Radiometric age of Cenozoic volcanism and paleomagnetic research

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In last decades, there were obtained tens of radiometric data on basaltic rocks using K-Ar method in order to understand volcanic setting, describe volcanic succession and define volcanostratigraphy. Now, there exist more than 400 data on the rock age. The radiometric research brought possibility to construct ideas on "volcanic phases"; longer periods of volcanic activity (e.g.: Kopecký 2010). Unfortunately, the data are coming from different laboratories, they were produced during nearly half century longing period and, what seems to be the greatest problem, there exist several different data on the same rock from the same location (e.g.: Milešovka Hill – 26.7; 30.,0; 31.1 and 31.6 Ma). Moreover, there was special behaviour of several minerals described during last years – the argon retention or loose, which can highly influence the rock age. The recent situation of the rock-age database can result in confusion if the data are used for description of one volcano development, one volcanic event definition and sometimes in evaluation of stratigraphy in complex volcanic units, as well. In similar cases, the judgement on reliability of each datum is very difficult and does not need to be realistic. The paleomagnetic results carrying basic information on polarity and on the magnetic vector orientation from the time of the rock origin, together with volcanological criteria employed can represent one of realistic and serious ways of solution.

The high content of titano-magnetite, esp. in rocks of basaltic chemistry, brings serious information on magnetic field orientation from the time of cooling. The critical temperature (Curie point) is 580°C, which is much lower than the temperature of the rock solidification. Using alternate field or thermal demagnetization together with measurements of remanent magnetization, we can distinguish the primary component from the secondary or even later ones. The primary magnetic component consists of magnetic declination and inclination which are dependent on the actual position of the magnetic pole rotating around the geographic pole. Combination of declination and inclination of the primary paleomagnetic vector can distinguish short time duration of volcanic events – e.g.: the Kozákov and the Trosky Formation of the Jičín Volcanic Field (Cajz et al. 2009), or three separate volcanic phases of the Bruntál Volcanic Field (Cajz et al. in print-2011). It is proved by tight cluster of the primary components. On the other hand, the cluster of primary components can be very wide. This means that the volcanic activity lasted for a long time, e.g.: the lower lithostratigraphic units of the České středohoří Volcanic Complex.

Using evaluation based on paleomagnetism and volcanological criteria simultaneously, the radiometric age is able to be determined more precisely.

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