to IAT. Žiar Fm. was metamorphosed in blueschist facies and subsequently retrogressed in greenschist facies conditions. The age of Žiar Fm. is supposed to be the same as for Hačava Fm. As a part of the Žiar Fm. could be classify effusive metabasalts with BABB signature and analogical metamorphic history from the surroundings of the Dobšiná town. Together with associated metacherts were preliminary designated as Steinberg Member.

The non-oceanic Nižná Slaná Fm. is is represented by sequence of metapelitic sediments, black shales and basic metavolcaniclastic rocks with metabasalt and metagabbroic bodies with calc-alkaline basalt (CAB) signature. The Nižná Slaná Fm. underwent multi-staged metamorphic alteration which conditions evolving from the epidote-amphibolite to blueschist or locally to greenschist facies. The age of the Nižná Slaná Fm. is supposed to be the Early Paleozoic because peak of metamorphism is older than 375 Ma.

The Jasov Fm. and Bučina Fm. are lithologically close and they are composed of strongly deformed metaconglomerates and metasandstones locally with small lenses of metarhyolites and rhyolitic metavolcaniclastics. Both formations experienced high-pressure stage of metamorphism and their age is supposed to be Permian based on lithological and compositional identity with other Permian complexes of the IWC.

The name Rudník Fm. we preliminary propose for the medium-grade metamorphic rocks-amphibolites and gneisses--with blueschist and greenschist facies overprint, which sporadically occur in the Bôrka Nappe. Amphibolites are geochemically close to N-MORB. The age of the Rudník Fm. is unknown.

The presence of both oceanic and non-oceanic formations in the Bôrka Nappe indicate, that not only subducted oceanic slab was involved in the area of HP/LT subduction zone metamorphism. Non-oceanic formations originally formed in the magmatic arc setting (Rudník Fm. probably as a basement of an arc) might build up the edge of a continental-type plate located just above subducting plate or the plate temporary involved in the subduction zone to the end of subduction. IAT/ BABB/ N-MORB-types of metabasalts associated with metacarbonates/ metapelites/ metacherts in oceanic formations of the Bôrka Nappe reflected gradual evolution of the Meliata ocean basin as a back-arc basin from the initial to the mature stage of its evolution.

Calc-alkaline Basic Volcanic Rocks in the Cretaceous Conglomerates of the Klape Unit (Pieniny Klippen Belt): the Problem of the Source Region and its Geodynamic Setting

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The Klape Unit is one of several north vergent units of the Pieniny Klippen Belt (PKB) – a narrow decollement thrust system sutured at the transpresive boundary between the outer and central Western Carpathians. In the upper part of the Klape Unit, in the flysh sequence Upper Cretaceous in age, several layers of polymict conglomerates are present. More than 100 petrographic types of rocks have been found as pebbles in these conglomerates inclusive variable volcanic rocks.

Based on the metamorphic alteration two groups of volcanic rock pebbles have been identified: (1) low pressure/low temperature (LP/LT) and (2) high pressure/low temperature (HP/LT) metamorphosed rocks. As follows from geochemical studies, the volcanic rocks belong to two genetic types: (1) metabasalts and metadolerites geochemically close to back-arc basalts (BABB) which have been found as HP/LT metamorphosed rocks only and (2) metabasalts to metarhyolites with the calc-alkaline signature, which occur in both metamorphic forms.

Petrography and geochemistry of LP/LT metamorphosed calc-alkaline basalts and basaltic andesites have been studied. Variability in petrographic types as a typical feature of these metavolcanic rocks is a result of (1) primary – magmatic and (2) secondary – metamorphic differences. Variability of petrographic types in magmatic stage of evolution was caused by (1) fractionation processes (mostly fractionation of plagioclase phenocrysts) and (2) differences in depths and rates of crystallization. Based on primary magmatic textures three types of studied volcanic rocks can be discerned: (1) aphyric, (2) porphyric and (3) glomeroporphyric types. The aphyric type is represented mostly by subvolcanic varieties with subophitic textures, effusive varieties are rare. The porphyric type is most common. Phenocrysts are formed by plagioclase (up to 1 cm), clinopyroxene and sometimes also by olivine. The same minerals together with the volcanic glass, apatite, magnetite and ilmenite form the matrix. Texture and grain size of the matrix depends on crystallization rate. Intersertal, hyalopilitic or amygdaloid texture frequently also with small volcanic glass lenses were indetified in quickly chilled varieties probably represented lava flow margins. In slowly crystallized internal parts of lava flows and in subvolcanic varieties the subophitic of trachytic matrix is typical.

Practically all calc-alkaline basalts and basaltic andesites from conglomerates of Klape Unit experienced an intensive LP/LT metamorphic alteration. Although primary magmatic textures are more and less preserved, primary mineral association was usually totally replaced by metamorphic mineral association. Plagioclase phenocrysts were albitized or replaced by prehnite gradually transformed to clinozoisite and epidote, clinopyroxene is replaced by carbonate or chlorite. The same mineral association together with sericite and ore minerals were formed at the expense of matrix. Amygdales were filled by chlorite, carbonate, albite and zeolites.

Metamorphic alteration of basalts and basaltic andesites caused mobility of some major elements, mostly alkalies or Ca. However distribution of less mobil major and trace elements clearly indicated original basaltic character of these rocks. The geochemical type of the studied rocks was reliably confirmed by distribution of immobile incompatible trace elements (REE, HFSE). Chondrite normalized REE patters of these rocks are nearly indentical despite of differences in petrographic types. Their typical features are sloping form as a result of differenciated enrichment LREE/HREE (La_N/Yb_N = 3.48 –5.28) and negative Eu anomaly (Eu/Eu* = 0.74 – 0.91) caused by fractionation of plagioclase. Such patterns are typical for calc-alkaline basalts of the active continental margins. Calc-alkaline character of studied rocks also follows from application of all relevant discriminant diagrams based mostly on HFSE distribution.

The production of calc-alkaline basalts and basaltic andesites are practically unambiguously related on destructive lithospheric plate margins (island arc and active continental margins), where are generated in the chains of volcanoes referred to as volcanic arcs. Studied calc-alkaline basaltic rock pebbles associated at all conglomerate layers of the Klape Unit with calc--alkaline andesite, dacite and rhyolite pebbles. Fluidal glassy rocks, ignimbrites and welded tuffs mostly of acidic composition are relatively widespread among them. Tuffaceous rocks have been also found. These facts indicate that all these volcanic association could be produced as subareal deposits of stratovolcanoes. Areal distribution of all these volcanic association not only in conglomerates of the PKB (Klape and Manín Units) but also in analogical conglomerates in Tatric and Fatric Megaunits suggests for large extent of the original source area – – may be magmatic arc. Petrographical and geochemical identity of studied rocks and volcanic rocks of the Malužiná Formation allow us to speculate about the Permian age of this arc. HP/LT metamorphic alteration of some calc-alkaline volcanic rock pebbles with the identical age of metamorphism to that in Meliatic Unit (inner Western Carpathians) support the concept of the southern exotic (ultragemeric?) nappes (an accretion prism?) as a direct source of the material in the Klape Unit conglomerates.

Disequilibrium Melting in Early Devonian (406 Ma) Orthogneisses from the Western Tatra Mts.

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Disequilibrium between melt and its residuum can arise because components generally have much greater diffusivities in silicate melts than in solid silicates. Therefore, if a melt is produced and segregated rapidly from its residuum, chemical equilibrium may not be attained and the melts are depleted in trace elements with the lowest diffusivities, such as Zr, Th, Hf and LREE relative to their source rocks (e.g. Sawyer 1991). These depletions are commonly attributed to disequilibrium between monazite and/or zircon and water-undersaturated granitic melt owing to slow dissolution rates of these minerals and their retention in the residuum (Watt and Harley 1993). In this study, we provide arguments for disequilibrium melting in Early Devonian orthogneisses from the pre-Alpine basement of the Tatra Mountains.

Investigated orthogneisses are from the Variscan basement of the Western Tatra Mts. They occur near the base of the upper structural unit, belonging to the HP/HT kyanite zone metamorphism (Janák et al. 1999). Orthogneisses are coarse-grained with augen-like K-feldspars, or fine-grained, foliated, with distinctive mylonitic fabric. Surrounding rocks are amphibolites with boudins of retrogressed eclogites and kyanite-bearing metapelites. Both amphibolites and pelitic gneisses show a migmatitic texture. All these rocks show intense deformation and retrogression related to Variscan uplift and Alpine (mostly brittle) overprint.

The orthogneisses are granitic in composition. Quartz is platy and ribbon-textured, K-feldspar is perthitic, often with microcline twinning and signs of dynamic recrystallization. Plagioclase is albite to oligoclase (X_{An} = 0.09 – 0.11), myrmekite has locally developed. The micas form a "mica-fish" texture. Biotite is Fe-rich (X_{Fe} = 0.7–0.8), often replaced by chlorite. Muscovite is slightly phengitic, some $^{40}Ar/^{39}Ar$ spectra are discordant due to an Alpine overprint. Garnet is rich in almandine (70 to 75 mol%) and spessartine (15 to 22 mol%), partly replaced by biotite and chlorite. Accessory minerals are apatite, zircon and monazite.

Metamorphic conditions in the kyanite zone metapelites – – a possible source rocks of granitic melts – reached c. 850 °C and 13 kbar according to the TWQ 2.02 (Berman 1991) and THERMOCALC 2.75 (Holland and Powell 1998) calculations. Such *P-T* conditions would be sufficient for dehydration-melting of biotite according to dehydration-melting reaction: biotite + kyanite ± plagioclase + quartz = garnet + K-feldspar + melt (Carrington and Harley 1995 and references therein), generating granitic melt and peritectic garnet + K-feldspar in the orthogneisses. However, the melt was mostly separated from its associated mafic selvages, being segregated into the veins and larger (several m) bodies.

The REE content of the orthogneiss UP1002 shows typical features of non-equilibrium melting with respect to accessory phases: a moderately fractionated pattern at low overall REE abundances, with distinct positive Eu anomaly (Fig. 1). Such a pattern, showing a dominant role of alkali feldspars with suppressed influence of accessory phases (monazite or garnet), is in contrast with other orthogneiss sample (e.g., 16/93). This sample has much higher REE abundances with a pattern typical of S-type granites: fractionated LREE, pronounced negative Eu anomaly and flat HREE. Similar features are known from migmatite terrains where both REE patterns occur in leucosomes (e.g., Watt and Harley 1993). The REE behaviour is mimicked