ACCOUNTING FOR RAPID SV CHANGES WITH QUASI-GEOSTROPHIC CORE FLOWS

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We have recently used an ensemble technique to invert core flows from models of the geomagnetic SV. We have generated random realisations of the small scale unknown magnetic field b_k at the CMB that we have added to models of the known large-scale magnetic field B. The resulting magnetic field enters the matrix that connects the flow to a SV model. Each realization of b, b_k corresponds to a flow solution u_k. The common part of all the flow solutions is obtained by taking the average of the ensemble of flow solutions. We have investigated how well magnetic observatory records are predicted from our flow solutions. We find that each member of the ensemble of solutions (u_k) interacting with its associated (B+ b_k) accounts well for the observatory records. We find also that the ensemble average interacting with B accounts for most of the records of the main geomagnetic jerks. We are thus in the position to discuss what flow changes are responsible for jerks and other rapid changes of the core field. We investigate whether it is possible to discriminate between jerks and other sudden variations from this standpoint.
We are now developing a fully self-consistent model of the rapid Secular Variation to complement this kinematic study. We will argue that our recent inference of rather strong magnetic fields in the core interior, about 10 times as intense as at the core surface, is consistent with the observation of rapid changes of the geomagnetic SV.

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