



Dynamic causes of the relation between area and age of the ocean floor

N. Coltice (1), T. Rolf (2), P.J. Tackley (2), and S. Labrosse (1)

(1) Université Lyon 1, Dynamique de la lithosphère, Villeurbanne cedex, France (coltice@univ-lyon1.fr ; stephane.labrosse@ens-lyon.fr), (2) Institute fuer Geophysik, ETH Zurich, Switzerland (tobias.rolf@erdw.ethz.ch ; ptackley@ethz.ch)

The distribution of seafloor ages determines fundamental characteristics of our planet: sea-level , ocean chemistry, tectonic forces and heat loss. The present-day distribution suggests that subduction affects lithosphere of all ages with the same probability (B. Parsons, J. Geophys. Res 87, 289-302, 1982). This is at odds with the theory of thermal convection which predicts that subduction should happen once a critical age has been reached. So far, the area-age distribution remains a primary constraint, which convection models have failed to satisfy (S. Labrosse and C. Jaupart, Earth Planet. Sci. Lett. 260, 465-481, 2007). We will show that combined action of plate-like behavior and continents causes the seafloor area-age distribution in spherical models of mantle convection to be Earth-like. Our simulations suggest that the seafloor age distribution on Earth has evolved in the past 500~Myrs, along with peaks of production rate of new ocean floor that could have reached twice the present-day value.