12th International Workshop on Modeling of Mantle Convection
and Lithospheric Dynamics

August 20th to 25th 2011, Döllnsee Germany

Mantle convection below the Pannonian Basin: First results

D. Keszthelyi[1], V. Magni[2], C. Faccenna[2], F. Horváth[1]
[1]*Eötvös University, Geophysical Department, Budapest*
[2]*Dipartimento Scienze Geologiche, University Roma TRE, Rome*
dkeszthelyi@caesar.elte.hu

It has been demonstrated that upper mantle flow systems have largely controlled the formation and evolution of Mediterranean backarc basins. A general feature of the region is that the formation of these basins was related to subduction of Mesosic oceanic lithosphere. Convergence rate between the European and Nubian Plates have been much slower than the retreat of the subducting slabs. This can result from that poloidal and torroidal flows related to slab rollback have played a fundamental role.

This was the case in the Pannonian Basin as well. Subduction of the Carpathian (Magura) oceanic basin commenced in the Early Miocene below Alpine and Dinaric orogenic terranes. These terranes extended above the retreating Carpathian slab until the slab fully consumed at the end of Middle Miocene. The subducted vertical slab broke off, and this process is still active in the Vrancea region of the Eastern Carpathians.

We devised numerical model calculation to simulate this process using the Citcom program. We were first interested in the influence of the subduction generated flow system on the upper plate, namely the thinning and extension of the Pannonian domain. In this model the locus of extension was quite restricted to the corner of the mantle wedge and localized rather than a general thinning and extension occurred.

In the next generation of models we tested the idea that the flow system below the Pannonian Basin was not isolated from the Mediterranean and inflow of mantle material through the Northern-Dinaric slab window took place simultaneously with the Carpathian slab rollback. Model results show that the combined flow system can result in a regional extension and thinning more compatible with observations. Furthermore it is expected that the 3 dimension pattern of this combined flow system can offer explanation for the significant internal rotations of Pannonian blocks during the extension.