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The role of continental growth on the evolution of seafloor spreading

Nicolas Coltice (1,2), Tobias Rolf (3), and Paul J. Tackley (3)

(1) Laboratoire de Géologie de Lyon, Université Claude Bernard Lyon 1, Ecole Normale Supérieure de Lyon, CNRS, France, (2) Institut Universitaire de France, (3) Institute of Geophysics, ETH Zurich, Switzerland

The area vs. seafloor age distribution is fundamental information to build plate reconstructions and evaluate sea level changes and heat flow evolution. Recent models of spherical mantle convection with plate-like behavior (Tackley, 2000a, 2000b) and continental drift (Rolf and Tackley, 2011) propose solutions compatible with the area vs. age distribution of present-day seafloor spreading (Coltice et al., 2012). Area vs. age distributions computed in convection models display fluctuations of the rate of seafloor spreading. The shape of the distribution varies from uniformly distributed to strongly dominated by younger ages over the course of a calculation. Two factors influence the computed area vs. age distribution: the time-dependence of the rate of production of new seafloor and the continental area that constrains the geometry of ocean basins.

Heat flow or sea level strongly depend on the shape of this distribution; hence it is essential to investigate how continental growth could have modified the area vs. age distribution. We will evaluate the role of increasing continental area on the computed seafloor spreading histories. We will show that the average production rate of new seafloor does not vary with continental area, contrarily to fluctuations that increase with continental area. We will show continental growth tends to favour the consumption of progressively younger seafloor. Consequences on heat flow and sea level will be presented.

References

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