Geophysical Research Abstracts
Vol. 17, EGU2015-5322, 2015
EGU General Assembly 2015

Blending geological observations and convection models to reconstruct mantle dynamics

Nicolas Coltice (1,2), Marie Bocher (1), Alexandre Fournier (3), and Paul Tackley (4)

(1) Université Lyon 1, Laboratoire de Géologie de Lyon, Villeurbanne cedex, France (coltice@univ-lyon1.fr), (2) Institut Universitaire de France, Paris, France, (3) Institut de Physique du Globe de Paris, France, (4) Institute of Geophysics, ETH Zurich, Switzerland

Knowledge of the state of the Earth mantle and its temporal evolution is fundamental to a variety of disciplines in Earth Sciences, from the internal dynamics to its many expressions in the geological record (postglacial rebound, sea level change, ore deposit, tectonics or geomagnetic reversals). Mantle convection theory is the centerpiece to unravel the present and past state of the mantle. For the past 40 years considerable efforts have been made to improve the quality of numerical models of mantle convection. However, they are still sparsely used to estimate the convective history of the solid Earth, in comparison to ocean or atmospheric models for weather and climate prediction. The main shortcoming is their inability to successfully produce Earth-like seafloor spreading and continental drift self-consistently. Recent convection models have begun to successfully predict these processes. Such breakthrough opens the opportunity to retrieve the recent dynamics of the Earth's mantle by blending convection models together with advanced geological datasets. A proof of concept will be presented, consisting in a synthetic test based on a sequential data assimilation methodology.