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Maximum entropy regularisation of the core flow inverse problem.

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We integrate a maximum entropy image reconstruction technique into the process of modelling the core flow at the core-mantle boundary (CMB). Core flow models are usually built from a secular variation model via the induction equation in the frozen flux approximation, providing (i) an extra constraint about the flow morphology, to reduce the parameter space, and (ii) a regularisation, to reduce the unconstrained effect of the small scales. Eymin & Hulot [2005] have shown that the interaction between small scales of both the flow and the magnetic field can generate secular variation at large scales. A good parameterisation of this process (e. g. by considering this interaction as an error of modelling, Pais & Jault [AGU 2006]) is crucial in order to extract a maximum of information from the data.

In this respect one should avoid adding unnecessary *a priori* information, as done by the usual quadratic regularisations. These lead to underestimate the power at large wave numbers (of importance for the core flow), and imply a loss of contrast in the reconstructed picture of the flow at the CMB. Recently introduced to invert for magnetic field models (Jackson [2003]) the maximum entropy regularisation is known to provide sharper pictures, with a minimum of *a priori* about their structure. We introduce this technique into the problem of retrieving the core flow, and apply it to the CHAOS model at the epoch 2002.5 (Olsen [2006]) using the tangentially geostrophic constraint. We present comparisons between flow models built from maximum entropy and quadratic regularisations, and discuss perspectives and implications for our method.