Geophysical Research Abstracts
Vol. 21, EGU2019-13164, 2019
EGU General Assembly 2019

Can cosmogenic radionuclides help to improve global geomagnetic field models?

Sanja Panovska, Monika Korte, and Norbert Nowaczyk
Helmholtz-Zentrum Potsdam - Deutsches GeoForschungsZentrum GFZ, Potsdam, Germany

Reconstructions of the geomagnetic field on long timescales place new constraints on the processes that generate the geomagnetic field and give us insight into the geomagnetic excursions – dramatic and short decrease in the field intensity without a full polarity reversal. Recent models spanning the past 100 ka (GGF100k model) and Laschamp (∼41 ka) and Mono Lake (∼34 ka) geomagnetic excursions (LSMOD) greatly improved our knowledge of the long–term changes. Although over 100 paleomagnetic sediment records and volcanic data covering the past 100 ka have been compiled to constrain the models, there are regions, especially in the Southern Hemisphere, that are still poorly sampled, and further data are needed to improve the model reliability. Variations in production of cosmogenic radionuclides, such as ^{10}Be, from ice cores and sediments provide an independent proxy of paleointensity variations for a range of timescales. This study demonstrates the potential of combining paleomagnetic measurements with cosmogenic nuclide production rates to reconstruct the geomagnetic field evolution. More than 40 globally distributed cosmogenic ^{10}Be records are compiled and production rates are transformed into paleointensities. The Laschamp excursion is the most prominent feature in the past 100 ka, recorded globally in the paleomagnetic records, and represented in the ^{10}Be records with the highest peak in production rates. We developed two spherical harmonic field models, one based on paleomagnetic data only and the other additionally including ^{10}Be records. The geomagnetic field predictions from the models are compared in order to investigate the influence of the cosmogenic isotopes on the modeling results. We studied the dipole moment variations over the past 100 ka, the paleosecular variation activity, the time–averaged field, and the field morphology at the core–mantle boundary.