Geophysical Research Abstracts, Vol. 8, 04543, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04543

The slab extraction model of HP and UHP exhumation: history, examples, and possible mechanical background

N. Froitzheim (1), M. Janák (2), J. Pleuger (1) and T. J. Nagel (1)

(1) Geologisches Institut, Universität Bonn, Germany, (2) Geological Institute, Slovak Academy of Sciences, Bratislava, Slovak Republic

(niko.froitzheim@uni-bonn.de / Phone: ++49-228-732463)

HP and UHP rocks may be exhumed by the subduction of their overburden of mantle rocks (slab extraction, Froitzheim et al., 2003). This requires the existence of two parallel-dipping subduction zones. If the middle plate, between the two subduction zones, is extracted downward, HP and UHP rocks in the lowermost plate and overlying subduction channel are exhumed. This allows fast exhumation of HP and UHP rocks in a purely convergent setting. This process was recently proposed as an explanation for exhumation of HP and UHP rocks in the Adula nappe of the Central Alps (Nagel et al., 2002, Pleuger et al., 2003) and Pohorje nappe of the Eastern Alps (Janak et al., 2004, 2006). The model was not entirely new, however. Matte & Burg (1981) drew a series of cross sections showing slab extraction in the Ibero-Armorican arc. Also in cross sections of Malavieille et al. (1984) exhumation of the internal crystalline massifs of the Western Alps is achieved through slab extraction. Strangely, these works were not remembered when the discussion about UHP exhumation started after the recognition of metamorphic coesite in 1984. A model kinematically similar to slab extraction but restricted to the crust was put forward by Hodges & Walker (1992) and mentioned by Michard et al. (1993). In addition to the examples mentioned above, slab extraction took probably also place during the exhumation of the UHP Western Gneiss Region of Norway. Brueckner & van Roermund (2004) showed that these rocks were subducted in the lower one of two parallel subduction channels, allowing exhumation by subduction of the intervening mantle wedge.

A possible mechanical background of slab extraction is shortly discussed. The activity of two parallel-dipping subduction zones ultimately leads to the elimination of

the middle plate. If slab pull is a significant driving force of subduction, and forces associated with plate bending effectively resist subduction, then the descent of the middle plate will accelerate during the latest stage when the middle plate has moved through the subduction hinge. This velocity increase may lead to rapid exhumation of the lowermost plate.

Brueckner, H.K. & Van Roermund, H.L.M., *Tectonics*, **23**, TC2004, (2004).

Froitzheim, N., Pleuger, J., Roller, S. & Nagel, T., *Geology*, **31**, 925-928, (2003).

Hodges, K.V. & Walker, J.D., *Geol. Soc. Amer. Bull.*, **104**, 560-569, (1992).

Janák, M., Froitzheim, N., Lupták, B., Vrabec, M. & Krogh Ravna, E.J. *Tectonics*, **23**, TC5014, (2006).

Janák, M., Froitzheim, N., Vrabec, M., Krogh Ravna, E.J. & De Hoog, J.C.M., *J. metamorphic Geol*., **24**, 19-31, (2006).

Malavieille, J., Lacassin, R. & Mattauer, M., *Bull. Soc. géol. France*, **26**, 895-906, (1984).

Matte, P. & Burg, J.P., *Geol. Soc. (London) Spec. Publ*., **9**, 353-358, (1981).

Nagel, T., de Capitani, C., Frey, M., Froitzheim, N., Stünitz, H. & Schmid, S.M., *Eclogae geol. Helv*., **95**, 301-321, (2002).

Pleuger, J., Hundenborn, R., Kremer, K., Babinka, S., Kurz, W., Jansen, E. & Froitzheim, N., *Mitt. Österr. Geol. Ges*., **94**, 99-122, (2003).