Different ages of granitic blocks in the Waschberg-Ždánice Unit and Allochthonous Molasse as indication for Moldanubian and Moravian rocks in the Bohemian spur

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The Bohemian Massif continues below the Eastern Alps as a southeast-directed basement promontory often referred as Bohemian spur (Tari, 2008). According to wells in the Alpine-Carpathian Foredeep, it consists of Variscan basement rocks (Matura, 2006) of the Moldanubian and Moravian Superunit. However, the composition of the Bohemian spur below the Alps can be inferred from blocky layers embedded in the Waschberg-Ždánice Unit and Allochthonous Molasse, representing the northernmost and youngest tectonic units of the Alps. In Lower Austria, the Waschberg-Ždánice Unit is composed of late Oligocene to early Miocene shales, marls and sandstones with polymict blocky layers containing “exotic” blocks from the crystalline basement. These layers are indicating widespread olistostromes surrounding giant olistoliths in the Eggenburgian stage (Gebhardt, 2021). The Allochthonous Molasse south of the Danube consists of sediments deposited in the Alpine-Carpathian Foredeep, accreted to the front of the orogen from middle Miocene onward. Its eastern part is composed of Eggenburgian to early Ottnangian marls with intercalation of sandstones and occasionally blocky layers also with “exotic” blocks. Granitic blocks from several outcrops of both units have been investigated by geochemical and geochronological methods to get insight to their source area on the Bohemian spur. From Waschberg to Niederhollabrunn blocky layers show a polymict composition marked by “exotic” granites with amphibole and pinkish K-feldspar. Furthermore, various granite gneisses, porphyric granite and minor amphibolite and marble occur. Additional migmatic paragneiss feature the blocky layers in the Allochthonous Molasse at Königstetten. The granitic rocks from blocky layers show an overall peraluminous composition. Additionally, higher SiO_2-contents connected with increased Rb/Sr-ratios indicate considerable magmatic fractionation of largely S-type granites. Nevertheless, granites with pinkish K-feldspar exhibit low $^{87}Sr/^{86}Sr$-initial ratios (0.705–0.707, 300 Ma) pointing to a significant I-type component in their magmatic source. U/Pb dating of zircons points to three different age groups: Three granites with pinkish K-feldspar exhibit ages around the Carboniferous-Permian boundary (302–290 Ma). A metagranite from Königstetten records a Carboniferous age of 323 Ma and two granite gneisses point with 587 Ma and 615 Ma to a Neoproterozoic age group. By comparing the Bohemian spur which is indicated by the granitic blocks with the adjacent Variscan basement there are similarities and differences. The Moldanubian Superunit contains a wide range of I- and S-type granites (Vellmer & Wedepohl, 1994) which are characterized by magmatic ages of 340–310 Ma (Finger et al., 2009). Nevertheless, granites equivalent in age and composition to the conspicuous granites with pinkish K-feldspar are unknown. Otherwise, granites similar to the metagranite from Königstetten are widespread in the South Bohemian Batholith. The Neoproterozoic granite gneisses indicate rocks from the Moravian Superunit as further source for the blocky layers. For instance, the Bíteš gneiss which is closest has a magmatic age (Friedl et al., 2004) similar to a granite gneiss sample from the Waschberg. It is important to note that the Rb/Sr cooling ages of biotite from all granitic blocks range from 300 to 230 Ma (Wegner et al., 2013), arguing for a prolonged cooling history of the hidden Bohemian spur.