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Phonolite volcanism in the Cenozoic Eger rift basin - new precise ages from accessory minerals

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A new set of U-Pb data was acquired for two groups of phonolite bodies emplaced in the volcanosedimentary sequence of the Cenozoic Eger rift in Bohemian Massif. The two groups of phonolite bodies are located in the western and eastern edge of this monogenetic volcanic field. The selected phonolite bodies represent the lava flows, cryptodomes or extrusive domes emplaced in phreatomagmatic maar-diatremes, remnants of dykes or a laccolith. The U-Pb dates were acquired using the Laser Ablation Split Stream system at Santa Barbara University geochonology lab, which provides the coupled geochronology and also the REE and selected major element geochemistry. Despite the great variety of internal zircon textures from oscillatory zoning to complex patchy patterns with a large range of cathodoluminescence intensity, the groups of spots gained coherent and suprisingly precise ages for each group of zircons. The western group of phonolite bodies display clusters of ages ranging between 33Ma and 36Ma, while zircons of the eastern group of the phonolites indicate ages between 30Ma and 32Ma. Indivudual zircon groups from single bodies are characterized by remarkable precision marked by errors of only 180 thousand years (5 samples) and 300-650 thousand years (2 samples). The U-Pb zircon ages are interpreted to reflect the high-temperature overprint of inherited (and possibly newly crystallized) zircons prior to emplacement of the phonolite bodies in upper the upper crust. In addition, titatine grains measured alongside the zircon grains (in another run) either overlap (Bořeň) with the zircon age error on Terra-Wasserburg diagrams (geochrone), or are 2 Ma years younger than corresponding zircon ages (Špičák phonolite body). In addition, the REE binary diagrams revealed separate clusters of Sm/Nd and also Hf content, which can be attributed to different degree of partial melting of parental magma in the source upper mantle or the lower crust for both groups of sampled phonolites. In summary, the results suggest that U-Pb geochronology using the LASS system is a powerful tool with a great potential for deciphering the evolution of phonolites in the Cenozoic rift system in Bohemian Massif and possibly other rift systems in the foreland of the Alpine orogeny.