

Palaeomagnetic studies

**Palaeomagnetic constrains for the Tertiary evolution
of the Romanian Carpathians**

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Palaeomagnetic results from the Romanian Carpathians and Transylvanian basin obtained mainly in the last 20 years has imposed significant constrains for geodynamical models of the Carpatho–Pannonian area. These tectonic implications of palaeomagnetic data are a consequence of the basic hypothesis of palaeomagnetism that the geomagnetic field was, on average, that of an axial and geocentric dipole. If this hypothesis is fulfilled, the palaeomagnetist can interpret his results in terms of palaeolatitude of the sampling site and its location with respect to the palaeomeridians. When palaeomagnetic directions from a possibly displaced or rotated block are compared with those from a neighbouring block, the declination difference between an expected or reference direction and an observed direction indicate the amount of vertical axis rotations, whereas the palaeolatitude difference indicates north-south displacement.

Main palaeomagnetic studies [PANAIOTU 1998 and references therein; ROȘU et al. 2004; PANAIOTU et al. 2004; DUPONT-NIVET et al. 2005] are coming from the following areas:

- 1) Miocene volcanism from the Apuseni Mountains;
- 2) Miocene to Quaternary volcanism from the Eastern Carpathians;
- 3) Miocene sediments from the Carpathian foredeep;
- 4) Paleogene sediments from the Transylvanian basin;
- 5) Upper Cretaceous magmatic rocks from the Apuseni Mountains and the Southern Carpathians.

All these studies point to the following conclusions:

- During the Tertiary northward drift of the area, only 20° of clockwise rotation took place between Eocene and Middle Miocene and there is no

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rotation between Maastrichtian and Eocene. The northward drift was ended before the next phase of rotations.

- The main phase of rotations started after 15 Ma. The results from the Miocene volcanic rocks from the Apuseni Mountains show a continuous clockwise rotation of about 70° between 15 Ma and 11 Ma. Simultaneous differential rotations took place in the northern part of the East Carpathians (~20° counterclockwise rotation) and the external part of the Southern Carpathians (~30° clockwise rotation).
- After 11 Ma, the area affected by rotations was reduced to the external part of the bending area of the Eastern Carpathians (post 4 Ma rotations) and the Apuseni Mountains. The amplitude of this final counterclockwise rotation of the Apuseni Mountains is around 15° with respect to 10–11 Ma volcanism from the Eastern Carpathians which show no rotation with respect to stable Europe.

Keywords: geodynamics, tectonics, models, Carpathians, Pannonia, rotation

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A romániai Kárpátok terciérkori fejlődéstörténetének paleomágneses eredményei

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Az utóbbi 20 évben végzett paleomágneses kutatások jelentősen megváltoztatták a Kárpát–Pannon terület geodinamikai modelljét. A cikk a legfontosabb eredményeket foglalja össze.