A numerical study on thermo-chemically driven core convection

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Our numerical study focuses on convection in a rotating spherical shell with the objective to model combined thermal and compositional convection as proposed for the Earth's core. We consider inner core cooling as the main driving mechanism which provides latent heat at the ICB as well as the release of light material. We assume double-diffusive convection, with the thermal diffusivity exceeding the compositional one by a factor of ten (Le=10). The core mantle boundary is supposed to be impermeable for the light component. The freezing inner core, however, provides a certain flux of light material at the inner core boundary. Therefore, appropriate Neumann boundary conditions are implemented in the numerical scheme. The ratio of thermal to chemical forcing in the Earth's core is still rather uncertain. As a simultaneous acting of both buoyancy sources is most likely we investigated core convection in a range of varying thermal to chemical forcing ratios. In this regard characteristic dynamical properties and spatial flow structures are discussed. Additionally, we compare our results to equivalent simulations with Dirichlet boundary conditions thus assessing the influence of the different types of boundary conditions on the convective flow.