The first full vector palaeosecular variation curve for Italy based on revised data from archaeological material and volcanic rocks

Evdokia Tema¹ and Philippe Lanos²
¹Dipartimento di Scienze della Terra, Università degli Studi di Torino, Torino, Italy (evdokia.tema@unito.it)
²CNRS IRAMAT-CRP2A, Université Bordeaux-Montaigne and Géosciences-Rennes, Université Rennes 1, Rennes, France (philippe.lanos@univ-rennes1.fr)

A new full-vector palaeosecular variation curve for Italy is presented based on a selection of high-quality data from sites within a 1000 km radius around Viterbo. The intensity and direction curves were calculated separately, using an updated compilation of Italian archaeomagnetic data from both archaeological material and volcanic rocks. The quality of the data was carefully evaluated, with particular attention on the reliability of the dating of the volcanic rocks and on the quality of the archaeointensity determinations. Only data from volcanic rocks of undisputable age have been considered. The new curves were calculated using Bayesian statistics and cover the last three millennia. The directional curve is very well constrained whilst the intensity curve is characterized by a larger error envelope, highlighting the need for new high-quality intensity data from Italy. Despite the limited number of reference data, the Italian intensity curve confirms periods with high intensity values of around 80 μT at 800-700 BC and 700-800 AD, in accordance with the geomagnetic intensity spikes previously identified in Middle East and Western Europe. Thanks to the privileged geographical position of the Italian peninsula, situated almost in the center of the Mediterranean, the Italian secular variation (SV) curves were used to analyze the evolution of the geomagnetic field in Europe by comparing them with other recently published SV curves for Western and Eastern Europe and with geomagnetic field models. The new curves can be used for archaeomagnetic dating not only in Italy but also in other countries of Europe such as Croatia, Slovakia and Serbia where no local SV curves are available so far.

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