# Global strength and elastic thickness of the lithosphere

Magdala Tesauro (1), Mikhail K. Kaban (1), Sierd A.P.L Cloetingh (2), Walter Mooney (3)

(1) GeoForschungsZentrum Potsdam (GFZ), Germany (2) VU University, The Netherlands, (3) U.S.Geological Survey, Menlo Park, U.S.

Rheology and strength of the Earth's lithosphere have been debated since the beginning of the last century, when the concept of a strong lithosphere overlying viscous asthenosphere was introduced. The issue of strength of the lithospheric plates and their spatial and temporal variations is important for many geodynamic applications. For rocks with given mineralogical composition and microstructure, temperature is one of the most important parameters controlling rheology. We present the first world strength and elastic thickness map obtained from global thermal and crustal models. Temperature estimates for the deeper horizons of the lithosphere, where the heat transport is mostly conductive, requires a precise knowledge of many crustal parameters (mainly thermal conductivity and heat production), which are extremely uncertain. Therefore, we use a combination of indirect approaches, such as seismic tomography and geothermal analysis. Furthermore, we implement a global crustal model on the base of previous compilations. Lithology of the upper and lower crust was classified based on tectonic maps of the World in agreement with the previous study of Tesauro et al. (2009). The results show a good correspondence between strength values and geological features. We observe some general tendency for old cratons and areas affected by the Tertiary volcanism, characterized by high and low strength values, respectively. At the same time, relevant differences in the strength distribution between similar structures are found. Furthermore, the young (Phanerozoic) geological features characterized by low Te (~25 km), high topography (>1000m) and seismicity. By contrast, the old (Achaean and Proterozoic cratons) internal cores of the continental plates show high Te (over 100 km), low topography (<1000m) and a small amount of seismicity.