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Improved thermal model simulating the Neogene volcanic process in Harghita Mountains (East Carpathians)

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The volcanism of the East Carpathians occurred gradually from northwest to southeast along the Carpathian belt and on the eastern side of the Transylvanian Basin, during Neogene to Quaternary times, being generated in a post-collisional tectonic setting, as a result of detachment of an oceanic lithosphere (slab break-off). To better assess the thermal effect of the generation of magmas in Neogene volcanic area on the temperature field, a numerical 2-D finite-element model for the processes of subsidence/sedimentation, uplift/erosion and generation of magmas has been carried out along a NW-SE lithospheric cross-section. The obtained thermal structure has been tested by comparison of the calculated surface heat flux profile with corresponding values from the surface heat flux map for the Romanian territory. The thermal effect of volcanic eruptions has been assessed in case of an instantaneous intrusion of a certain magma volume at crust base. For about 2 Ma, which is the average life of a volcano in the study area the magma volume migrates toward surface and cool down. To better evaluate the spatial distribution of the thermal parameters and structures required in thermal modelling, the information supplied by tomographic and seismic refraction experiments has been taken into account. A set of shear-wave velocity models, obtained by non-linear inversion of the surface wave group velocity data for the Romanian territory, has been used in seismic velocity - temperature conversion technique, in order to reduce the uncertainties in temperature estimates of thermal modelling. The results pointed out potential for used procedure in reducing uncertainties of inferred temperatures produced by an unrealistic parameterisation (the location of the magmatic sources and their intensities), and, consequently, in reducing the uncertainties in

temperature estimates in the lithosphere beneath the investigated tectonic unit.