Lateral Variations of Seismic Velocities and Anisotropic Structure of the Lithosphere Beneath the Bohemian Massif

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Lateral variations of seismic velocities and their azimuth and spatial variations are mapped at various depths of the Earth's crust and the upper mantle beneath the Bohemian Massif (MB). Regional travel times derived for various directions (Plomerová et al. 1984) allowed us to map apparent velocities and relate them to the tectonics of the region. Velocities of the crustal phases Pg, Sg are mostly higher in the centre of the BM than in its northern fringe formations. However, the highest velocities are observed in the Moravian-Silesian region. The lowest velocities were found in the Krušné Hory Mts. block and in the Vogtland-Thuringian formation. Apparent velocities of Pn and Sn waves propagating through the upper mantle are higher in the central part of the BM, particularly for the NE and NNE propagations. Also the Saxothuringian zone is characterised by high velocity propagations in the NE. On the contrary, waves from the E-ENE azimuths propagates with lower velocities.

Teleseismic studies of the upper mantle include both isotropic and anisotropic tomographies. They map isotropic velocity perturbations, the relief of the important mantle boundary between the lithosphere and asthenosphere and document a distinct anisotropic structure of the subcrustal lithosphere which is different in various large tectonic units. The seismic anisotropy in the Moldanubian part of the BM can be characterised by the hexagonal symmetry with the high velocities plunging to the south, whereas in the Saxothuringian the high velocities dip to the NNW (Babuška et al. 1984, 1993).

Our study is oriented towards retrieving multi-layer self-consistent 3-D anisotropic models of the lithosphere and the sublithospheric upper mantle beneath the BM, and geodynamic interpreting the region as a collision zone characterised by two systems of successive palaeosubductions divergent relative to the suture between the Moldanubicum and Saxothuringicum (Plomerová et al. 1998).

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Partial Melting and Retrogressive Metamorphism of Amphibolites of the Niedźwiedź Massif (Eastern Part of the Fore-Sudetic Block)

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The Niedźwiedź amphibolite massif is situated in the eastern part of the Fore-Sudetic Block, directly to the east of the Doboszowice Metamorphic Unit. Amphibolites of the massif are separated from the overlying metasedimentary rocks of the Doboszowice Metamorphic Unit by the Paczków thrust (Mazur et al. 1997); their eastern (lower) border is the Ramzová thrust (Fig. 1).

The Niedźwiedź massif is composed of structurally and compositionally variable amphibolites. We have distinguished two basic amphibolite varieties: amphibolite I and amphibolite II. Granular amphibolite I consists of hornblende + garnet $Alm_{50}Spess_2Py_{17}Grs_{31}$. It locally contains centimetre-scale nests of clinopyroxenite, dominated by sodium-rich (10-20 % Jd) diopside $Wo_{48}En_{34}Fs_{17}$. Clinopyroxenite nests are rimmed by a few millimetres thick zone of oligoclase+quartz+sparse epidote. Thin quartz-oligoclase schlieren occur also in places within the amphibolite I.

Amphibolite II is well foliated and consists of hornblende+oligoclase+epidote/zoisite+ quartz). There occurs the whole range of varieties transitional between amphibolite I and amphibolite II.

Structural relationships suggest that amphibolite I originated during the progressive stage of metamorphism and experienced long static recrystallisation period. Preliminary thermobarometric calculations indicate 720-750°C (amphibole-plagioclase) and 12-14 kbar (garnet-amphibole-plagioclase; Puziewicz and Olejniczak 1997). Isothermal decompression to approximately 10 kbar induced initial partial melting, produc-

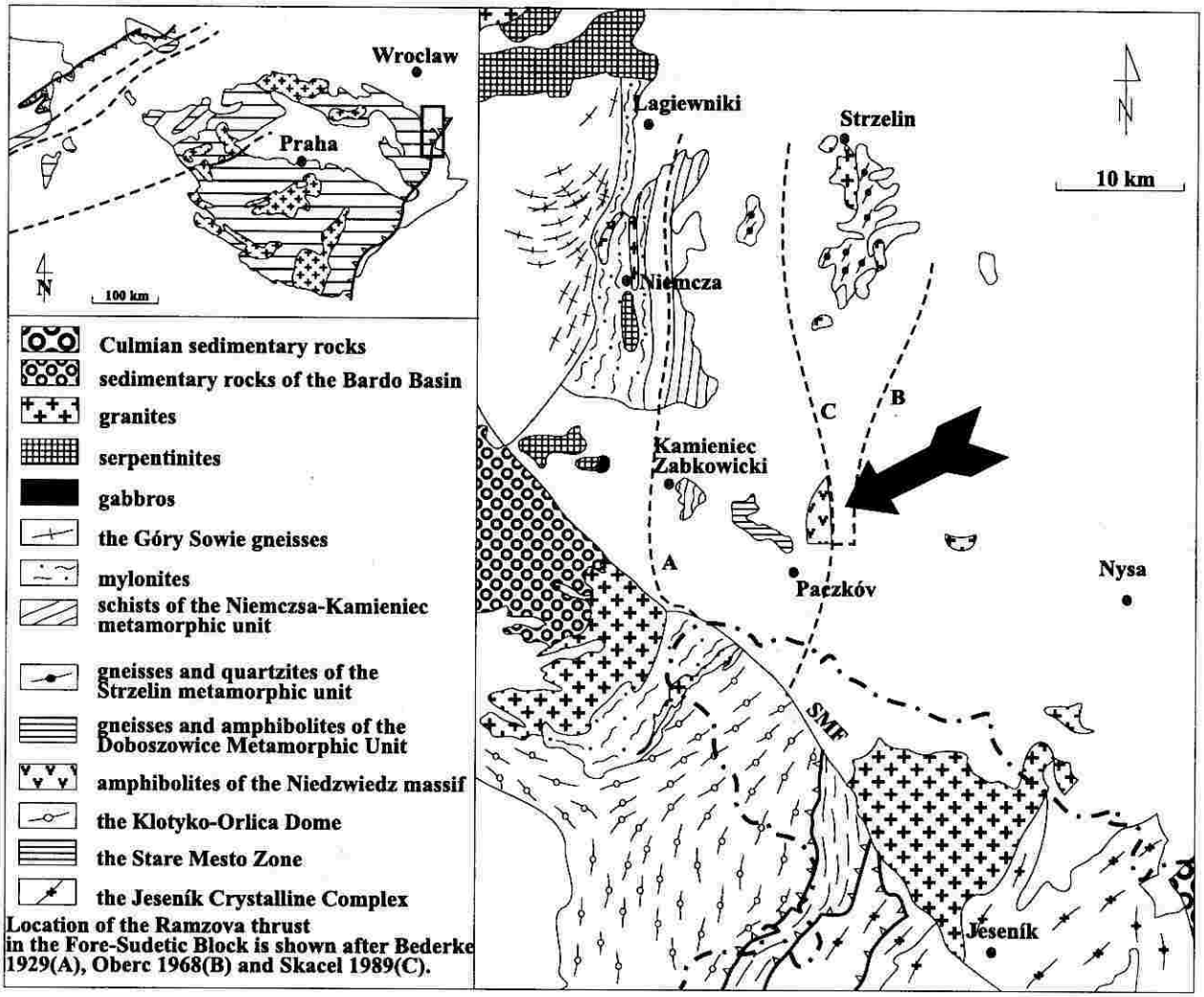

Fig. 1. Location of the Niedźwiedź massif in the Fore-Sudetic Block.

ing tonalitic melt and clinopyroxenitic restite. The last stage of metamorphic history of the rock was deformation and retrogression under conditions of the epidote-amphibolite facies.

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On the P-T Path of Franciscan Metamorphism: Geological Implication

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The Franciscan belt of California is a classic blueschist metamorphic terrain characterised by the lawsonite-jadeite-glaucophane assemblage. However, this view was challenged in middle 80's by Maruyama and Liou and their collaborators, who claim the Franciscan metamorphism did not enter the stability field of pure jadeite + quartz. The differences between conventional and new views are represented by different P-T paths.