
Early Miocene tectono-sedimentary shift in the eastern North Alpine Foreland Basin and its relation to changes in tectonic style in the Eastern Alps

Eline Le Breton^{*1}, Anne Bernhardt¹, Robert Neumeister^{1,2}, Claudia Heismann¹, Arthur Borzi¹, Julian Hülscher^{1,3}, Richard Sanders¹, Patrick Grunert⁴, Mark R. Handy¹, and Peter Mcphee¹

¹Institute of Geological Sciences, Department of Earth Sciences, Freie Universität Berlin – Allemagne

²DEEP. KBB GmbH, Bad Zwischenahn – Allemagne

³Basalt-Actien-Gesellschaft, Linz am Rhein – Allemagne

⁴Institute of Geology and Mineralogy, University of Cologne – Allemagne

Résumé

A striking difference along the Alpine Orogen is the style of collisional tectonics during the Oligo-Miocene, with the onset of escape tectonics in the Eastern Alps. The indentation of the Adriatic Plate into the Eastern Alpine Orogen resulted in the formation of conjugate dextral and sinistral strike-slip faults in the vicinity of the Tauern Window. Moreover, major changes occurred in the foreland of the Eastern and Southern Alps in the Early Miocene, with the cessation of the northern Alpine front propagation and the onset of thrusting along the Southern Alpine Front. In this study, we present new results from structural, stratigraphic and subsidence analyses of the eastern North Alpine Foreland Basin (NAFB) as part of the "Mountain Building in 4 Dimensions" project, German branch of the European AlpArray initiative, which aims at better understanding the deep crustal-mantle structures of the Alpine Orogen and their relation to surface processes. Our results show a first phase of onset of foreland sedimentation in the eastern NAFB between c. 33-28 Ma, followed by a strong tectonic-driven subsidence between c. 28-25 Ma ending by a phase of erosion and the formation of a basin-wide Northern Slope Unconformity (NSU). During this time period, the rift-related Mesozoic normal faults of the European platform were reactivated and are capped by the NSU. We interpret this phase as an increase in the flexure of the subducting European Plate under the growing Alpine Orogen. Between 25-19 Ma, the eastern NAFB remained in a deep-marine, underfilled state with a gently increase in subsidence. A major shift took place around 19-17 Ma with strong tectonic-driven uplift, ranging from 200 m (absolute minimum) to 1200 m depending on uncertainties on paleo-water depths, and rapid sedimentary infill of the basin. We discuss the possible causes for this major tectono-sedimentary shift in the eastern NAFB in relation to contemporaneous changes in collisional tectonics within the Eastern and Southern Alps, and with a potential Early Miocene slab break-off event beneath the Eastern Alps.

Mots-Clés: Eastern Alps, North Alpine Foreland Basin, Late Miocene, Uplift, Slab break off

^{*}Intervenant