A two phase segregation model

Y Ricard, F. Dubuffet and O. Sramek*.
Laboratoire des Sciences de la Terre, CNRS, Université de Lyon 1
* Permanent address, Univesity of Yale

Various geodynamic situations involve simultaneously two phases interacting in the same convective medium. This is the case when partial melting is present and was the case when the iron and the silicates differenciated in the Hadean Earth. The attemps to handle such situations in numerical codes have not been very numerous. In addition to be intrinsically with lateral viscosity variations, non Boussinesq (as the difference between densities can be of the same order as the densities themselves), each phase must also be considered as compressible. We present the first results obtain with a code that solves the equations and formalism proposed by Bercovici et al. (2001). The applications to the formation of the core will be presented.

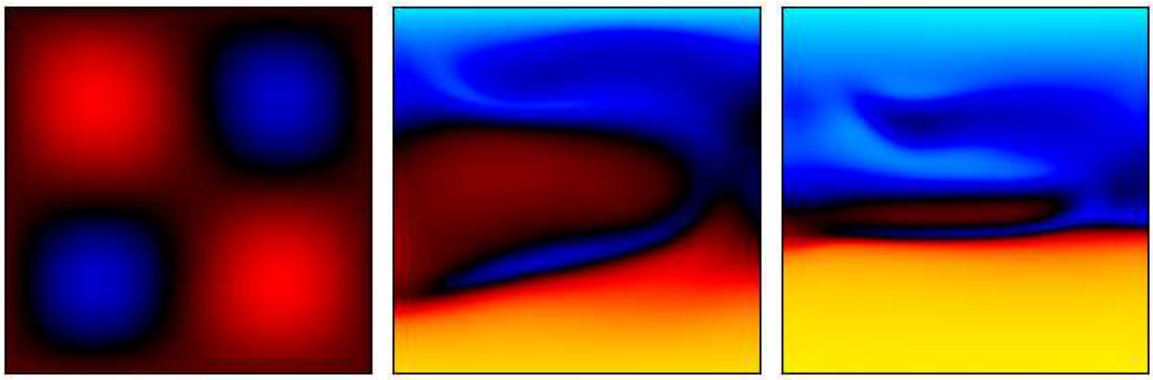

Figure 1: On left, initial metal-silicate proportion, the zones rich in liquid metal are in red. The flow corresponds to the superposition of an incompressible circulation (the iron rich zones are denser, the silicate-rich zone lighter) and a compressible flow (Darcy flow of liquid metal through solid silicates). After some time (middle and right panels), the metal (yellow) has segregated from the silicates (blue).

Bercovici, D., Y. Ricard, and G. Schubert, 2001. A two-phase model of compaction and damage, 1. general theory, *J. Geophys. Res.*, **106**, 8887–8906.