Abstract

The CMB is believed to be the heat flow rate-delimiter of the Earth, making it an important region to study the planet's dynamics and evolution. Nevertheless, the heat flow estimates in this area are poorly constrained. In this study it is aimed to determine the influences of the magnetic field as a constrain for the calculation of the CMB heat flow. To do this, it was first needed to determine the most Earth-representative dynamo scaling law. The diffusivity-free law, with an exponent of 1/3, was proven to be favoured by the data set with rigid boundaries and with both fixed flux and fixed temperature conditions. An exponent of 0.31 was obtained for the RMS field inside the core suggesting that the law does not depend on the thermal conditions of the simulations. However, this was not the case at the CMB where only fixed temperature simulations obeyed it. The law was then coded into a numerical model to be used as a magnetic constrain based on non-decaying and dipole-dominated fields. Nevertheless, it was shown by an exponent of 0.29 that the law is independent of the magnetic topology. No estimates of the heat flow were obtained due to model limitations.