Siginficance of HP to UHP metamophism along Himalaya - What we learn from the Bohemian massif

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It is well recognized that the Eocene ultra-high pressure (UHP) metamorphism recorded in the Kaghan and Tso Morari Massifs in NW Himalaya is the direct result of the subduction of the Indian continent beneath the south Indian margin (Guillot et al., 2008). In contrast, the origin of the Oligocene high-pressure (HP) granulites in domal/antiformal structures along the Higher Himalayan Crystalline belt is highly debated. Do these rocks record the thickened crust in Oligocene time or relamination of deeply subducted continental material to the base of the South Tibetan block (Hacker et al., 2011).

The Variscan Bohemian massif in Czech Republic provides an insight of the origin of these Himalayan granulites. In the Bohemian massif, the root of the orogenic belt is well exposed.

Recent studies show that the Carboniferous HP granulites retain vertical mylonitic fabrics, suggesting that large-scale overturn produced crustal-scale dome-like structures. Numerical modelling by Maierova et al. (2014) for the Variscan evolution of Bohemian Massif demonstrates that the vertical exchange of the felsic lower crust with overlying dense material, which is followed by the development of a major decoupling zone separating the superstructure from the deep orogenic infrastructure. This decoupling zone, called here the infrastructure– superstructure transition zone, is responsible for the transfer of material and heat resulting in channel flows. Thermal structure of this zone suggests that mid-crustal rocks produce partial melting and a thick layer of migmatite as observed in the Higher Himalayan Crystallines.

It is proposed that the Carboniferous evolution of the Bohemian Massif may be analogous to Tertiary crustal dynamics of the Higher Himalayan system. Based on the model we thus predict a multistage evolution of large hot orogens including massive vertical movement of material and heat transfers.

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