A numerical study on possible driving mechanisms of core convection

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We present a numerical study on core convection based on a model of a rotating spherical shell where different driving mechanisms are investigated. Two different sources are potentially available to act as driving forces. The first is based on the super adiabatic temperature gradient in the outer core. The second is of chemical nature and is derived from light elements which emerge at the boundary between the inner and the outer core as a result of the freezing process of the outer core. So far it is uncertain if the convective flow in the outer core is dominated by thermal or by chemical buoyancy. Dynamically, both components differ mainly in terms of their diffusional time scales, whereas the chemical component diffuses much faster than the thermal one. To investigate the influence of the driving mechanisms on the convective flow pattern we considered different scenarios including the two extreme cases of purely thermal and purely chemical driven convection and the more likely situation of a joint action of both sources. We focused on the question how the driving mechanisms affects the differential rotation and the spatial distribution of helicity which are particularly important for the dynamo process.