



A new small-mammal biostratigraphy and high-resolution chronostratigraphic model for the Upper Freshwater Molasse of the eastern part of the North Alpine Foreland Basin (Bavaria, Germany)

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A detailed integrated stratigraphic study (lithostratigraphy, biostratigraphy, magnetostratigraphy, $^{40}\text{Ar}/^{39}\text{Ar}$ dating) was carried out on twelve sections from the eastern part of the Upper Freshwater Molasse of the North Alpine Foreland Basin (NAFB), improving greatly the chronostratigraphy and the temporal resolution (up to 100 kyr) of these sediments. The sections contain 19 new small-mammal bearing levels. Based on this material and 24 already published localities we propose a new taxon-range-zonation for the Late Ottnangian to the Early Badenian, consisting of nine zones or subzones respectively. Radiometric ages obtained for glass shards from tuff horizons are used together with the new biostratigraphic information for confirming the magnetostratigraphic correlation to the Astronomical Tuned Time Scale (ANTS04). This correlation implies that the Brackish- to Freshwater Molasse transition already occurred during the latest Ottnangian. The pre-Riesian hiatus, a remarkable feature in both the central and eastern part of the basin and the southern Bohemian Massif, occurred during the latest Karpatian and lower Early Badenian in Eastern Bavaria and Bohemia and during the Late Karpatian and earliest Badenian in Western Bavaria. The geochemical and Ar-Ar data of volcanic ashes suggest that highly evolved silicic magmas from a single volcano or volcanic centre, characterized by a uniform Nd isotopic composition, erupted repetitively over the course of at least 1.6 myr. Four phases of eruptive activity were identified at 16.1 ± 0.2 Ma, 15.6 ± 0.4 Ma, 14.9 Ma, and 14.5 ± 0.2 Ma. The correlation of the local biostratigraphic zonation to the ANTS04 enables further the characterization of both the Ottnangian-Karpatian and Karpatian-Badenian boundaries in the NAFB by mammals. According to these results the Ottnangian-Karpatian boundary is contemporaneous with the last appearance dates of *Ligerimys florancei*, *Melissiodon dominans* and *Prodeinotherium bavaricum* and the first appearance date of *Megacricetodon cf. bavaricus*. The Karpatian-Badenian boundary is characterized by a further size increase of the large *Megacricetodon* lineage and possibly a re-immigration of *Prodeinotherium bavaricum*.