

NEOGENE VOLCANISM IN THE PANNONIAN BASIN - IMPLICATIONS FOR THE NATURE OF THE MANTLE AND FOR THE GEODYNAMIC RELATIONSHIPS

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In the last decade, considerable amount of new geochemical data (major and trace elements, radiogenic isotope ratios) has been obtained for each association of the Neogene volcanic assemblage of the Carpathian-Pannonian Region (CPR). These volcanic suites are strongly related to the main geodynamic events of the CPR, therefore their studies can contribute to our knowledge about the evolution of this area. In spite of the increasing amount of data, however, there are still major debates about the genesis and geodynamic implications of the volcanic series. Here, we attempt to summarize our present knowledge on these rocks and the different opinions about the origin of this volcanic assemblage.

In accordance with the main tectonic events of the CPR, the Neogene volcanism can be subdivided into pre-extensional, syn-extensional and post-extensional periods. The pre-extensional volcanism is characterized by voluminous explosive eruptions of silicic magmas roughly along the Mid-Hungarian Tectonic Zone (MHTZ). Melt generation could take place at the base of the hot, thick continental crust presumably due to the intrusion of mantle-derived magmas. Major lateral displacements along the MHTZ could enhance this process. The syn-extensional volcanism evolved continuously from this initial volcanic phase and resulted in widespread explosive volcanic eruptions of mafic to silicic magmas and minor potassic to ultrapotassic melts. Genesis of the Middle Miocene calc-alkaline volcanism in the Northern Pannonian Basin is a subject of debate. We suggest that a series of geodynamic events resulted in the magmatic activity involving subduction-related metasomatism and subsequent extension-related melt generation in the lithospheric mantle. The calc-alkaline volcanic suites at the eastern segment of the Carpathian volcanic arc show some geochemical differences compared with those of the Northern Pannonian Basin and are commonly interpreted as the result of gradual slab break-off process. The post-extensional dominantly alkaline mafic volcanism might be a response of active upwelling of relatively hot asthenosphere beneath the thinned lithosphere of the Pannonian Basin. This mantle is akin to the common European Asthenosphere Reservoir. In addition, involvement of melts derived from variously metasomatised lithospheric mantle occurred beneath the central parts of the Pannonian Basin.

