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Implementing time-dependent maximium entropy regularisation in geomagnetic field modelling

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We integrate the maximum entropy image reconstruction technique into the process of modeling the time dependent geomagnetic field at the core-mantle boundary (CMB). In order to decrease the unconstrained effect of the small scales in the process of inverting the data, some models are regularised using an *a priori* quadratic norm (Bloxham & Jackson [1992]). This artificial damping leads to underestimate the power at large wave numbers, and implies a loss of contrast in the reconstructed picture of the field at the CMB.Jackson [2003] recently introduced another kind of regularisation that maximises the entropy of the magnetic field map. It provides sharper field models, with a minimum of *a priori* about its structure, but was only developped to build snapshots of the magnetic map.

We introduced this technique into the time-dependant problem, and applied it to model the field over the interval 1740-1990, from the compilation of historical observations that lead to the *gufm1* model (Jackson *et al.* [2000]). We then present comparisons between models built from maximum entropy and from quadratic damping. From those models we proceeded to core-flow inversions: we detail the modifications induced by our new method and discuss its implications for the Earth's outer core.