ARCHITECTURE OF MANTLE ROOT OF VARISCAN OROGEN IN EUROPE

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The lithospheric mantle underlying the Variscan orogen in Europe is recently the place of numerous case studies based on peridotite and pyroxenite xenoliths occurring in Cenozoic alkaline lavas. Despite of this, the possible architecture of mantle root of the orogen is not discussed, probably because the general plate tectonic model of formation of lithospheric mantle underlying Phanerozoic orogen should be defined first. In this abstract the attempt to define essential features of such lithospheric mantle is presented.

The mantle part of the subducting plate can be "docked" to the mantle wedge of the overriding plate when the subduction stops. The mantle root of the orogen is thus constructed of (1) mantle wedge of the overriding plate, and (2) mantle part of the subducted plate. If the subducting plate is oceanic, the suture possibly is marked by eclogites which made the former oceanic crust. However, the fragments lithospheric mantle underlying the continents/microcontinents can also be docked to the orogenic root. The crustal screens are then introduced into the mantle root of the orogen.

The European Variscan Orogen consists of few major tectonostratigraphic units, which supposedly represent independent subduction-collision systems. Seismic studies show that their mantle roots are different in terms of seismic anisotropy [1]. Numerous petrological data provided by mantle xenolith case studies suggest the variation in lithology of subcontinental lithospheric mantle beneath the orogen. Nevertheless, only three lithospheric mantle domains of different characteristics have been defined up to now: the two ones underlying French Massif Central [2] and that underlying the north-eastern part of the Bohemian Massif [3]. Their extent remains poorly defined because of uneven distribution of xenolith occurrences.

After the Variscan orogen was formed, lithospheric mantle delamination and replacement of "collisional" mantle by upwelled asthenosphere modified its architecture. These late-orogenic mantle lithologies supposedly are of different characteristics than those assembled in an orogenic root at the collision stage. Much later the orogen was subjected to rifting commencing the next Wilson cycle in the Alpine epoch. The volcanic activity during that rifting brought to the surface the mantle xenoliths which are the basis for studies of lithology of the mantle root of the Variscan orogen. The metasomatism, which affected the subcontinental lithospheric mantle during rifting produced changes which must be filtered in order to recognize the primary mantle characteristics.

The common experience in regional-scale petrological studies of mantle xenolith suites is that the mineral-chemical signal usually is not clear, even if the main trends are well defined. The mineral-chemical interpretations possibly can be supported by the regional scale textural study of xenoliths by means of EBSD technique. Interesting example is provided by Kukuła et al. [4], who studied xenoliths occurring in various lava occurrences in the Heldburg Dike Swarm in Thuringia. They showed the consistent deformation style in all xenoliths, which is an indication that they come from mantle domain recording similar deformation history

The instructive example is provided by our studies which show that the mantle root of NE part of Bohemian Massif cointains only late-metasomatic clinopyroxene coeval with Cenozoic rifting, which thus is not useful to decipher the Variscan record [e.g., 5]. We suggest that aluminium content in orthopyroxene is a good proxy for pre-rifting mantle root characteristcs. It defines strongly depleted lithospheric mantle domain in Lower Silesia and Upper Lusatia. This domain could be of oceanic nature, and the possible eclogitic screen located to NE was recently documented by seismic study [6].

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