



## Subduction and roll-back of narrow oceanic slabs: Back-arc basin modelling of the Carpathians subduction zone

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The Carpathians subduction system evolved similarly to many Mediterranean systems where extensional back-arc basins and separate large sag basins develop in the overriding plate. The evolution of such basins can be explained in the context of roll-back of narrow oceanic slabs. Their evolution is linked to extensional and sag back-arc basins, retreating orogenic systems and slab detachment. A recent example of slab detachment can be studied by the Vrancea slab beneath the SE Carpathians.

Significant effort has been dedicated to modelling such Mediterranean-style subduction systems, and in most cases the model was set up with a narrow oceanic domain, which has an increased difficulty to create rollback due to reduced buoyancy of the slab.

Our approach is to use a two-dimensional thermo-mechanical numerical model that introduces an inherited oceanic domain, which adds to the younger, narrow ocean developed in the later stages. Our model can produce sustained subduction of the oceanic slab associated with roll-back and slab detachment. In most of our models a retro-arc sag basin develops, which can be interpreted as the Transylvanian Basin. This sag basin is one of the most consistent features of our model. At larger distances from the subduction zone, the extensional back-arc of the Pannonian basin can be modelled by introducing an lithospheric weakness zone, which represents a suture zone inherited from a previous orogenic evolution. Such a suture zone is compatible with the overall orogenic evolution of the Alps-Carpathians-Dinarides system. We furthermore discuss the limitations of our 2D modeling in the overall 3D settings of the Carpathians system and possibilities of future integration.