Applying "domino" model to study dipolar geomagnetic field reversals and secular variation

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Aiming to understand the physical processes underneath the reversals events of geomagnetic field, different numerical models have been conceived. We considered the so named "domino" model, an Ising-Heisenberg model of interacting magnetic spins aligned along a ring [Mazaud and Laj, EPSL, 1989; Mori et al., arXiv:1110.5062v2, 2012]. We will present here some results which are slightly different from the already published results, and will give our interpretation on the differences.

Following the empirical studies of the long series of the axial magnetic moment (dipolar moment or "magnetization") generated by the model varying all model parameters, we defined the set of parameters that supply the longest mean time between reversals. Using this set of parameters, a short time series (about 10,000 years) of axial magnetic moment was generated. After de-noising the fluctuation of this time series, we compared it with the series of dipolar magnetic moment values supplied by CALS10K.1b model for the last 10000 years. We found similar behavior of the both series, even if the "domino" model could not supply a full explanation of the geomagnetic field SV. In a similar way we will compare a 14000 years long series with the dipolar magnetic moment obtained by the model SHA.DIF.14k [Pavón-Carrasco et al., EPSL, 2014].