

## **Exhumation, thickening and orogen-parallel extension in the Eastern Alps: laboratory models and field observations**

**Claudio L. Rosenberg**

Freie Universität Berlin, Institut für Geologie (cla@zedat.fu-berlin.de)

A reassessment of the amount of Tertiary E-W extension in the Eastern Alps suggests that it was no larger than 20 % and that exhumation of the Tauern Window was mainly due to erosional unroofing of an intensely folded crustal segment. This conclusion is consistent with the patterns of cooling and of the metamorphic isograds within the Tauern Window. A series of experimental models scaled for density and viscosity was performed to investigate the relationship between orogen-parallel extension and orogen perpendicular thickening in the Eastern Alps. In particular, we studied the effects of indentation obliquity on the deformation patterns caused by continental indentation. The shape and orientation of the indenter were inspired from the Dolomite indenter of the Southern Alps. The results of our experimental models showed that minimum changes in the angle of convergence induce marked differences in the patterns of deformation. The only models, whose fault patterns satisfyingly reproduced the one of the Eastern Alps were those characterized by NNE-directed motion of the indenter. In these models E-W extension formed in front of the leading edge of the indenter, as observed in the Eastern Alps along the Brenner extensional fault. Extensional deformation in the models formed in order to maintain the compatibility between the areas located on both sides of the indenter edge, which became shortened at different rates and in different directions. Therefore, extension was not caused by gravitational instabilities, but by the kinematic and geometrical boundary conditions imposed by the indenter shape and the convergence direction. Lateral escape was always modest in our models, reaching a maximum of 20 %. This value is much smaller compared to previous estimates, but close to the amount inferred by our reassessment of Tertiary E-W extension in the Eastern Alps.