

Mgr. Petr Schnabl - Dissertation

Paleomagnetism and magnetomineralogy of rocks from the Bohemian Massif and Tethyan Realm

Abstract

The thesis deals with paleomagnetic and rock magnetic properties of Silurian/Devonian and Jurassic/Cretaceous limestones, Paleogene/Neogene basaltic rocks and altered Silurian basalts. The main goal is to determine the history of the Earth's magnetic field from the Silurian to the present.

Two lithostratigraphic formations are defined in the Jičín volcanic field on the basis of volcanology, paleomagnetism and radiometric dating. The Trosky Formation (24.6±18.3 – 15.7 Ma) is composed of several Strombolian-type volcanoes, while the Kozákov Formation (5.2 – 4.6 Ma) is represented by effusive products with a crater vent of a single giant volcano. One Pliocene (4.3–3.3 Ma) and two Pleistocene phases (2.6–2.1 Ma and 1.8 – 1.1 Ma) of volcanic activity

Magnetostratigraphy is a very important tool for the definition of the J/K boundary. The boundary between the Crassicolaria and Calpionella zones is present within geopolarity zone M19n. The boundary between the ammonite zones Jacobi and Durangites also lies close to this point.

Paleomagnetic directions of Silurian and Devonian rocks in the Bohemian Massif are very difficult to interpret and have been studied as a challenging problem for many years. In the Barrandian area, two potential components have been identified: approximately $200^\circ/-30^\circ$ and $200^\circ/+30^\circ$. The first direction has been reported as the primary one by several authors, while the second one is possibly of secondary origin but also Lower Paleozoic in age. This interpretation implies an approximately 200° clockwise (160° counter-clockwise) rotation during the Variscan orogeny. According to the second theory, which has not been published yet, the direction $200^\circ/+30^\circ$ is the primary one and the direction $200^\circ/-30^\circ$ is a secondary one, caused by supergene processes related to tropical weathering in the Mesozoic. None of these two theories is supported by clear evidence. This thesis, however, presents several specialized rock magnetic methods which can help to solve this task. Newly obtained data rather suggest the validity of the first theory. This means that the Barrandian area was rotated 200° clockwise or 160° counter-clockwise until the end of Variscan orogenic processes.