

SUBDUCTION, SLAB DETACHMENT AND MINERALIZATION: THE NEOGENE IN APUSENI MOUNTAINS AND CARPATHIANS

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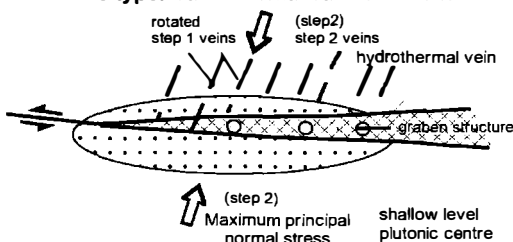
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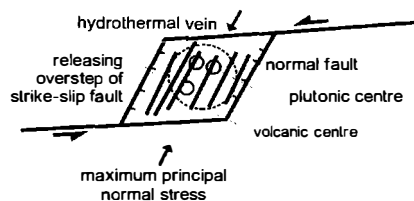
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The Inner Carpathians comprise several distinct Neogene late-stage orogenic Pb–Zn–Cu–Ag–Au ore districts. The mineral deposits in these districts are closely related to volcanic and subvolcanic rocks, and represent mainly porphyry and epithermal vein deposits, which formed within short periods of time in each district. Here, we discuss possible geodynamic and structural controls that suggest why some of the Neogene volcanic districts

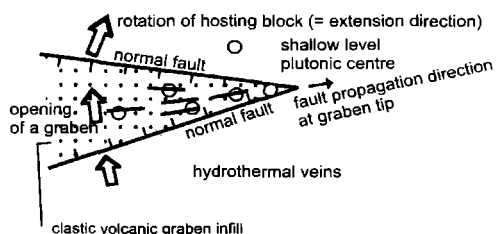
Baia mare type: transtensional transform motion



West Carpathian type: releasing overstep in wrench corridor



Apuseni type: magma and fluid channelling by rotation-induced extension



within the Carpathians comprise abundant mineralization, while others are barren. The Neogene period has been characterized by an overall geodynamic regime of subduction, where primary roll-back of the subducted slab and secondary phenomena, like slab break-off and the development of slab windows, could have contributed to the evolution, location and type of volcanic activity. Structural features developing in the overlying lithosphere and visible in the Carpathian crust, such as trans-tensional wrench corridors, block rotation and relay structures due to extrusion tectonics, have probably acted in focusing hydrothermal activity. As a result of particular events in the geodynamic evolution and the development of specific structural features, mineralization formed during fluid channelling within trans-tensional wrench settings and during periods of extension related to block rotation (Fig. 1).

Fig. 1. Generalized models of the geodynamic control of late-stage orogenic systems. a – Slab window and extension (Apuseni type). b – Magma and fluid channelling by intersection of a transform fault and volcanic chain (Baia Mare type). c – Wrench corridor type of magma and fluid channelling (West Carpathians type).