

## **Inferring Radial Models of Mantle Viscosity from Geophysical Observables**

Soldati Gaia\*, Boschi Lapo\*\*, & Deschamps Frédéric\*\*\*.

\*INGV, Rome, Italy

\*\*Seismology and Geodynamics, Institute of Geophysics, Swiss Federal Institute of Technology, Zurich, Switzerland

\*\*\*Geophysical Fluid Dynamics, Institute of Geophysics, Swiss Federal Institute of Technology, Zurich, Switzerland

The inference of mantle viscosity from geophysical signatures is complicated by the existence of multiple solutions, which can hardly be revealed all at once by traditional inverse techniques. A detailed exploration of the model space by forward techniques can provide us with much more information concerning the range of possible solutions. Here, we examine the problem of non uniqueness by considering a large number of models produced by a non-deterministic global optimization method, the genetic algorithm (GA) technique. The viscosity profile of the mantle can be related to its the density structure through an appropriate mantle flow modeling that explicitly accounts for radial variations in viscosity, and that predicts surface geoid anomalies. The fitting function in our GA approach is based on the correlation between the predicted and observed geoid. Density anomalies are constrained from seismic velocity anomalies and a velocity-to-density scaling relation. We considered several density models based on recent tomographic models, and we investigated the role of velocity-to-density scaling relation.