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Late Burdigalian sea retreat from the North Alpine Foreland Basin: new magnetostratigraphic age constraints

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Introduction

Burdigalian sea retreat

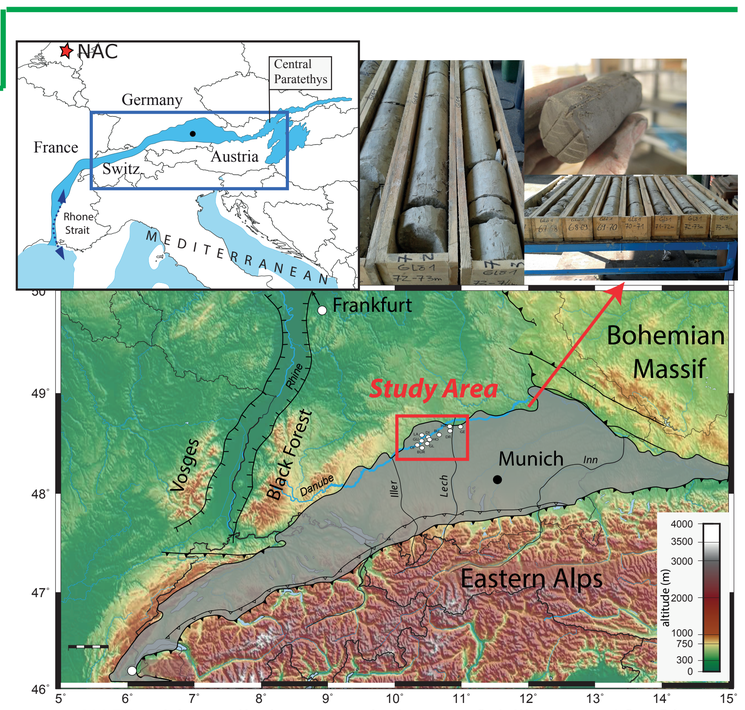
The transgressive-regressive infill of the North Alpine Foreland Basin (NAFB) reflects a **major change in Paratethys paleogeography** during the Burdigalian. At this point the connection to western Mediterranean became limited, and the western NAFB (Switzerland and S-Germany) most likely became separated from the rest of the Central Paratethys Sea[4]. In the S-German Molasse Basin, the change is represented by a change from marine (OMM) via brackish (OBM) to freshwater (OSM) molasse.

Large age bias

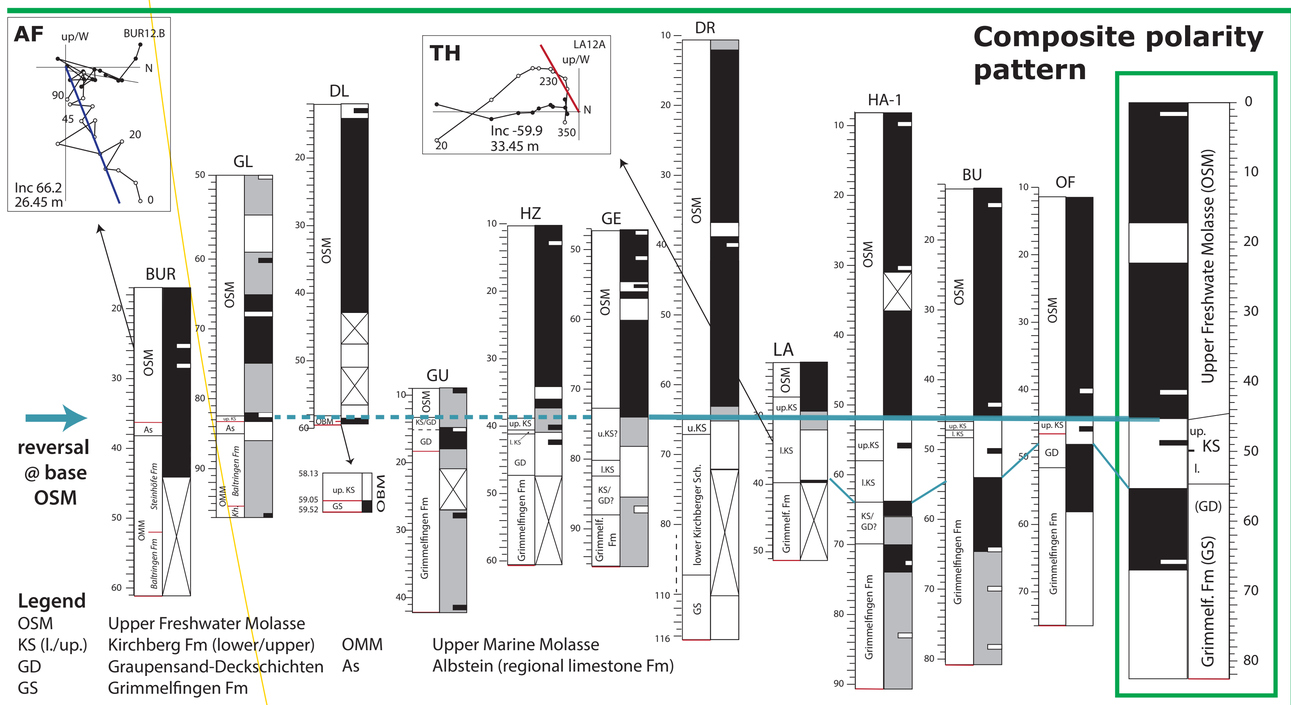
An age bias of **up to 0.7 Myr** exists for the onset of freshwater deposition in **S-German and Swiss Molasse** regions, despite the use of very similar small mammal assemblages and independent dating techniques in both regions[1,2]. Recently, Reichenbacher et al.[3] suggested an age of 16.5-16.7 Ma for the base of the OSM after a low-resolution magnetostratigrphic study.

Magnetostratigraphy S-German Molasse Basin

Our **objective** is to **refine the chronostratigraphy** of the central NAFB by applying high-resolution magnetostratigraphy on the OBM/OSM transition in **eleven parallel drill cores** from the S-German Molasse Basin. The new age constraints will **improve paleogeographic reconstructions** of the NAFB.



NAFB with studied area and photos of drill cores. After[5,6]



Magnetostratigraphic drill cores results with black/white/gray indicating normal/reversed/unclear polarities, and a composite column based on highest quality cores. Demagn. plots[7] *of alt. field (AF) and thermally (TH) cleaned samples.*

Drill cores & Results

Biostratigraphic framework

- Brackish (OBM): sandy Grimmelfingen Fm (GS) and fine-grained Kirchberg Fm (KS) with endemic *Rzhekia* marker fauna
- Freshwater (OSM): silts/clays
- Detailed small mammal zonations

Mixed demagnetization data

- 40-60% reliable samples

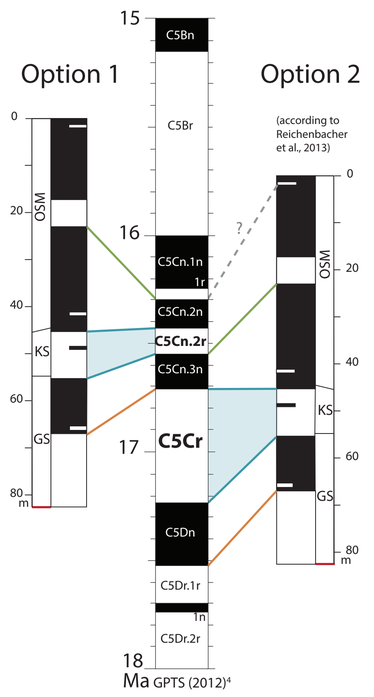
Clear composite polarity pattern

- based on highest quality cores

Correlation to GPTS

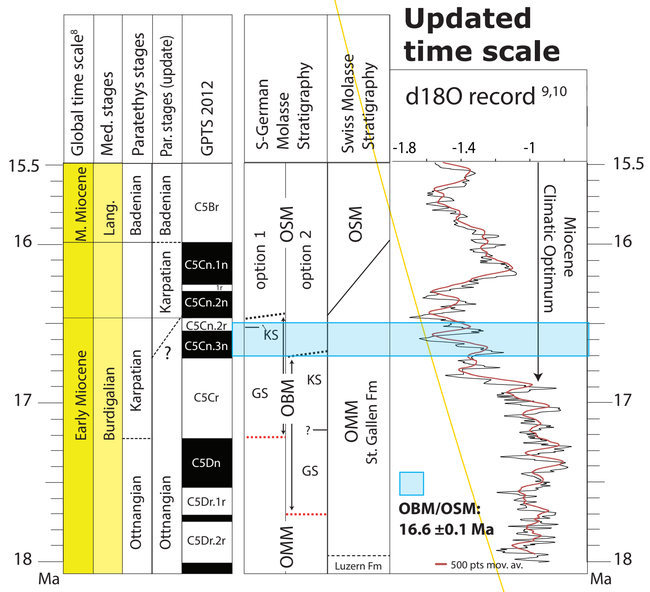
- **Option 1:** KS to C5Cn.2r
best fit for constant sed. rates
- **Option 2**: KS to C5Cr
with variable sed. rates and erosion

Age correlation



Updated chronostratigraphy

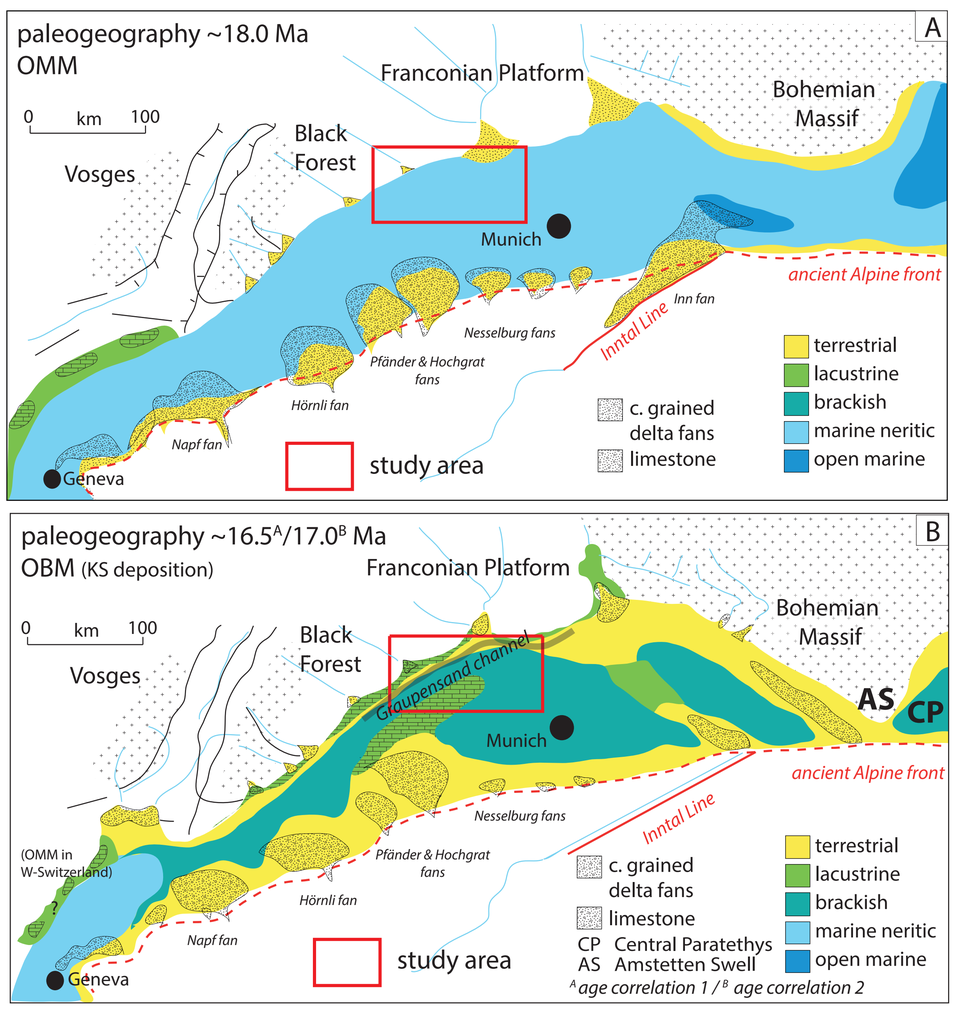
The mean age is **16.6 ± 0.1 Ma** for **sea retreat** from the S-German Molasse Basin. We exclude an age >17.5 Ma for the base of the OSM[1]. The age of base of the OSM is most likely similar in S-Germany and Switzerland.



Updated paleogeography

1) Restricted Rhone connection and south NAFB: ++ clastic input Alpine front.
2) Deposition and erosion Graupensand gully
3) Transgression Kirchberg Fm.
4?) Disconnection NAFB and Central Paratethys: uplift Amstetten Swell.

Burdigalian paleogeography NAFB



Sketches modified after [11]

Conclusions & Follow-up

Magnetostratigraphic dating reveals an **age of 16.6 ±0.1 Ma for sea retreat from the central NAFB**, which:

- solves a long-standing age bias,
- backs up the age model of Reichenbacher et al.[3],
- updates the regional time scale, challenges paleogeographic reconstructions, e.g. it suggests a much later uplift of the Amstetten Swell.

***Rhezakia* fauna** is now a tie point for correlation within the Paratethys Sea.

Magnetostratigraphy on scientific drill cores in the underlying OMM should improve NAFB chronostratigraphy.

Acknowledgements

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Sant et al. (submitted to G&PC)