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# Deciphering elastic thickness (Te) in the light of GPS measurements

Nicolas Houlié (1) and Anthony Watts (2)
(1) ETH-Z, Zurich, Switzerland (nhoulie@ethz.ch), (2) University of Oxford

Recent studies suggest there might be a relationship between the long-term elastic thickness (Te) and the short-term seismic thickness of the lithosphere (Ts). In Europe, regions of high Te, which are associated with old cratonic lithosphere, correlate with high Ts while regions of low Te, which are associated with younger orogenic belts, correlate with high Ts. The cause of this relationship is unclear, but it appears that Te and Ts are both proxies for the thermal and mechanical properties of the lithosphere and, potentially, its strength on long and time-scales. Another observation that may relate to the lithospheric strength are GPS measurements of ground deformation. We have therefore examined the relationship between the observations of Te and the results of two decades of ground deformation as measured by GPS and find that there is a correlation between them. Regions of high Te and small topographic relief correlate, with reduced ground deformation while regions of low Te correlate with high topographic relief and increased ground deformation. Yield Strength Envelope considerations based on GPS-derived inferences of the strain rate confirm this relationship with old cratonic Europe expected to be associated with a higher Te than young orogenic Europe. We discuss here the significance of these relationships for the rheology of continental lithosphere and its behaviour on long and short time-scales.