EXTRUSION TECTONICS DUE TO THERMAL SOFTENING OF A THICKENED CRUSTAL ROOT: THE BOHEMIAN MASSIF, EUROPEAN VARISCIDES

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The Variscan orogen in Central Europe shows several peculiarities which are difficult to explain. In Lower Carboniferous times a high heat flow regime was accompanied by the juxtaposition of upper and lower crustal rocks along steep extensional shear zones that cut through the entire crust. The Bohemian shear zone (BSZ) forms the most important and best studied candidate of these crustal-scale elements. An overall dip-slip extensional kinematics of the BSZ is compatible with several, up to 90° deflections of the mylonite belt at the surface. As the vertical throw of the BSZ is large (10 km), deeply buried high-grade Moldanubian and Saxothuringian rocks could be exhumed and juxtaposed against very low-grade metamorphic rocks of the supracrustal Tepla-Barrandian unit (TBU). A large number of plutons, partly mantle derived, intruded synkinematically into the BSZ mylonites. Taking the large number of new structural, petrological and geochronological data into account, it will be shown that a thermally softened, collapsing crustal root supported the Lower Carboniferous elevator-style sinking of the supracrustal TBU into weak, melt-bearing high-grade Moldanubian and Saxothuringian rocks. The latter were rapidly exhumed from below the TBU extruding at its flanks. It is suggested that the high heat flow regime resulted from hot asthenosphere that replaced the previously thickened, but now decoupling, mantle lithosphere and thus came close to the base of the crust. A similar geodynamic setting has recently been suggested to explain the juxtaposition of supracrustal and infracrustal rocks of the Tibet-Himalaya orogen.