LONG-TERM ELASTICITY IN THE CONTINENTAL LITHOSPHERE.

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The evolution of the Gulf of Aden and the Anatolian fault systems is modelled using the principles of elastic fracture mechanics usually applied to smaller scale cracks or faults. The lithosphere is treated as a plate and simple boundary conditions are applied that correspond to the known plate boundary geometry and slip vectors. The models provide a simple explanation for many observed geological features. This suggests that long-term elasticity must be retained within the continental lithosphere and that viscous stress relaxation is negligible. Observed differences in behaviour between ocean and continental lithosphere are attributed to buoyant continental crust, which by thickening or thinning suppresses large displacements on extensional or contractional features in the upper mantle. Strike-slip boundaries and extrusion processes are favoured