

Active tectonics and earthquake potential in two Eurasian continental intraplate environments

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The Neogene evolution of the Alpine-Pannonia-Carpathian system was largely determined by escape motion along mostly east-west oriented large scale strike-slip fault zones and significant crustal thinning. These major features of the system are our study areas, the Mur-Murz fault zone and the thin Pannonian crust. The tectonic regime in the region has recently changed and the fast moving crustal domains are now blocked within the frame of the European Platform. Although the seismic hazard is now only moderate in both environments, the vulnerability is increasingly high. There are three capital cities in the study areas. Budapest located inside the basin produces 35 %, the studied region produces 40 % of the GDP of the country, whereas along the fault zone Bratislava produces 40 % and Vienna 35 % of the GDP of the respective countries. In this paper we jointly analyze geodetic and seismic data for the assessment of earthquake potential. GPS networks enabled us to detect the current motion and strain and determine the change in the driving mechanisms, the rate and style of tectonic activity with respect to the Neogene evolution. Our data show a still existing eastward motion of the crust along major fault zones from between the collisional zone of the northward moving Adria and the stable Bohemian Massif towards the Pannonian basin. We also suggest that this motion is now being absorbed in the central part of the basin causing increased seismicity. The thin crust of the basin is now compressed and it acts as a stress absorber. It gets compression from the east but also through the Dinarides mountain chain from the south but prevents the Carpathians from present deformation. The strike-slip zone is still alive but the deformation is concentrated much closer to the Adria region. The basin itself is the warmest thinnest crust in the European part of Eurasia and the only dryland back-arc basin. With high heat flow, elevated asthenosphere this environment expectedly have special rheological response to the ongoing deformation. The comparison of geodetic and seismic slip rate may provide further insight into the crustal dynamics of the area. We compare our calculations in the Mur-Murz fault zone to an earlier estimate to further study the seismic slip deficit and hazard and we also compare geodetic and seismic data at an other intraplate environment, the central part of the basin having different geological environment and style of continental intraplate deformation.