

## **Hydromagnetic waves in Earth's core as a source of secular variation: Evidence from geodynamo models.**

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The origin of westward and eastward motions of the geomagnetic field on timescales of hundreds to thousands of years is not well understood. Possible mechanisms include advection of field lines by zonal flows and/or the propagation of hydromagnetic waves in the core. Here we analyse output from two convection-driven geodynamo models, identify the presence of hydromagnetic wave flows and find that these are associated with azimuthal motions of radial magnetic field features at the outer surface. The mechanism producing these motions will be described and model results will be compared to the evolution of the geomagnetic field at the core surface inferred from historical and archaeomagnetic observations. Our results demonstrate that hydromagnetic waves can occur in dynamos where the underlying field is constantly evolving and suggest that such waves could contribute to observed geomagnetic secular variation.