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# Lower Miocene (upper Burdigalian, Karpatian) volcanic ash-fall at the south-eastern margin of the Bohemian Massif in Austria – New evidence from $^{40}Ar/^{39}Ar$-dating, palaeomagnetic, geochemical and mineralogical investigations*

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At the south-eastern margin of the Bohemian Massif in Lower Austria and the Czech Republic several tuffs and tuffite layers are intercalated in the Lower Miocene shallow marine sediments. During geological mapping in north-eastern Austria an outcrop with 90 cm thick tuffs and tuffites was found close to Straning, a village about 4 km SE of Eggenburg. The whitish-grey, indistinct bedded volcaniclastics were preserved from erosion in a small-scale graben inside granites of the Thaya-Batholith. Corestone-weathering and limonitic crusts (tafoni-weathering) on the granite surface give evidence that the primary tectonic graben existed before sedimentary filling. Before the ash-fall the major part of the graben was filled by marine, greenish-grey, thin and plane bedded, non-calcareous, smectitic silty clays of the Zellerndorf Formation (middle Burdigalian, Ottnangian). The uppermost part of these clays already shows thin tuffitic intercalations. The almost monospecific microfauna (predominantly ?*Silicoplacentina* sp. ("*Saccammina*") and very rare *Triloculina* sp.) in this upper section is typical for shallow, probably brackish-water deposits. The shallow depositional environment may also explain the preservation of the exceptionally thick acidic volcaniclastics above. The overlying multiphase Straning ash consists of silts with a fine silty mean between 7.1 and 8.6 Phi (i.e. 7.3 - 2.6 µm) typical for distal fallout tephra. The tephra consists of high amounts of volcanic glass as well as biotite, alkali feldspar, plagioclase, quartz, ilmenite, apatite, and zircon. Smectite (84 %), small amounts of illite (14 %) and traces of kaolinite are the characteristic clay minerals of the Zellerndorf Formation, whereas the overlying tuffs and tuffites only consist of smectite in the clay fraction < 2 µm. The chemical composition of the volcanic glass indicates a rhyodacite/dacite character of the volcanic source, originating from a calc-alkaline arc volcanism. The typology of the volcanic zircons give evidence of very high eruption temperatures of about 850° C and also reveals a hybrid character of the parental magma, close to an anatectic origin. Volcanic zircons and the composition of Rare Earth elements are significantly different from other Burdigalian (Eggenburgian, Ottnangian) and Langhian (early Badenian) tephra from the surrounding region in Austria and Czech Republic. K-feldspar crystals of the tuffs were dated by the $^{40}Ar/^{39}Ar$ technique. The inverse isochron age of 17.23 ± 0.18 Ma corresponds with the middle - late Burdigalian (Ottnangian - Karpatian) transition. The reversed palaeomagnetic polarity of the tuff restricts the age interval to the lowermost part of the chron C5Cr and therefore per definition to the basal part of the late Burdigalian (early Karpatian). Consequently the volcaniclastics can be correlated with the lowstand systems tract (LST) in the basal part of the global 3rd order sea level cycle Bur 4. The volcanic source of the Straning tuffs might be traced back to the western Inner Carpathian volcanic arc. The tuffs are most likely genetically related to the Middle Rhyolite Tuff (late Burdigalian, Karpatian) of northern Hungary to southern Slovakia.