The age of the Danube fault, 40 years after W. Schreyer

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As a result of his PhD study, Werner Schreyer published several papers about petrographic work in the Bavarian Forest where he investigated Variscan basement rocks close to the Danube valley. He also addressed the age of the Danube fault based on his observation from Natternberg, geological map sheet Deggendorf, and finally (in 1967) concluded that the Danube fault was formed during late-Variscan times and not, as suggested earlier (1961), during the Tertiary period.

The Danube fault stretches for about 200 km and is one of the most impressive fault lines in central Europe. As revealed by our recent field mapping, ancient motion along this fault has produced intensive cataclastic deformation along the Donaustauf segment of the fracture zone. The strain localised in this zone resulted in pervasive brittle deformation of the primary rock type, K-feldspar dominated granite. The cataclastic material was ultimately subjected to argillic alteration and K-feldspar was almost completely transferred into illite and other phyllosilicates. The crystallization age of the granite (known as "Kristallgranit") derived from an unaltered sample is 325 Ma (Pb- evaporation method) whereas the age of argillic alteration is constrained by K-Ar dating of illite fine-fractions (<2 µm) at 266 and 255 Ma. The new ages bracket the time of deformation and imply near surface exhumation of the fault rocks already during the Permian period, confirming Werner Schreyer's conclusion from 1967. Post-Cretaceous movement along the Danube fault, as indicated by offset of Mesozoic and Tertiary strata, did not re-open the K-Ar illite system. The illite ages also suggest that hydrothermal fluorite mineralization, genetically connected with the Danube fault, was an early Permian process.

References

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Peat deposits from Central Europe to the East European Plains investigated by uranium-series dating

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Interstadial and interglacial peat deposits are widespread in a transection between Central Europe, Lithuania, Russia, and Siberia, and enable us to reconstruct the vegetation history of the Northern Hemisphere. Multidisciplinary studies including lithostratigraphy, palaeontology, and palynology were performed by partners all over the transect. The reliable chronological frame for the reconstruction of climate and vegetation history was investigated by uranium series dating. The suitability of the peat layers for dating strongly depends on two essential prerequisites: (1) during the initial formation process any thorium was absent and (2) a geochemically closed system behaviour excluding uranium and thorium migration after deposition. However, peat may contain varying amount of admixed thorium by dust and clay minerals, while water passing through the peat layer can cause migration of uranium. Therefore, dating has to be carefully checked for the fulfilments of the prerequisites. Uranium series dating was performed on peat and organogenic deposits applying the thermal ionisation mass spectrometry (TIMS). Coeval peat samples were burned to ash and prepared by the leachate/leachate technique, spiked, and chemically separated for measurements of the isotopic composition. Once isotope activities are determined, age calculation depends on the evaluation techniques used to obtain reliable ages. The evaluation procedure includes (1) estimation of the thorium index by the isochron method to (2) correct the activity ratios for admixed detrital thorium, (3) calculation of corrected single ^{230}Th/U ages, (4) checking corrected ages with the Chi-square test, and (5) calculation of weighted mean of isochron derived detritally corrected age for the deposit. The study of a variety of sections of burial peat on the transect gave a widespread overview on the suitability of peat deposits. Several case studies were investigated by uranium series dating. At the Netiesos section located in Lithuania, the age determination for the peat failed owing to the impossibility of determining an isochron to correct the single ages for the admixed detrital thorium. Furthermore, the investigation of the peat section of Gröbern, Germany, failed due to wide spreading activity ratios clearly demonstrating open system behaviour. Comparisons with radiometrically investigated uranium series ages retrieve the possible reasons. An isochron derived detritally corrected age of 219 ±8 ka was successfully determined for the peat layer from Krivosheino in Siberia, which is in excellent agreement with independent age control.