of kilometres (whole lithospheric folding). Folding is often associated with differential vertical motions. Significant uplift has been taking place at the basin margins and along several internal basement highs, and accelerated subsidence is in progress in localised depressions at the basin centre.

The importance of late-stage compression in the Pannonian basin for explaining its anomalous topography and intraplate seismicity is interpreted in a more general context of structural reactivation of back-arc basins. Possible sources of compression have been investigated by means of numerical modelling. The state of recent stress and deformation in the Pannonian basin, particularly in its western and southern part, is governed by the complex interaction of plate boundary and intraplate forces. These are the counterclockwise rotation and northward indentation of the Adriatic microplate, as the dominant source of compression, in combination with buoyancy forces associated with an elevated topography, and crustal as well as lithospheric inhomogeneities along the Alpine, Carpathian and Dinaric orogens.

Miocene Danube Basin: Geodynamics and Depositional History

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In a W–E cross section, the Slovakian northern part of the Danube Basin has a character of three depressions – Blatne, Risnovce, and Komjatice, being divided by Povazsky Inovec Mts., and Tribec Mts. horst structures.

By the combination of geodynamic, and paleogeographic history with a depositional history, we are presenting a complex sequence stratigraphic model of the basin.

The Eggenburgian to Ottnangian geodynamic development started under a transpressional regime at the northern margin of the basin, forming wrench fault furrow type depocentres. The Late Ottnangian to Karpatian phase of the initial rifting was forced by the extrusion of the Central Western Carpathian part of the ALCAPA microplate from the East Alpine realm. The transtensional pull apart depocentre system gradually widened. The Early Badenian transtensional rifting, demonstrated by a rapid tectonic subsidence forced the opening of the southeastern part of the basin. A complex wide extensional rifting started during the Middle Badenian, causing the unification of the basin. The deposition of marine sediments took place in whole the basin territory. At the end of the Middle Badenian time the sedimentary record shows the initial emergence of two drab horst structures, and starting partial separation of the mentioned depressions. The Upper Badenian to Sarmatian geodynamic development shows a gradual ceasing of the rifting, i. e. a transition from the synrift stage to a thermal relaxation. The largest Sarmatian accommodation place took place in the central Risnovce Depression, being filled by thick deltaic deposits. The next phase of tectonic subsidence took place only in the southern part of the basin during the Early Pannonian time, being controlled by deep listric faults, dipping to SE. Then the next thermal postrift phase followed. During this Pannonian phase only normal faults at the basin margin controlled the subsidence..The latest Late Miocene to Pliocene extensional phase coincided with the thermal collapse of the Danube Basin, and caused the development of separated sag basins.

The depositional history of the Danube Basin reflects the tectonic, subsidence, and eustatic changes, as well as changes in the sediment supply.

By the analysis of depositional key surfaces, bounding the principal depositional systems tracts, we can roughly reconstruct the succession of depositional sequences within the Miocene infill of the basin. The Danube Basin fill was separated into 7 principal depositional sequences.

The Eggenburgian to Early Ottnangian Sequence Nr. 1 starts by the deposition of alluvial clastics in local depressions of the basement, and later by marine coarse clastics at the toes of marginal rock cliffs. The marine fine clastics show a gradual decrease of salinity at their top.

The Ottnangian to Karpatian Sequence Nr. 2 lower boundary is situated within the coarse fluvial to deltaic clastics, covering the Ottnangian Cibicides-Elphidium Schlier. The transgressive brackish, anoxic to marine deposits are covered by the highstand systems tract related marine neritic ones. The upper boundary of this sequence, deposited at the northern part of the basin displays a subaerial erosion surface.

A distinct geodynamic change caused, that the following Sequence Nr. 3 developed in a new depocentre in the southeastern part of the basin, and its duration is from the latest Karpatian to the Early Badenian. Its lower boundary coincides with the pre-Neogene basement surface. The lowstand continental clastics were flooded and covered by marine sandy clays, related to the transgressive, and highstand depositional systems tracts.

The Middle Badenian Sequence Nr. 4 evolution starts probably before the end of the Early Badenian at the NW edge of the basin. The lowstand deposits are represented by a huge accumulation of alluvial coarse clastics in the local pull apart Blatné Depression. The following flooding covered the whole basin area by transgressive clayey deposits, continuing into similar highstand sandy clays with offlap stacking pattern in their upper portion.

The Upper Badenian Sequence Nr. 5 transgressive portion shows a new depositional onlap on the basin margins, and on the elevated horsts. The transgressive depositional systems of shelf sand ridges are capped by offshore clays during the highstand period of relative sea level change. The final part of this sequence is represented by the deposition of hyposaline facies assemblages, continuing until the earliest Sarmatian time.

At the basin margins, the eroded Badenian strata were incised by fluvial channels, transporting clastic material into fan deltaic systems. They were flooded by a new transgression of the

Sarmatian sequence Nr. 6. The depocentres shifted to the north and northwest. A wider flooding is documented also at the eastern, and northeastern margin of the basin. The brackish-water deposits of the transgressive and highstand systems tracts are sandy and sandy-clayey. The falling stage of the relative sea level caused the Late Sarmatian isolation, which led to a drop of salinity, and to a progradation of sandy deltaic bodies, lasting until the earliest Pannonian time.

The Pannonian Sequence Nr. 7 started by the infilling of erosional channels on the top of the earliest Pannonian strata. The following brackish-water sequence finished by a total raplacement by alluvial facies in the Late Pannonian.

Geochemistry of Lamprophyres of the Ditrău Alkaline Massif

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Introduction

Lamprophyres are a clan of H_2O and/or CO_2-rich, alkaline rocks ranging from sodic to potassic and from ultrabasic to intermediate. Commonly, they exhibit a distinctive inequigranular texture resulting from the presence of ferromagnesian macrocrysts set in a fine-grained matrix. Irregular to spherical, felsic globular structures are widespread. Lamprophyres typically form en echelon dykes, sills, pipes and vents which may aggregate into extensive swarms or clusters (Mitchell 1989).

The Ditrău Alkaline Massif (DAM) is one of the most diverse and compound geological formations of the Eastern Carpathians. In the past decades numerous scientific essays were published on the complex geological interpretation of the massif, while the origin of lamprophyre dykes intersecting the granitoids, syenitoids and hornblendites of DAM was slightly discussed. So far, only petrographical analyses were performed on the lamprophyre bodies (Herbich 1871, Berwerth 1905, Mauritz 1912, Mauritz et al. 1925, Vendl 1926, Streckeisen 1954, Streckeisen and Hunziker 1974, Anastasiu and Constantinescu 1982, Jakab 1998), hence, the petrological and petrotectonical interpretation of these rocks would be highly contribute to the understanding of DAM's genetics. This paper presents the latest geochemical results of the lamprophyre bodies from the northern part of DAM.

Petrography

The lamprophyre dykes from the DAM show felsic globular structures filled with combinations of carbonates, feldspars and biotite. There are two types of lamprophyres in the studied area: a more abundant melanocratic type with clinopyroxene, edenite-ferroedenite-hastingsite (Pál-Molnár 2000) and biotite phenocrysts and mesocratic varieties with phenocrysts of garnet. The texture is typically porphyritic and panidiomorphic. The fine-grained matrix consisting of the same minerals as the phenocrysts, together with plagioclase feldspar compose 83–100 vol% of the lamprophyres. Accessory minerals are titanite, apatite and Fe-Ti oxides. In the melanocratic dykes the clinopyroxene is uralitized, the edenite-ferroedenite-hastingsite is partially replaced by chlorite-oxide minerals±carbonate±epidote aggregates, the biotite is chloritized and the matrix plagioclase feldspar is sericitized. The garnets of mezocratic samples are totally or partially altered. Latter lamprophyres contain secondary leucoxenic patches and in general are strongly altered both the phenocrysts and the groundmass.

Geochemistry

The whole-rock geochemical analyses were determined with ICP-MS at the Department of Geology and Geochemistry, University of Stockholm.

Lamprophyres are linked together with alkaline rocks by their high average contents of low-field-strength incompatible elements K, Rb, Ba and Sr, but near-basaltic levels of many high-field-strength elements (Ti, Y and heavy REE) and Sc (Rock 1987). Plotting all analyses on standard discrimination diagrams, distribution of lamprophyres show that they are alkaline (Fig. 1A) according to the criteria of Irvine and Baragar (1971) and metaluminous (Fig. 1B) (Maniar, Piccoli 1984). Based on their SiO_2 *vs*. K_2O composition the investigated samples plot in the AL (alkaline lamprophyres) and CAL (calc-alkaline lamprophyres) fields (Fig. C) after Rock (1987). Tectonic classification (Pearce, Cann, 1973) groups the lamprophyres into the continental field (Fig. D) which is in accordance with the intraplate origin of the DAM (Pál-Molnár, 2000).

Conclusion

The lamprophyre dykes from the DAM are melanocratic with clinopyroxene, edenite-ferroedenite-hastingsite and biotite phenocrysts and mezocratic with phenocrysts of garnet. Felsic globular structures are filled with combinations of carbonates, feldspars and biotite. The lamprophyres have alkaline and metaluminous characteristics. According to Rock's classification they are AL (alkaline lamprophyres) and CAL (calc-alkaline lamprophyres). The lamprophyre dyke-swarms have intra-plate origin.