Traction and strain-rate at the base of the lithosphere: An insight into cratonic survival
Supplementary material

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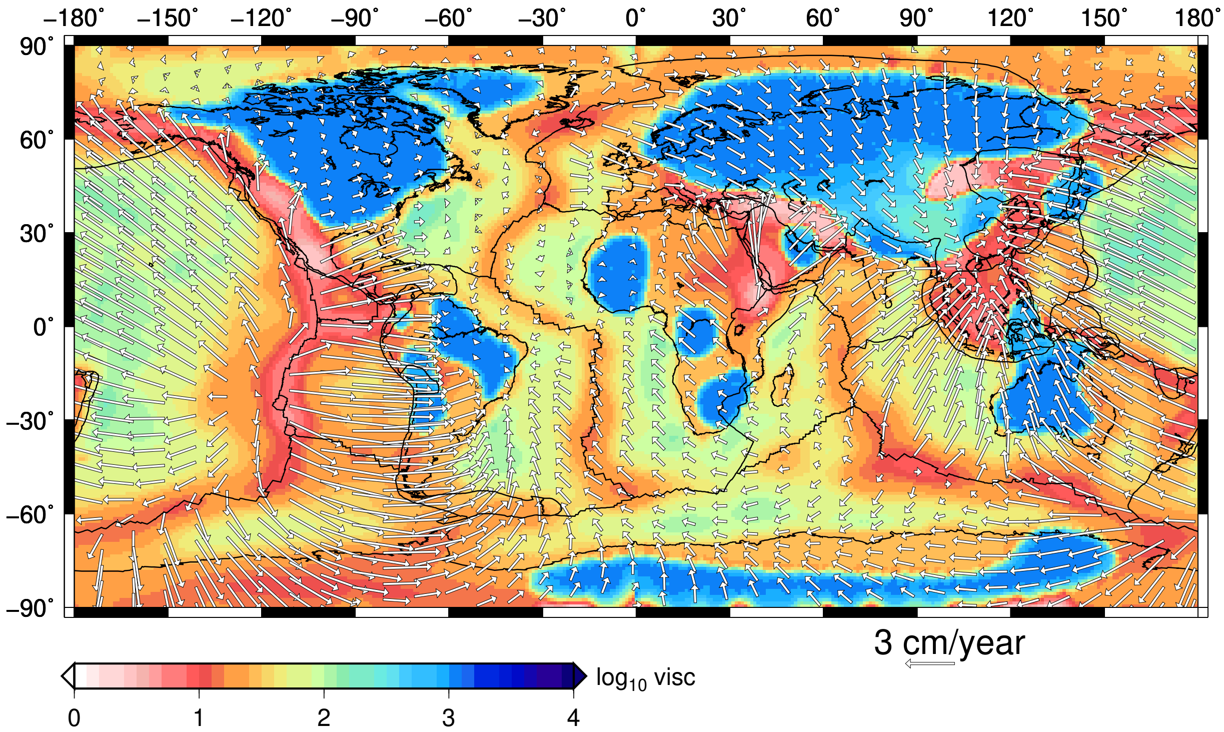
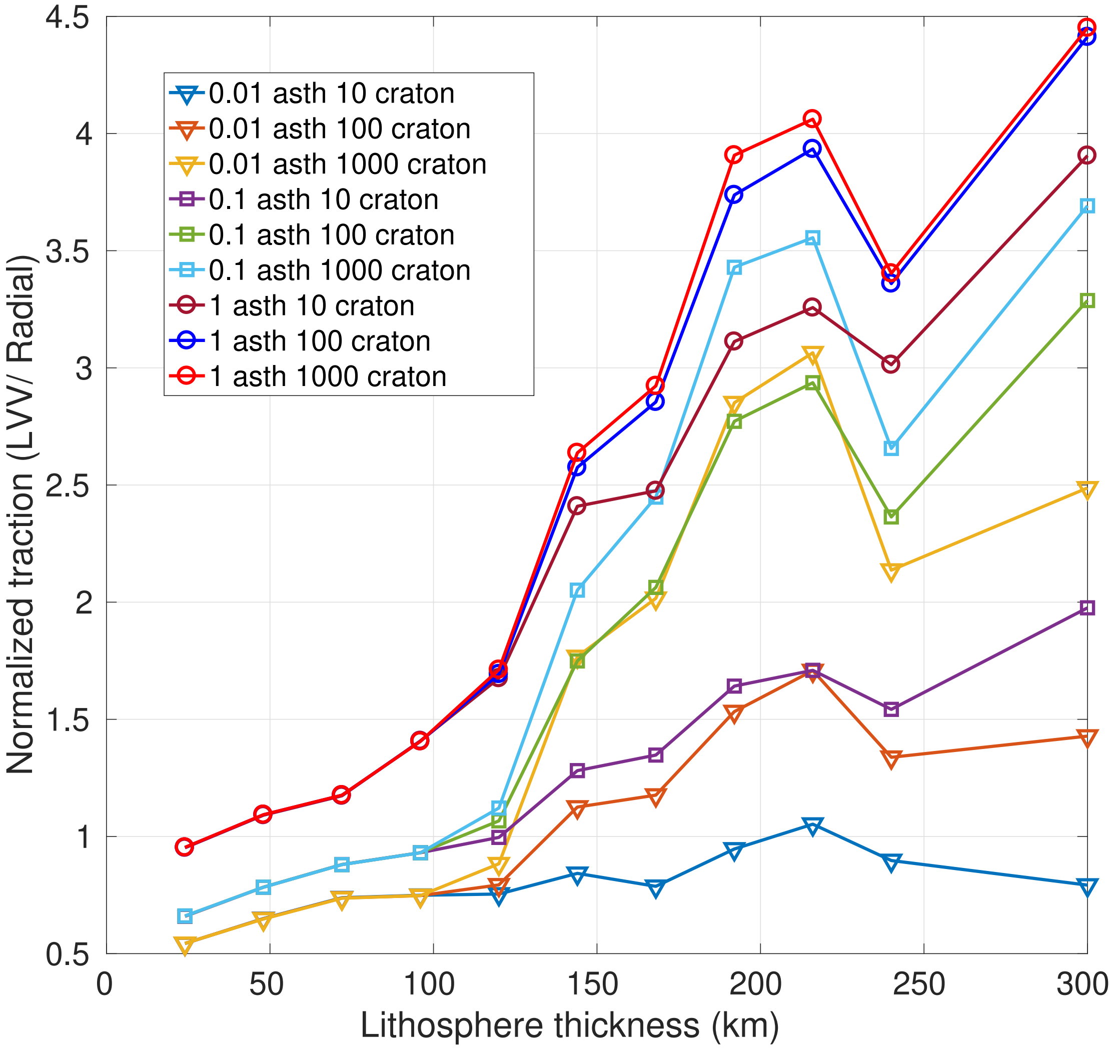
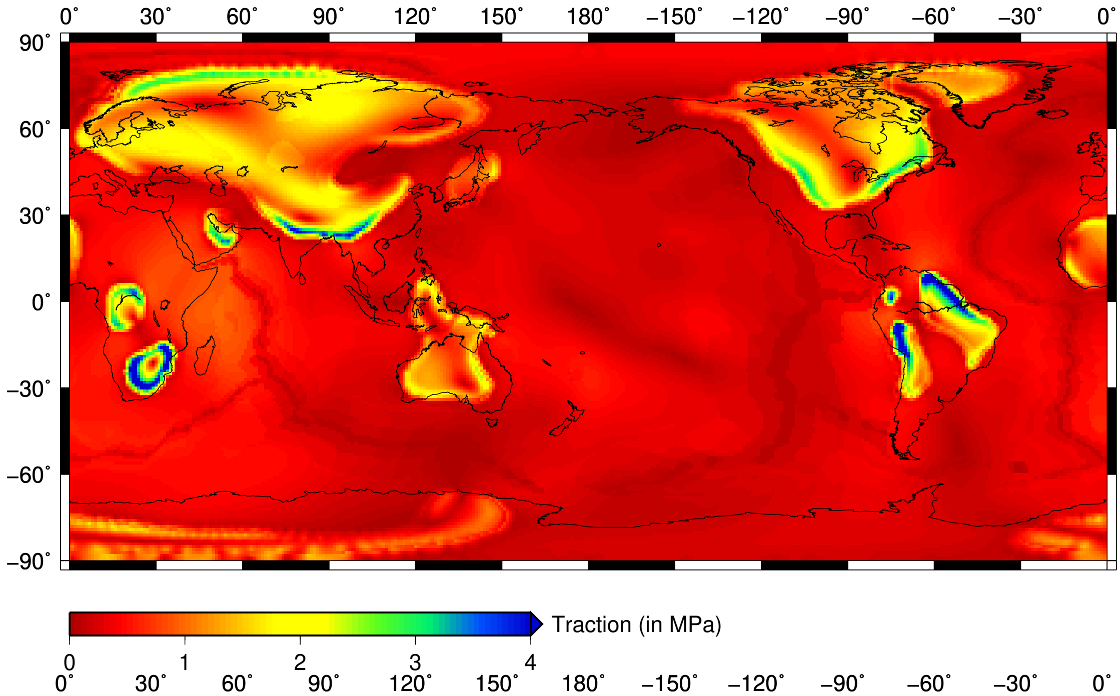
S 1: Velocity vectors are plotted above viscosity structure at 24 km depth from models with a viscosity combination of 10^{20} Pa-s asthenosphere and cratons of 100 times viscosity contrast. Background colour represents normalized value of LVV with respect to the reference viscosity of upper mantle.

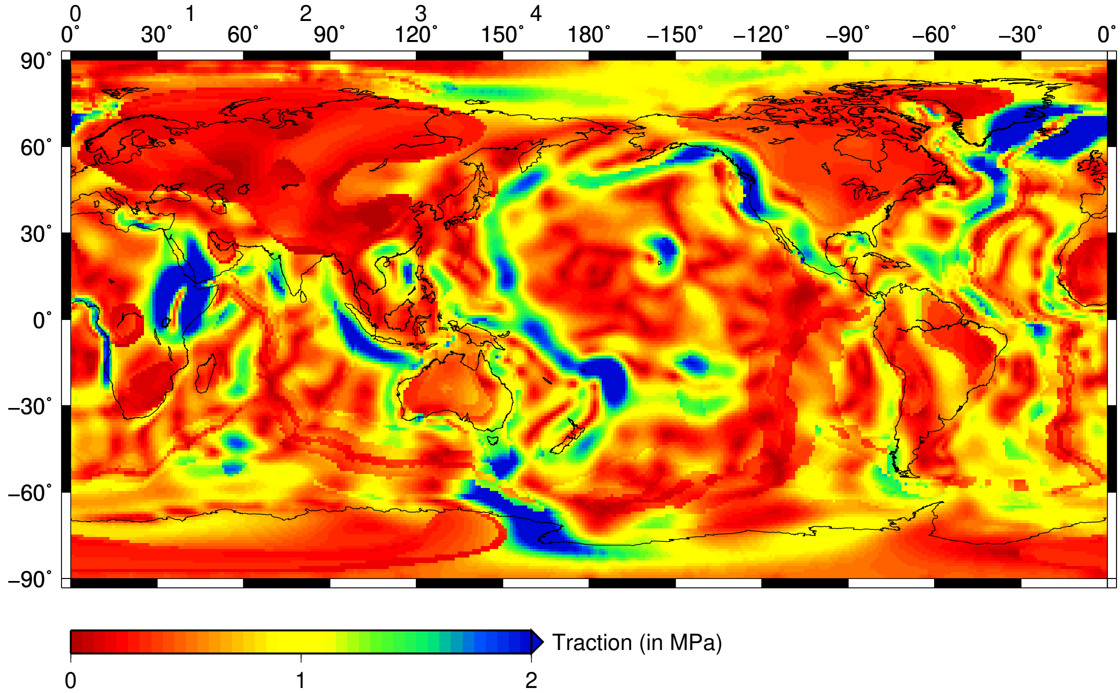


S 2: Traction ratio calculated at the surface from models using no-slip boundary conditions (similar to ?). Lines of different colours are obtained from models of different viscosity combinations of asthenosphere and cratons mentioned in the legend.



S 3: **Top:** Traction magnitudes at the base of the lithosphere from a model without any density anomaly in the upper mantle (till 670 km) but with lateral viscosity variations (LVV) arising from high viscosity cratons (100 times more viscous that intraplate areas). In this case, higher tractions are found to occur only underneath the cratons. **Bottom:** Traction magnitudes at the base of the lithosphere from a model with no LVV but with density anomalies in the entire mantle. High tractions occur under the plate margins (the Pacific, the Indian Ocean, the East African rift). Cratons do not show high tractions in this case.





S 4: We calculate lithospheric thickening rates due to thermal cooling. If we take thermal cooling time scale as $\tau = \frac{l^2}{\kappa}$, where l is the lithospheric thickness in the order of kilometers and κ is the thermal diffusivity in m^2/s, then, lithospheric thickening rate scales with, $\dot{\epsilon_c} \sim \frac{1}{\tau}$. Hence, the normalized rate (q') becomes $q' = \frac{\dot{\epsilon_c}}{\dot{\epsilon_0}} = \frac{1}{\tau \times \dot{\epsilon_0}}$, where $\dot{\epsilon_0}$ is the average strain-rate at the base of 120 km thick lithosphere. This normalization indicates the intensity of lithospheric thickening due to thermal cooling compared to mantle shearing at the base of 120 km thick lithosphere. The result (black dashed line) shows that the thickening rate due to cooling is much slower than the deformation rate due to mantle shearing.