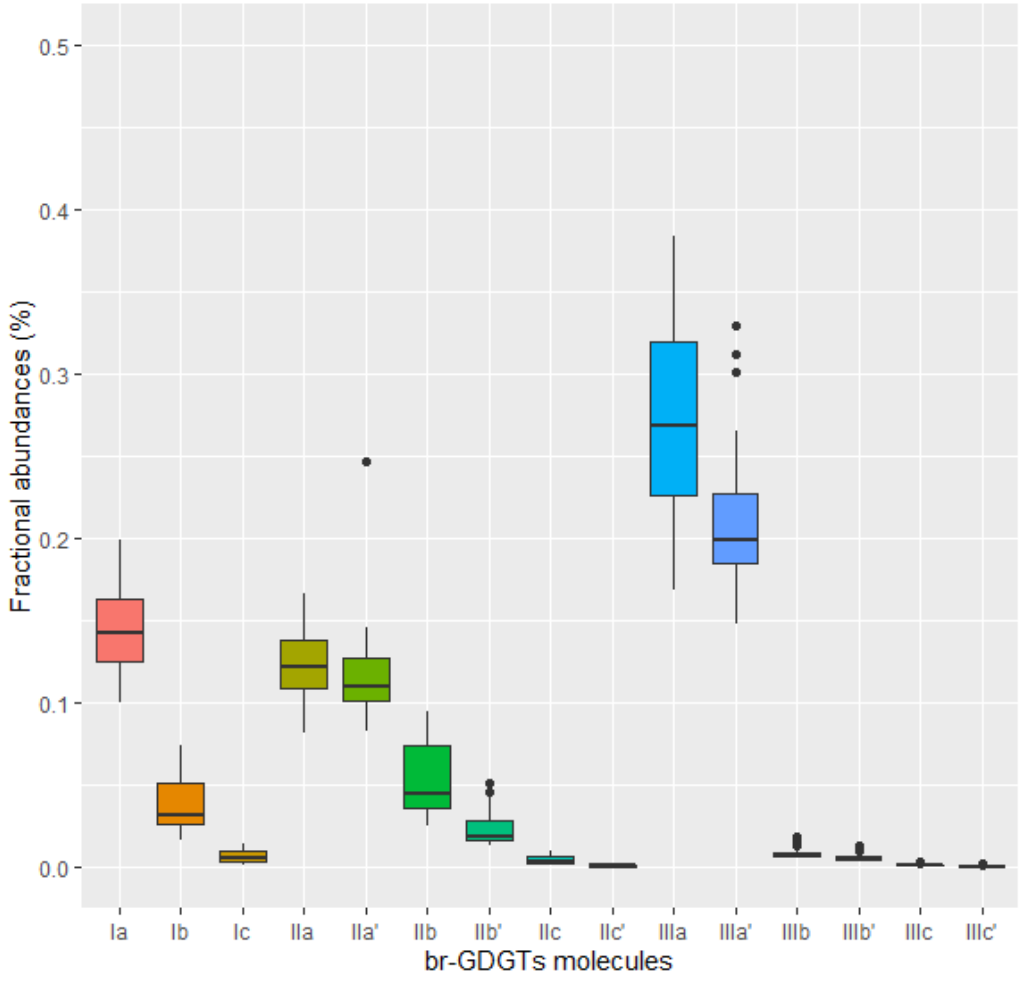

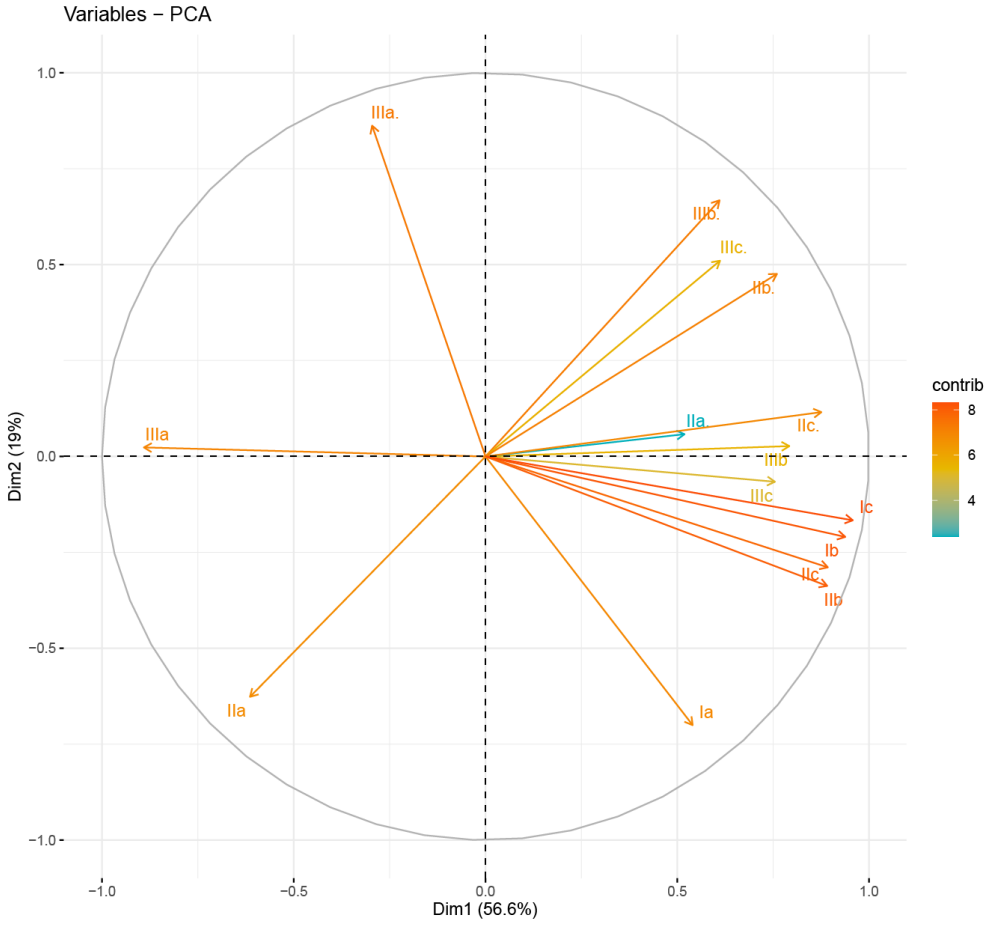

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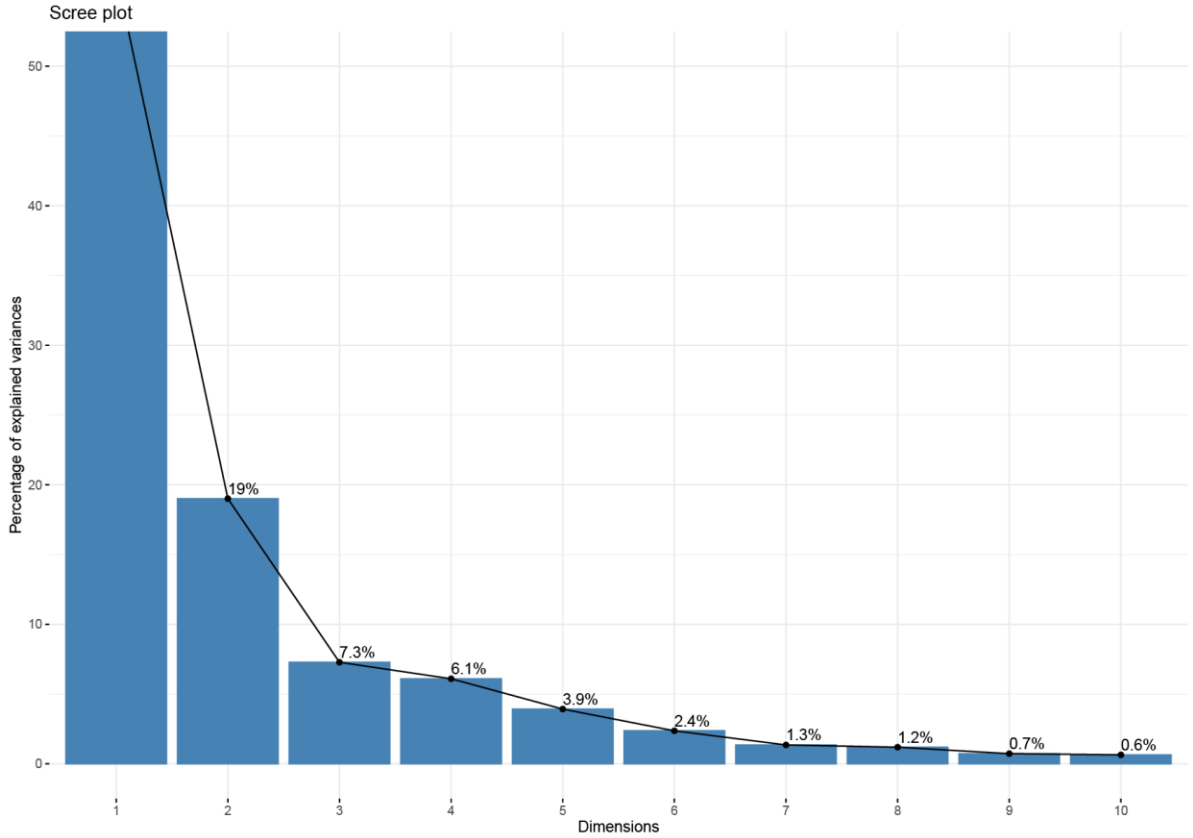

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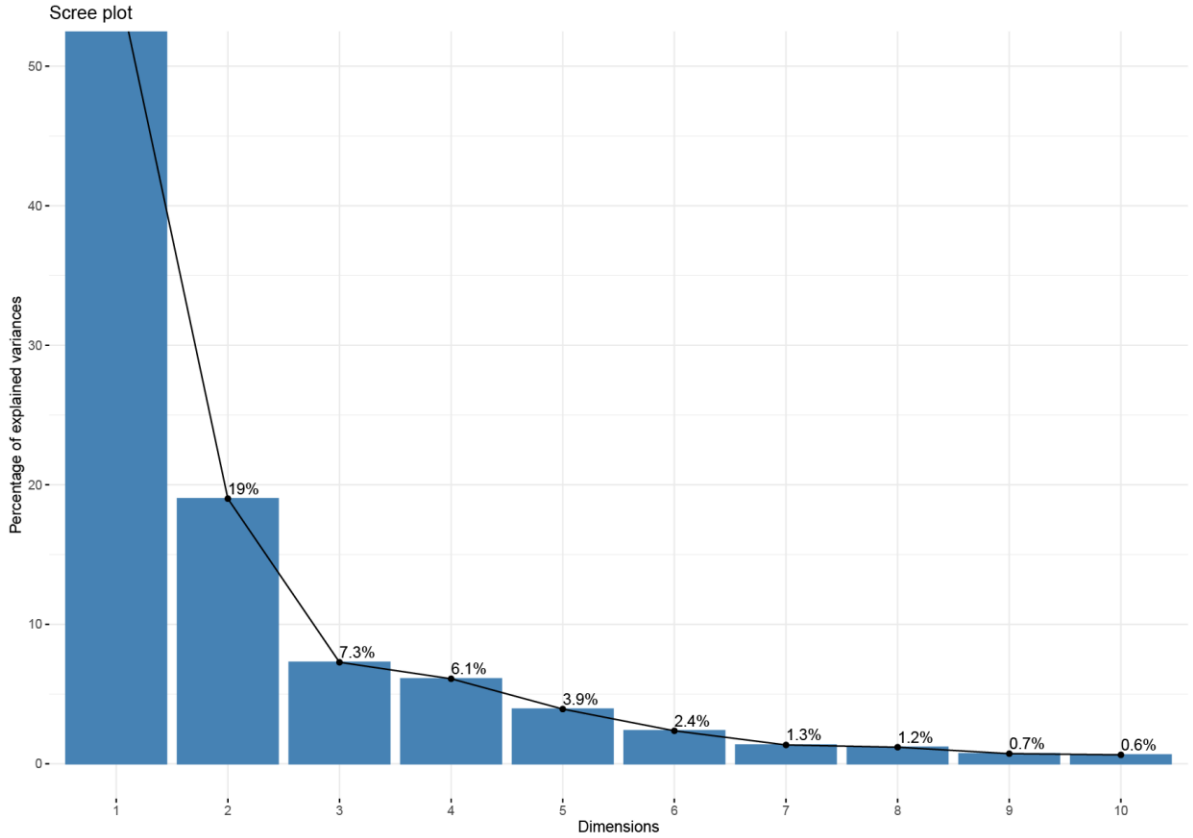

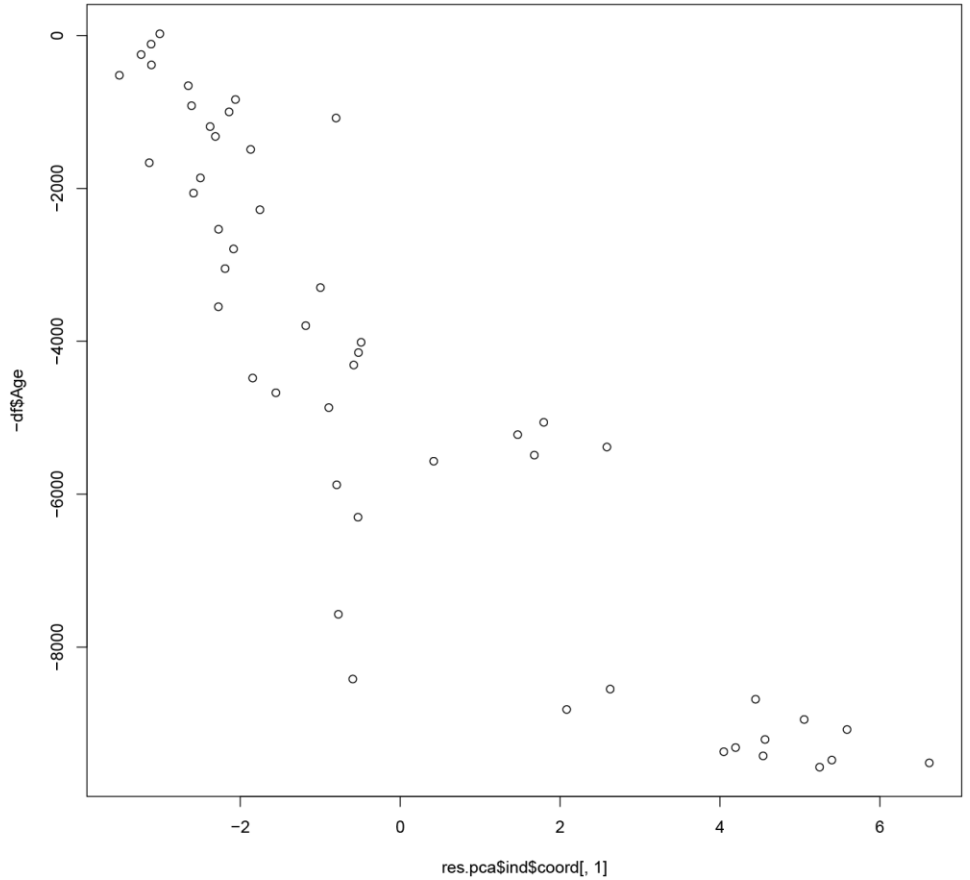

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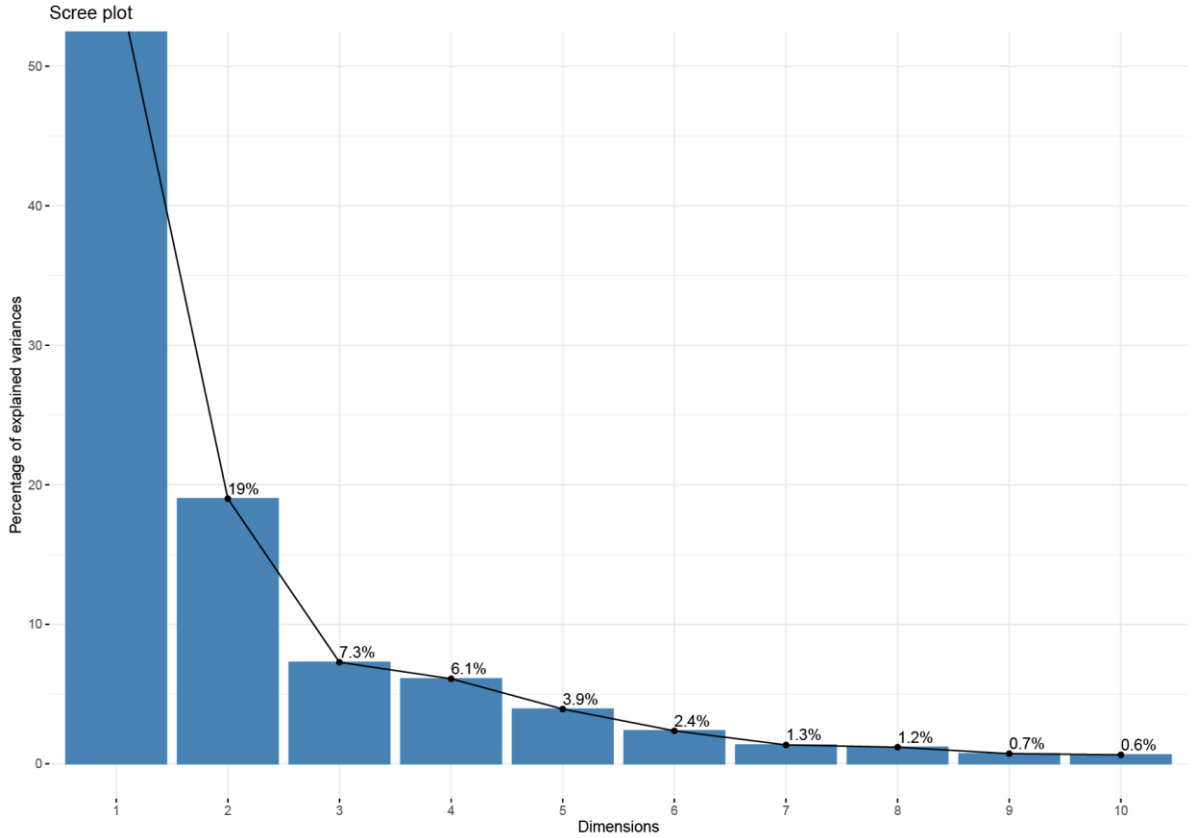

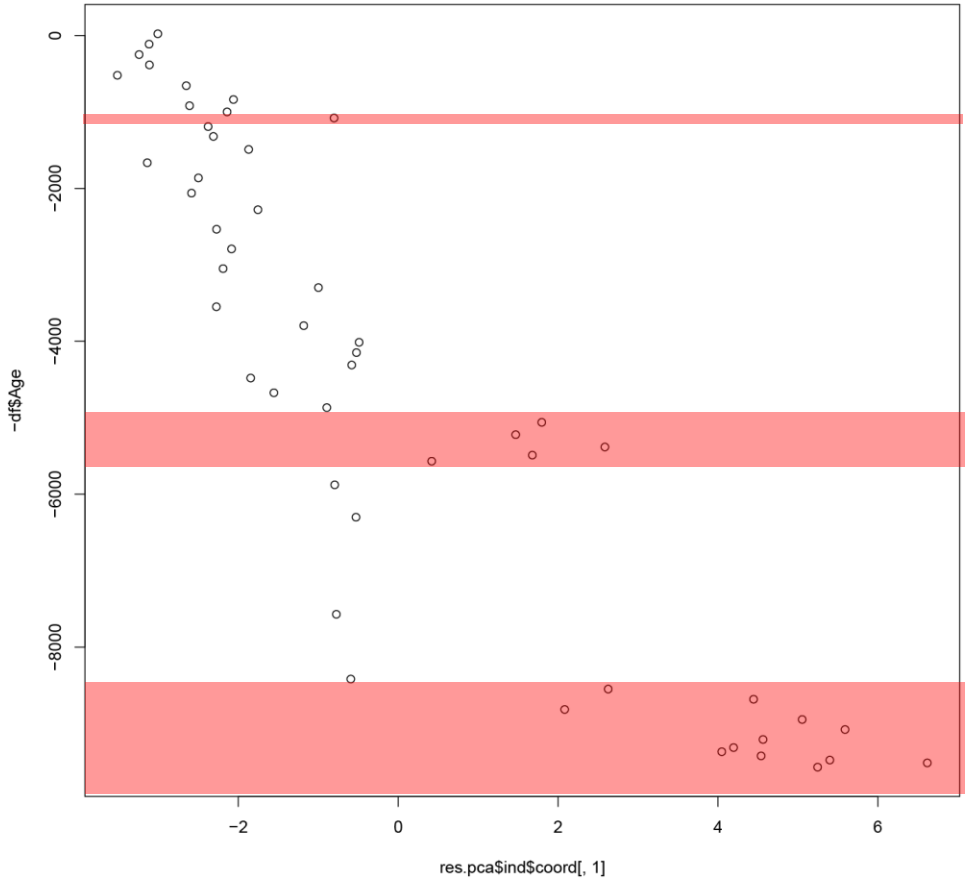

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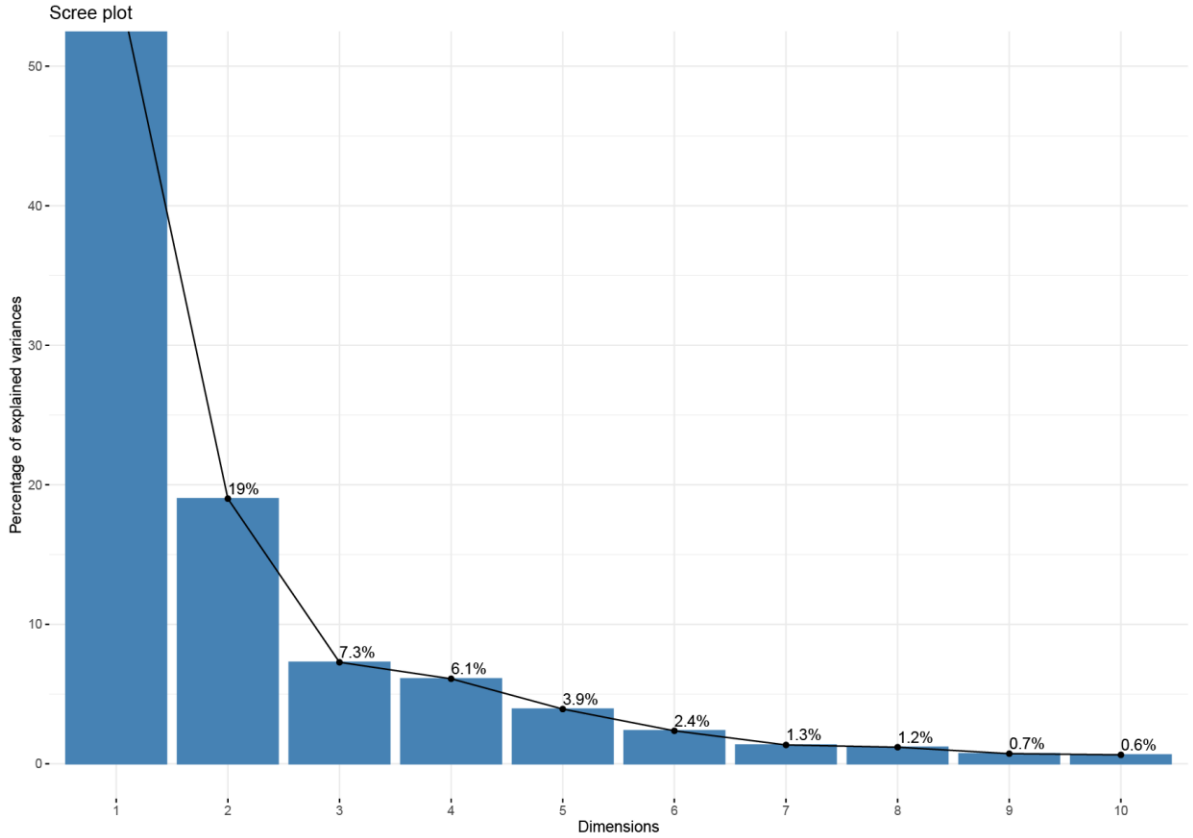

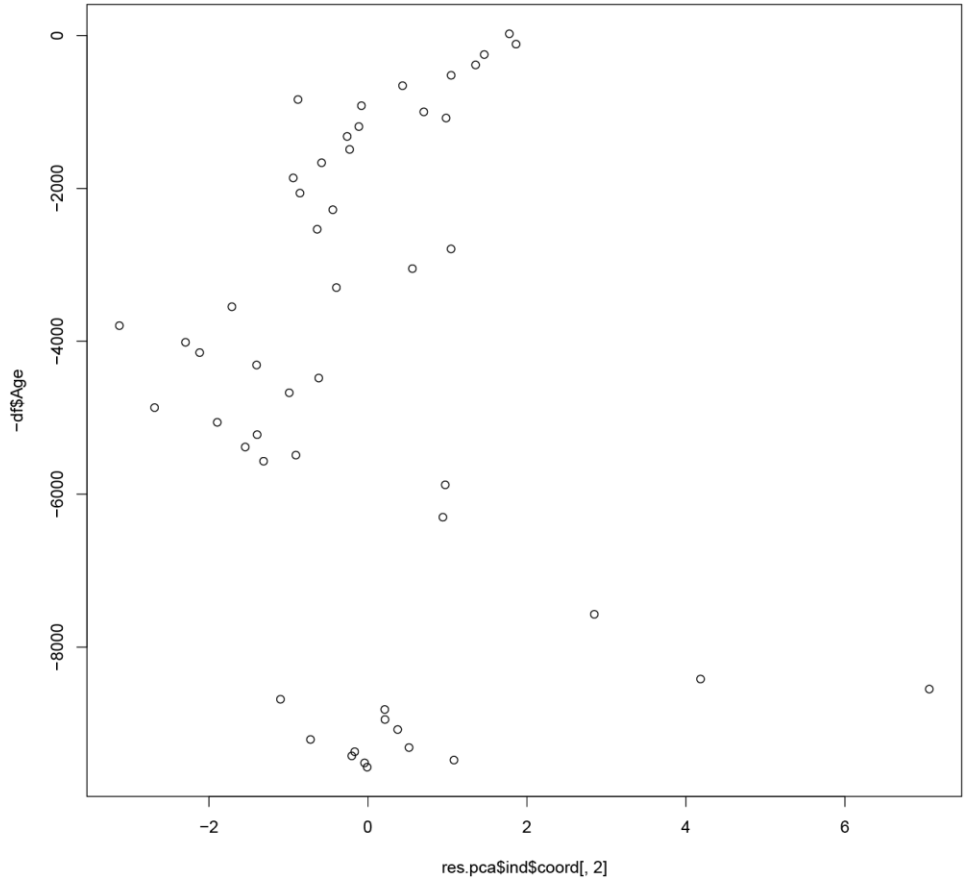

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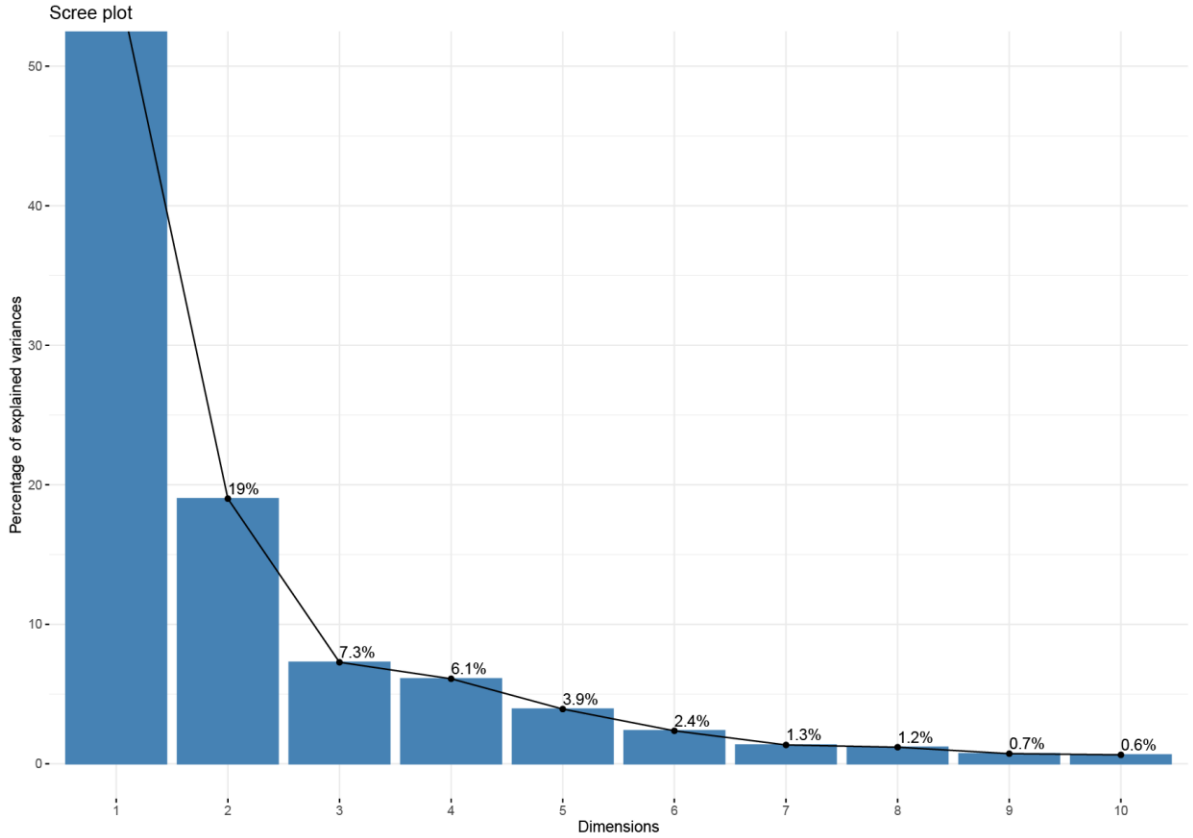
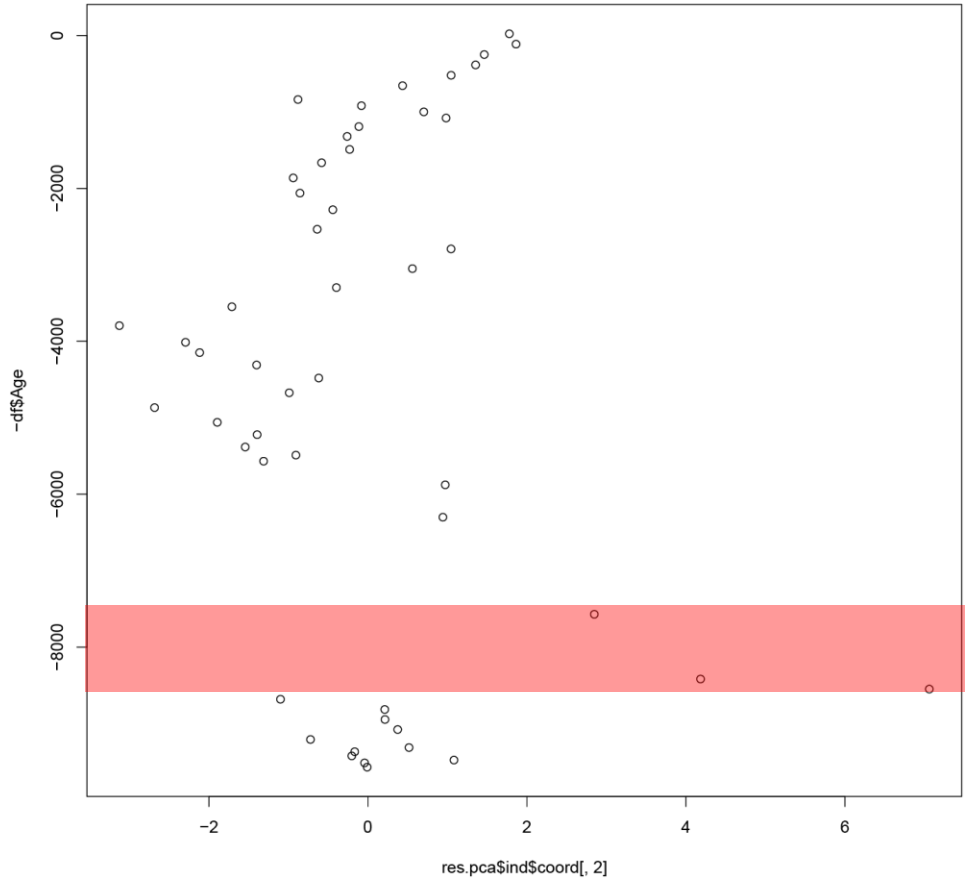




XRF analysis (Unkelbach *et al.*, 2021)

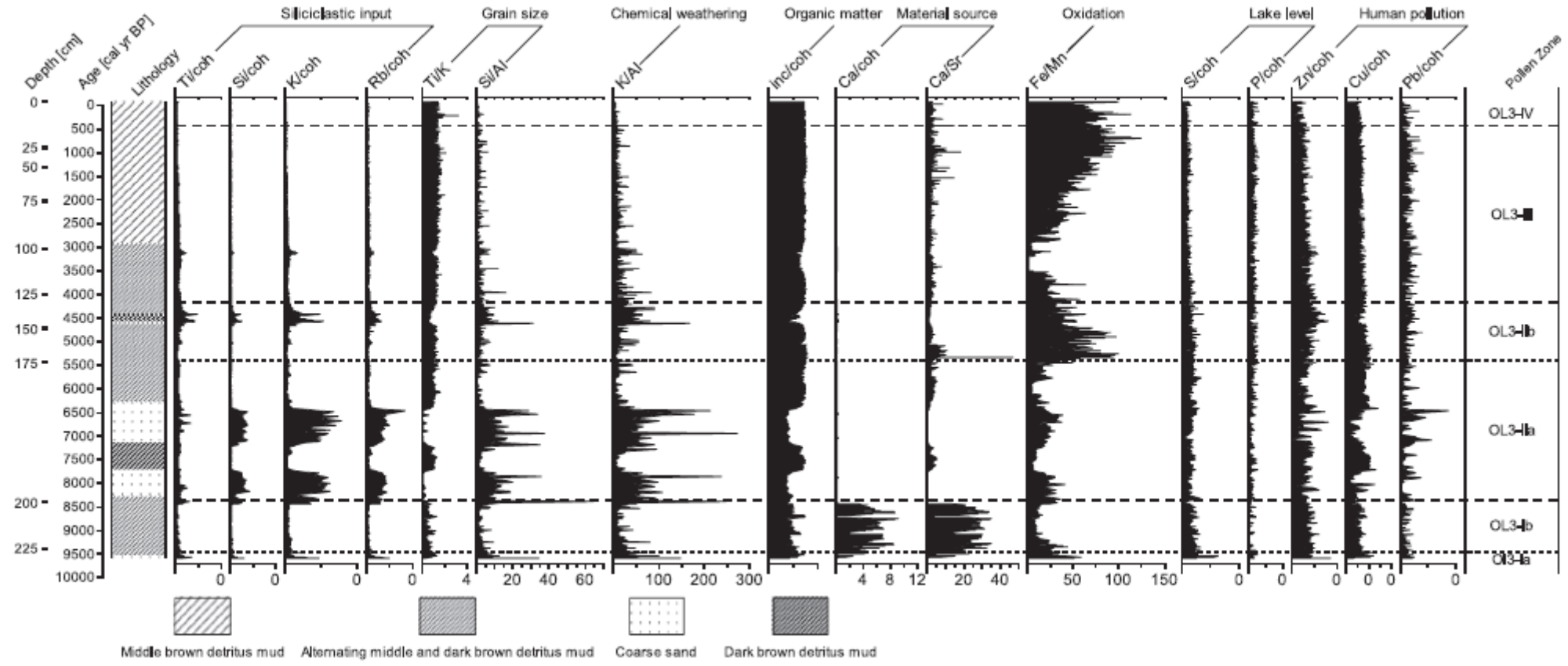
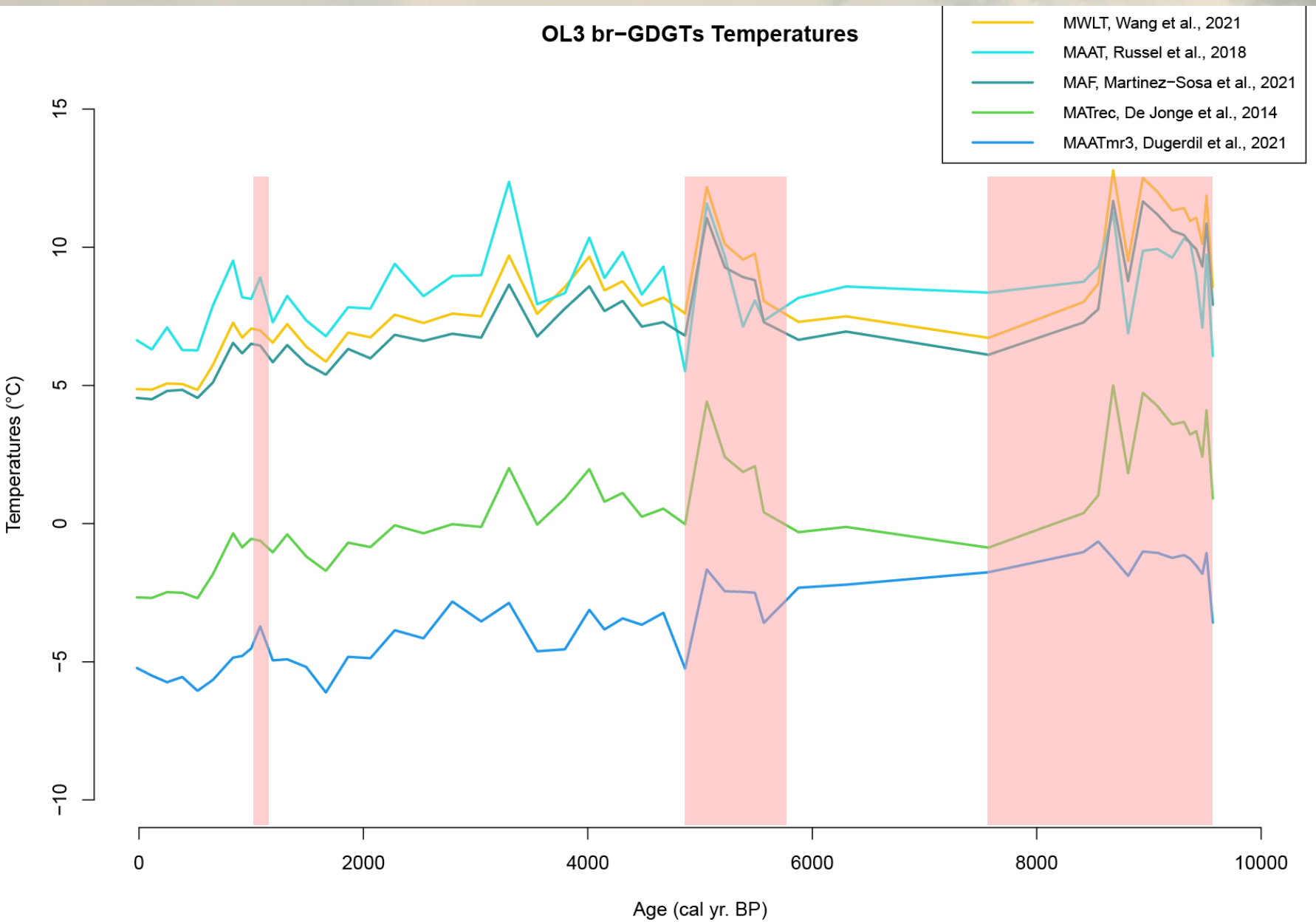


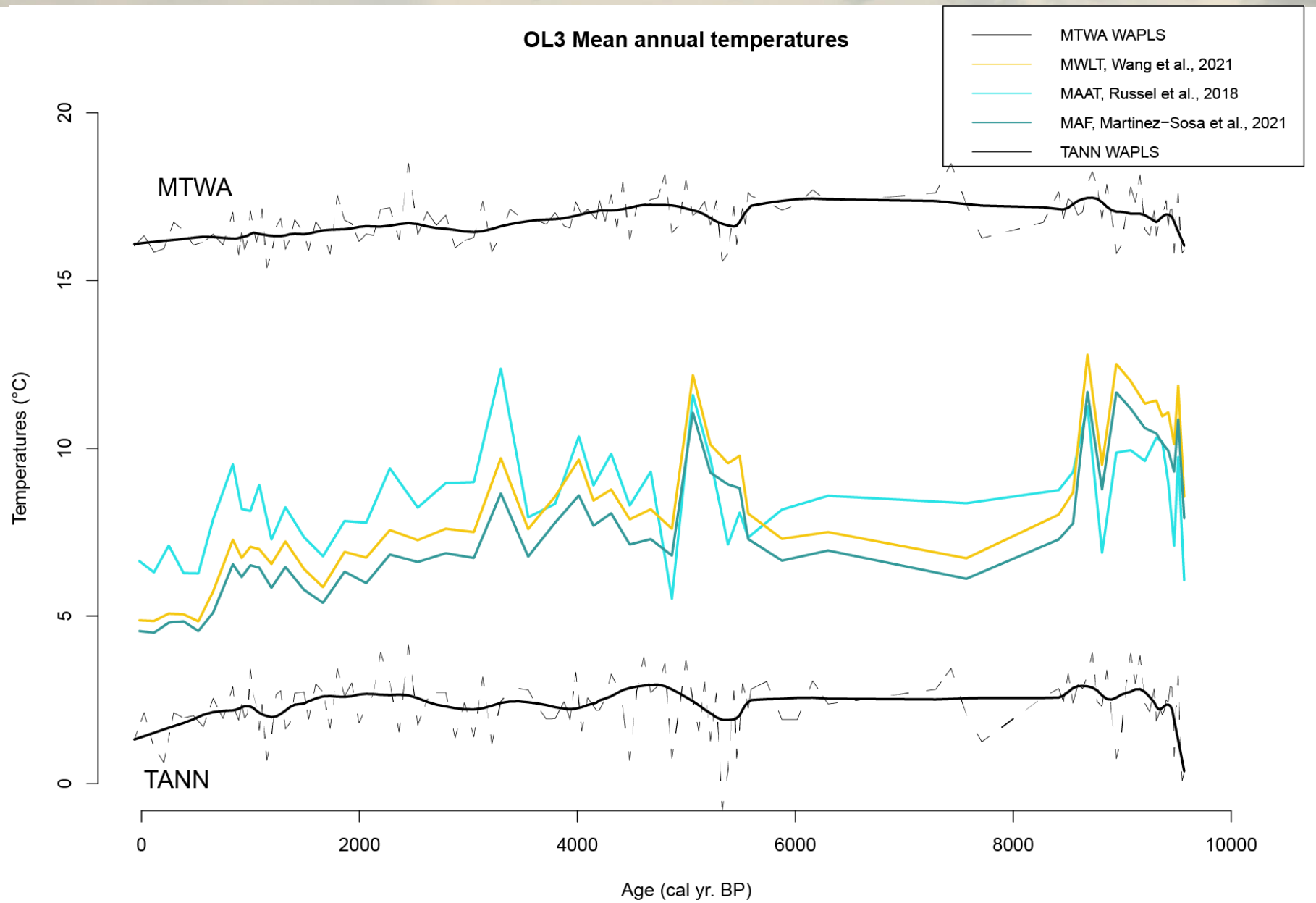
Fig. 6. XRF results and lithography of core OL3.

→ Stages where brGDGTs were not only influenced by different factors: chemistry/lake productivity

brGDGTs calibrations



brGDGTs calibrations & pollen transfer functions



THANK YOU FOR YOUR ATTENTION

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