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Core flow inversions from the Earth's magnetic field

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Abstract content
   (Max 300 words)

The Earth's core flow at its boundary with the mantle is explored by inverting the magnetic induction equation with respect to the International Geomagnetic Reference Field models, measured in nano-Teslas, and its secular variation, in nano-Teslas per year, for the period 1965 to 2010 divided in five-year intervals. The South Atlantic anomaly and geomagnetic jerks were also investigated. To reduce the solution's non-uniqueness, the Frozen-flux approximation and flow tangential geostrophy is assumed. Further a priori information was added to damp the solution. Both the magnetic field, with its secular variation, and the velocity field's potentials are expanded in terms of spherical harmonics. Inversion proceeds by a linear least-squares method with Choleski decomposition on the resulting Elsasser and Gaunt matrices. Results indicate flow patterns, in kilometers per year, that includes a vortex near the South Atlantic anomaly that stayed relatively stable through this 45-year period. It was also found that accelerations, in kilometers per squared year, are more varied between each five-year interval.

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