



Seminario

Geodynamic retrodictions: reconstructing past mantle flow to test geophysical hypotheses against geologic data

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Abstract:

In the last decades mantle convection models have become ever more sophisticated. As many model features, such as complex rheologies or thermochemical flow properties, involve ad-hoc parameterizations and long-range extrapolations, testing mantle convection models against observables is of fundamental importance. The long time scales of mantle flow, on the order of millions of years, rule out predictions on future system states. But viable tests of mantle convection models, to resolve uncertainties in model parameters and the assumptions they are based upon, can be done by comparing past mantle states obtained through retrodictions against constraints gleaned from the geologic record.

The adjoint method allows us to uniquely reconstruct a past thermal state of the mantle that naturally evolves into its present-day state. Although the theory and uniqueness properties of the adjoint method in geodynamics are well understood, its application to the real Earth is still in its infancy. We will look here at some recent results for the evolution of the Atlantic hemisphere over the last 40 Ma and discuss the current state and the future potentials of mantle retrodictions.

Proponente: Manuele Faccenda
