

Paleomagnetospheric processes

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On geological time scales, variations of the internal geomagnetic field affect the structure and the dynamics of the Earth's magnetosphere and contribute to what may be called space climate and paleomagnetospheric processes. This presentation is going to summarize the paleomagnetospheric research that was carried out in the context of the DFG Priority Programme SPP 1097 *Geomagnetic Variations*. We have studied structural aspects of paleomagnetospheres using theoretical concepts of magnetosphere formation, a potential field approach to model magnetopause shielding, and magnetohydrodynamic simulations. The types of geomagnetic variations considered here include changes of the dipole moment magnitude and excursions of the dipole axis. Quadrupolar paleomagnetospheres serve as important examples to assess the rich variety of non-dipolar configurations. Energetic particles in the paleomagnetosphere were studied by means of scaling relations for cutoff energies and differential particle fluxes as functions of a reduced dipole moment. We further quantified how higher-order core fields can open the polar caps and even create new particle entry regions in the equatorial region.