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# A generating process of the geomagnetic drifting field

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The geomagnetic field is comprised of drifting and standing field. The drifting field is the field that drifts westwards nearly steadily over the past several hundred years and the standing field is that stays at the same place. The drifting field has two major characteristic features. When the field is expressed in a spherical harmonic series, the drifting field mainly consists of sectorial harmonics. Secondly the rate of drift is uniform irrespective of the harmonics. This means the drift velocity is non-dispersive.

We here propose a model of the generating process of the drifting field. Because of the non-dispersive nature of the drift velocity, we assume the westward drift is a phenomenon closely tied with material flow rather than a magnetohydrodynamic wave. Furthermore we take it a phenomenon near the surface of the core where the dipole field is dominant.

If the mantle is approximated by an electrical insulator, the electric current in the core normal to the core-mantle boundary must be zero. This provides a strong constraint on the liquid flow near the surface. If we assume infinite conductivity of the core for simplicity, only the sectorial flow is allowed for the toroidal flow, and the meridional flow for the poloidal flow. The sectorial toroidal flow, interacting with the dipole field, induces sectorial poloidal field, whereas the meridional poloidal flow produces the meridional poloidal field. The surface layer, which is rotating westwards as a whole, carries these fields westwards together. Since the rotation of the meridional field is unrecognizable, only the sectorial field is observed as the drifting field.

We present a simplified model that describes the above process.

Keywords: geomagnetic secular variation, westward drift, drifting field, core surface flow