



## **Shannon information of the geomagnetic field for the past seven millennia and implications on the present field understanding**

Enkelejda Qamili (1,2), Angelo De Santis (1,3), Gianfranco Cianchini (1,2)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Roma 2, Rome, Italy (enkelejda.qamili@ingv.it), (2) Scuola di Dottorato in Scienze Polari, Università degli studi di Siena, Siena, Italy, (3) Facoltà di Scienze Matematiche, Fisiche e Naturali, Chieti, Italy

The behaviour in time of the geomagnetic field, as expressed by the International Geomagnetic Reference Field (IGRF-11; valid over the last 110 years) model, deserves a special attention when compared with that shown by several paleomagnetic/archeomagnetic models such as CALS3k, CALS3k\_cst, ARCH3k, ARCH3k\_cst, SED3k valid over the past 3000 years and CALS7k valid over the past 7000 years. In order to exploit the dynamical properties of the geomagnetic field in its wholeness, we apply some concepts of the Information Theory to the above models, in particular analysing the behaviour over time of Shannon Information and Kolmogorov Entropy. The results show how the present geomagnetic field is rather distinct, at least for the past 400 years: a global critical state started at around 1750, and is still present, being characterized by significant low geomagnetic dipole energy and Shannon information and high K-entropy. The details of how these characteristics may develop are not clear, since the present state could move toward an excursion or a geomagnetic polarity reversal, although we cannot exclude the possibility that the “critical” behaviour will become again more “normal” stopping the present geomagnetic field decay.