

textures and microstructures as well as from intrusion depth of granitoids. Intrusion depths decrease from the western Rensen Pluton (ca. 8 kbar) towards the eastern Rieserferner Pluton (ca. 2-3 kbar). This goes along with different amount of horizontal north-south shortening. In order to explain the situation a 3 dimensional kinematic model of flow between nonparallel plates was established that has to fit data on the flow regime, published data on Tertiary plate motion and variable amount of

exhumation. The corridor can be described as a obliquely convergent pure shear dominated wrench zone. Divergent flow and variable amount of horizontal shortening between non-parallel plates accounts for exhumation of rocks from variable depth. Boundary effects include west-east coaxial stretch along the rheologically soft Tauern Window boundary and discrete shear along the stiff Periadriatic Lineament.

Strukturelle und metamorphe Entwicklung des Schneebergerzuges ab dem Zeitpunkt beginnender Extensionstektonik

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Basierend auf eigenen Studien und Literaturdaten wurde ein Druck-Temperatur-Deformationspfad nach dem Höhepunkt alpidischer Metamorphose vor ca. 100 Ma rekonstruiert. Orientierte Proben, stammend aus der Übergangszone Ötztalkristallin - Schneebergerzug, wurden auf ihren Einschlussinhalt sowohl in Quarzextensionsgängen als auch in metamorphen Mineralen (v.a. Granat) untersucht. Zwei unterschiedliche Schnittlagen (y-z und x-z) deuten auf einen mehrphasigen Deformationsablauf hin, wobei in y-z-Schnitten non-koaxiale Scherindikatoren mit thermisch equilibrierten Internegefüge und in x-z-Schnittlagen niedrig temperierte Dehnungsstrukturen dominieren. Rotationale Deformation in y-z weist auf sinistrale Bewegung gegen SW hin, die von NW-SE gerichteter Abschiebung in x-z abgelöst wird. Der im Gelände ermittelte Deformationsablauf wurde anhand detaillierter Fluidpetrographie nachgewiesen, wobei neben primären CO₂-H₂O Einschlüssen besonderes Augenmerk auf orientierte Einschlussebenen (fluid inclusion planes, FIPs) gelegt wird, um das vorherrschende Spannungsfeld während progressiver Deformation und Metamorphose rekonstruieren zu können. FIPs setzen sich aus hochsalinaren, wässrigen Einschlüssen zusammen und

treten normal zu NW-SE gerichteter Dehnungsrichtung auf.

Der vorliegende P-T-d Pfad setzt sich vor allem aus der Kombination von Fluid-Isochoren als Barometer mit konventioneller Thermobarometrie sowie temperatur-sensitiver Mikrostrukturen als Thermometer zusammen.

Aufgrund der chronologischen Unterscheidungen einzelner Fluidgenerationen werden primäre CO₂-Einschlüsse in Quarz und in Granat von intra- und transgranularen Einschlüssen in Quarz abgelöst. Letztere setzen sich aus niedrigdichten CO₂ sowie wässrigen Einschlüssen unterschiedlicher Salinität zusammen. Wässrige salinare Einschlüsse werden als meteorische Wässer entlang von Dehnungsrisen in flachem Krustenniveau während finaler isobarer Abkühlung interpretiert.

Verglichen mit bisher bekannten Hebungsprofilen aus dem Schneebergerzug, lässt sich progressive Deformation während retrograder Metamorphose detailliert als Isochoren-dominiertes konvex-konkaves p-T-Muster darstellen.

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Cretaceous evolution of the eastern margin of the Graz Paleozoic: Constraints for extension and exhumation based on structural, fluid inclusion and thermobarometric data

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Two different p-T-d paths from northern and southern areas at the Eastern margin of the Graz Paleozoic were

estimated using conventional thermobarometry, fluid inclusion and structural studies. Both study areas are

similar by their tectonic evolution and show intense retrograded rock units. Within the Strassegg area three different quartz vein generations were distinguished, which record various stages of progressive deformation and metamorphism. After peak of metamorphism around 6 kbar and 500°C, a P-T-deformational path shows “pseudo-isochoric” cooling down to ca. 3 kbar and 300°C. Late stage deformation under sub-simple shear divergent conditions and normal faulting is related to horizontal extension and steepening of the P-T loop by isothermal decompression to below 1 kbar. Finally rocks cooled isobaric at shallow crustal level. This retrograde decompressional path was associated with a change in fluid regime by unmixing of a single parent metamorphic fluid, leading to the coexistence of CO₂-H₂O-NaCl-rich and H₂O-NaCl-rich fluids that caused precipitation of sulfides and gold. Ore precipitation took place along “pseudo-isochoric” cooling down to 8-9 km (2.5-3 kbar). Latest H₂O-NaCl-rich fluids represent infiltration by shallow crustal faults.

Data from the Naintsch area reflect a more steepened isothermal decompressive path. Fluid inclusions consist of H₂O-NaCl-CaCl₂±MgCl₂. Thermobarometric data give peak metamorphic conditions around 580-600°C and pressures around 7.5 to 9.5 kbars based on garnet-biotite thermometer and garnet-biotite-muscovite-

plagioclase barometer. These data show higher peak metamorphic conditions compared to the Strassegg area. FI microthermometry of extensionally quartz vein generations and thermobarometric data from retrograded garnet-biotite schists, which host the quartz veins, reflect nearly isothermal decompression followed by final isobaric cooling for the Naintsch area. Additionally, garnet growth within this area is documented by major element zoning patterns and rotated inclusion trails of ilmenite inclusions, which are distinguished by different growth stages. Comparing the two estimated p-T-deformational paths, it is suggested that:

a) Deepest crustal level is exposed at the southeastern part of the Graz Paleozoic at Naintsch area. The rocks reflect most intense retrogression due to vertical exhumation of rocks from around 20-24 km to 2-4 km and display a huge isothermal decompressive path.

b) The structural features at Strassegg are similar with the Naintsch area, but reflect a more shallow crustal level of about 18 km and a more shallow styled p-T-deformational path. This can be correlated with the E-W-extend of the Anger Crystalline Complex, located between the Paleozoic units and Lower Austroalpine, which affects the Cretaceous normal fault geometry.

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Precambrian and early Palaeozoic crustal domains along the northeastern margin of the Bohemian Massif, Czech Republic and Poland

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We have undertaken a single zircon study to define the age and tectonic evolution of crustal domains in the easternmost Sudetes along the NE margin of the Bohemian Massif. Many of our ages for the Lugian and Silesian domains have already been published (Kröner et al., 2000; 2001), and we report here new data for the Velké Vrbno Unit and granitoid gneisses occurring in the northern continuation of the Orlicka-Snieżnik Complex in southern Poland.

The Velké Vrbno Unit occurs along the boundary between the structurally upper Lugian domain (granitoid protolith ages between 480 and 520 Ma), and the underlying Silesian domain (granitoid protolith ages between 680 and 550 Ma) which were amalgamated during the Variscan orogeny. The Unit consists of tonalitic gneisses, granitic orthogneisses, metavolcanics, banded amphibolites, metagabbros, metapelites, paragneisses, calc-silicate rocks, marbles and quartzites. All these lithologies are tectonically interlayered and contain numerous

large-scale boudins of retrogressed eclogites. The structural evolution is almost identical to that described in the Keprník and Desná domes of the Silesian domain, and peak metamorphic conditions were reached at ~340 Ma and are represented by mineral assemblages in the eclogite boudins, where the jadeite content in relict omphacite indicates minimum pressures of 15 kbar.

Three samples of tonalitic gneisses and one sample of a granitic orthogneiss yielded Neoproterozoic zircon ages between 561 Ma and 626 Ma. One sample of strongly deformed and locally mylonitized granitic gneiss produced SHRIMP and evaporation ²⁰⁷Pb/²⁰⁶Pb ages of ~2001 Ma, similar to 2048-2104 Ma granitoid orthogneisses from South Bohemia (Wendt et al., 1993) and probably representing a tectonic slice of Palaeoproterozoic basement of unknown derivation. All these zircon ages indicate a clear affinity of the Velké Vrbno unit to the Neoproterozoic Silesian domain.