Formation of sheet convection and helical current coils in geodynamo simulation with low Ekman number

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We have performed geodymano simulation with low Ekman number (Ek=O(10E-7)). We report new findings about convection and dynamo in the core from our simulation results.

We found the convection and magnetic structure are different from that in high Ekman number case. The convection structure becomes thin sheet plume. Many helical current coils are formed along thin sheet plumes. This convection amplifies magnetic fields efficiently through dynamo process. Magnetic energy becomes several times larger than the kinetic energy of convection.