

3-D structure of the Earth's mantle and core, from a large database of P, PKP, PcP travel-times.

Observations of the travel time of seismic waves reflected from, or refracted through the Earth's core are essential to our understanding of the deep Earth. These seismic phases are sensitive to features difficult to image like the topography of the core-mantle boundary (CMB), the short-scalelength structure of the D" region, and the structure of the Earth's core. I invert tomographically a large database of P, PKP, PcP travel-times from the ISC (International Seismological Centre) bulletins, to map P-velocity heterogeneities in the Earth's mantle and outer core, and undulations in the topography of the CMB. The pattern of heterogeneity I find in the outer core is correlated with that of CMB undulations; outer-core heterogeneity can therefore be explained as an effect of gravity anomalies within the core, produced, in turn, by the heterogeneous structure of the mantle and CMB themselves.

With respect to earlier studies by myself and co-authors (Soldati, Piersanti, Dziewonski), I take advantage of an increased computational power, to conduct a large number of linear inversions, changing the values of the numerous available regularization parameters. This way, it is possible to monitor accurately the trade-off (smearing) between structure mapped in differently sampled regions of the deep Earth. This should lead to identify a relatively error-free solution model, or assign to any selected solution an appropriate "error-bar", before subjecting it to geodynamic interpretations.