PETROGRAPHIC EVIDENCE TO EXTENSION OF THE PANNONIAN BASIN

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Introduction

The Pannonian Basin is thought to have formed as a result of a complex deformation history in the Middle-Late Miocene. Two major tectonic events have been recognized which determined the evolution of the basin: 1/ a rollback effect of subduction in the Early-Middle Miocene (thinning factor was nearly the same for both the lithospheric mantle and the crust: $\beta = \delta = 1.4\text{-}1.6$); and 2/ an asthenospheric mantle upwelling in the Late Miocene which caused a large-sized extension in the lithospheric mantle (thinning factor: $\delta = 4\text{-}8$) at the central portion of the basin (HUISMANS *et al.*, 2001). Subcontinental lithospheric mantle xenoliths collected from the Bakony-Balaton Highland Volcanic Field (central part of the Pannonian Basin) have been studied petrographically to trace textural evidence of the large-scale mantle deformation events described.

Sample and techniques

After looking at more than 300 mantle xenoliths from the Bakony-Balaton Highland Volcanic Field, one spinel lherzolite xenolith from Szentbékkálla with a unique, special tabular texture was chosen for a detailed microscopic study using universal stage. We measured lattice-preferred orientation (LPO) of orthopyroxenes and olivines on more than 100 grains, respectively and our data have been projected and evaluated on a stereographic projection.

Results and conclusions

LPO patterns of orthopyroxene show a (001) maximum parallel to the lineation in the foliation plain and another maximum perpendicular to the lineation and the foliation. The pattern of the (010) plains also displays a double maximum similar to that of (001). The pattern of the (100) plains displays a single maximum perpendicular to the lineation in the foliation plain. Only very few orthopyroxenes display "normal" LPO pattern: (001) parallel to the lineation and the foliation and (010) perpendicular to both plans. Olivine LPO's are normal, (100) plains are in the foliation parallel to the lineation, whereas (010) is perpendicular to the lineation and foliation, both show single maximum.

The orthopyroxenes are more resistant to recrystallization than olivines (PASSCHIER & TROUW, 1998; MERCIER, 1985) and may preserve earlier deformation states of the mantle. Our results suggest that the observed orthopyroxene patterns might be due to a deformation predating the deformation that recrystallized the olivines in the mantle. The orientations of the stress fields of the two deformations were significantly different, almost perpendicular.

These results correspond to geophysical modeling of formation of the Pannonian Basin, as summarized HUISMANS *et al.* (2001), and might provide the first petrographic evidence that a two-stage deformation process formed the basin.

References

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