A survey of the application of continuum mechanics and the rheology of crystalline materials to the Earth:

- Introduction. Basic physical facts about the Earth: the gravity field and the geoid; seismic wave propagation; surface heat flow and internal temperature distribution; structure, composition and state of the Earth’s interior.

- Rheological equations of state (infinitesimal elasticity and anelasticity, linear and nonlinear viscosity, viscoelasticity). Effects of temperature, pressure and time on rheological behaviour. Equations of conservation of momentum, energy, and mass.

- Low-temperature (< ½ solidus temperature) rheology: shear failure criteria; frictional properties and faulting in the Earth’s crust; seismicity and earthquake parameters; thermal state and rheological properties of the continental lithosphere.

- High-temperature (> ½ of solidus temperature) rheology: microphysical basis for flow in solids (diffusion and dislocation creep); high-frequency and zero-frequency properties of the Earth’s mantle; estimation of mantle viscosity.

- Geodynamic processes: thermal convection and plate tectonics; extension of continental lithosphere and initiation of sea-floor spreading; subduction of oceanic and continental lithosphere; exhumation of UHP rocks.