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 CO_2-H_2O-NaCl-rich and H_2O-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 H_2O-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 H_2O-NaCl-$CaCl_2$±$MgCl_2$. Thermobatrometric 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-Snieznik 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 $^{207}Pb/^{206}Pb$ 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.

Granitoid gneisses and granites N of the Orlicka-Snieznic Complex in southern Poland are exposed in isolated occurrences the largest of which is the Strezlin Metamorphic Unit. Six zircons of the Strzelin gneiss have a mean age of 1020 ± 1 Ma, and abundant xenocrysts vary in age between 1135 and 1767 Ma. The Gosciecice augen-gneiss N of Strzelin was dated at 513 ± 1 Ma and carries 1096-1301 Ma xenocrysts. The Maciejowice granite-gneiss, previously correlated with the Silesian domain in Czech Republic has an age of 501 ± 1 Ma (xenocryst age of 1694 Ma), identical to ages of the Snieznik and Gieraltow gneisses of the Lugian domain. Finally, the Doboszowice granite-gneiss NW of Paczków has an emplacement age of 380 ± 1 Ma with a xenocryst at 592 Ma.

The above ages conclusively demonstrate the existence of extensive Grenville-age and older basement in the fore-Sudetic block of Poland to which the 2 Ga gneiss of the Velké Vrbno unit probably also belongs. This basement was tectonically sandwiched between younger rocks during repeated Palaeozoic deformation associated with the collision of the West Sudetes with Baltica and further convergence during the Variscan event.

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Mass accumulations of regular sea urchins in the Late Badenian (Middle Miocene) of the Leitha Platform (Eastern Austria)

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The abandoned quarry at Winden is the north-eastern most outcrop along the Badenian Leitha Platform. Geographically the section is already part of the Danubian Basin, although a narrow connection to the Eisenstadt-Sopron Basin was warranted since the Middle Badenian some km in the south-west of Winden in the North of the Fertörakos Platform. According to Schmid (1968) the sediments exposed in Winden are of Late Badenian age (Bulimina-Bolivina zone).

The predominating limestone facies is represented by bright yellow calcarenites consisting mainly of corallinacean debris, accessory components are foraminifers, echinoid debris and bryozoans. These are interbedded by greenish, marly layers of several cm thickness. In addition, two layers of scattered pebbles are observed within the rather monotonous section. Sedimentary structures, such as erosive boundaries, reworked clay clasts and broad channel cuts document the transport of the corallinacean debris. The origin of the coarse sediment was the nearby Leitha Platform from where currents, storms or gravidity transport moved the debris towards the now exposed slope.

Echinoids are the most common macrofossils found within the section. They are represented by ossicles of the regular echinoid Schizechinus dux, which is especially abundant and documented by test fragments, spines, teeth, parts of the Aristotle's lantern and plates of the apical disc. Other echinoids such as Echinolampas hemisphaerica and "Cidaris" schwabenaui are rare and represented only by coronal fragments and spines. Aside from echinoderms, only calcitic molluscs occur in larger abundance due to the preservation bias. Among these pectinids, spondylids and oysters predominate the spectrum. Especially Flabellipecten leythajanus, Macrochlamis nodosiformis and Ostrea digitalina have already been documented by Schmid et al (2001) to be common elements of the agitated shallow marine environments of the small carbonate platforms bordering the Late Badenian Eisenstadt-Sopron Basin. Other organism groups, such as brachiopods (Megathiris detruncata), balanids and polychaets (Ditrupa sp.) are rare and probably transported into this environment together with the corallinacean debris.

In the base of the section a mass accumulation of Schizechinus dux is preserved within a limestone bed. Several hundred coronas of this species are located in public and private collections, which include also limestone slabs with tens of specimens within a few square decimetres. The specimens are denuded coronas and lie chaotically, both in life position and overturned within the bed. The apical disc is missing in nearly all specimens. The spines and lantern ossicles can often be found within the corona of the echinoids. Most of the specimens are of approximately the same size and document only a small part of the size range known of this species. Regular echinoids have a poor fossil record, they are usually rare and poorly preserved and thus heavily taphonomically biased. The reason for this are the organic sutural connections, without any interlocking structures, which would strengthen the corona. Experimental disintegration of extant regular sea urchins showed that they did readily disarticulate, especially under the influence of turbulence and temperature. Even when buried within the sediment, regular echinoids tend to disintegrate within a few weeks due to bioturbation.

The mass accumulation of Schizechinus dux within this bed is related to a mass mortality event and subsequent transport into this depositional environment, where the