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. 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 magnetostratigraphic study.

Magnetostratigraphy S-German Molasse Basin

Our objective is to refine the magnetostratigraphy 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.

Updated chronostatigraphy

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. 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 Kirkberg Fm.
47) Disconnection NAFB and Central Paratethys: uplift Amstetten Swell.

Drill cores & Results

Biostratigraphic framework
- Brackish (OBM): sandy Grimmelfin-gen Fm (GS) and fine-grained Kirch-burg Fm (KS) with endemic Rhezakia 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 CScr2r best fit for constant sed. rates
- Option 2: KS to CScr with variable sed. rates and erosion

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.,
• 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

A special thanks to employees of the Bavarian Environmental Agency (LfU) from Hof for their help during the drilling sessions, e.g. it suggests a much later uplift of the Amstetten Swell.

References
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