



Origin of detrital rutiles in Austrian loess as reflected by their trace element compositions and U-Pb ages

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Previous studies on detrital rutiles in sandstones demonstrated that rutile trace element geochemistry (especially Cr and Nb contents) and Zr-in-rutile thermometry may yield diagnostic data on the lithology and metamorphic facies of possible source rocks. U-Pb geochronology of detrital rutiles is as yet rare in spite of its potential to date metamorphic events, thereby yielding useful information for provenance analysis. In this study we provide the first trace element and U-Pb data from 89 detrital rutiles separated from loess in Austria and analyzed by EPMA and LA-MC-ICP-MS. Cr and Nb data indicate that the majority (70-73%) of the rutiles are likely to originate from metapelitic sources, ca. 9-14% from metamafic rocks, while the rest cannot be unambiguously attributed to any of these sources. Rutiles in loess sampled close to the Alps (Wels section) generally displayed lower metamorphic temperatures (580-650 °C) compared to those found in proximity to the Bohemian Massif (700-800 °C; Krems, Stratzing profiles). The rutile U-Pb ages from loess at Krems cluster around 345-370 Ma. These ages and the calculated metamorphic temperatures reveal that these rutiles record the last high-T overprint of rocks making up the Varied series and Gföhl units, thereby strongly favouring Bohemian Massif granulitic sources for many of these grains in loess of the region. At the same time, the lower temperatures found for rutiles in loess at Wels implies that these rutiles were derived from Alpine amphibolite-grade metamorphic rocks.