subaerial erosion phase, documented by distal root remnants on the upper surface of the transgressive sand sheet.

Above the erosional flooding surface, the third cycle starts with a lag comprising thin sandy clay rich in molluscan fauna.

An abrupt onset of shallow offshore facies is visible above the molluscan lag. It consists of grey laminated silty clays, coarsening upwards into silts and sands of beach-ridge facies association. The cycle is topped by lagoonal grey silty clays with mixed freshwater and brackish molluscan fauna. The top of this unit is organic-rich and contains small rootlets.

The fourth cycle starts with rapid flooding and sedimentation of shallow offshore greenish-grey laminated silty clays, passing gradually upwards into lower and upper shoreface sands, representing a prograding beach-ridge facies association.

The fifth cycle starts with very thin (3–15 cm) back-barrier transgressive facies of sandy clays rich in plant fragments. The transgression culminated by a thin layer of green clay, which we interpret as the maximum flooding surface. The overlying laminated offshore silty clays show slight coarsening upwards. The sedimentary succession continues with yellow, well-sorted fine sand with abundant shell material. It represents a beach-ridge facies.

The overlying structureless fine sands to silty sands contain freshwater and continental molluscan fragments as well as wood and plant debris. The sedimentary paleoenvironment is interpreted as the landward margin of beach ridges, on the margin of lagoonal/paludal areas.

The cycle is covered by 10–40 cm thick marsh-related lignite seam with roots, penetrating more than 3 m deep into the underlying sediment. This initial transgressive unit of the sixth cycle is followed by the onset of greenish-grey laminated offshore clays. 18 cm above its base, a thin (4 cm) layer of grey pure clay is developed with nodular central part. We suggest that it was deposited under sediment-starving conditions and interpret it as a small-scale cycle maximum flooding surface. The overlying clays coarsen upwards into laminated silty and sandy clays and, across flaser-laminated portions, they gradually pass into sands interpreted as a prograding beach-ridge facies association on a wave-dominated delta front. At the base, the sands are horizontally laminated, passing upwards into hummocky cross-stratified and rippled portions. The sandy facies is covered by lagoonal silty clays with freshwater molluscan fragments, interpreted as a low-energy delta plain.

The lacustrine cycles are overlain by a composite alluvial plain facies association, which includes an alternation of four different lithofacies, related to floodplains, levees, channels and crevasse splays.

The generalized stacking pattern of the recognized cycles (parasequences) in the studied sedimentary succession in Pezinok clay pit displays a relatively rising water level from the first cycle upwards in the section. These results suggest that most of the studied succession belongs to one 3rd-order sedimentary sequence. Based on the stacking pattern trend, a 3rd-order maximum flooding surface can be interpreted at the boundary between cycles 4 and 5. The upper two cycles and the alluvial-plain facies association may represent a highstand sedimentary systems tract. The presence of a thick fluvial channel fill in the uppermost part of the section may indicate a 3rd-order sedimentary sequence boundary at its base. This estimate may correlate with such sequence boundary recognized in the upper part of the Pannonian zone *E* in seismic sections.

Metamorphism of Amphibolites from the Polish Part of the Staré Město Zone

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The Staré Město Unit (Sudetic part of the Bohemian Massif) separates East Sudetes and West Sudetes. It consists of several NE–SW-trending belts of different lithologies. The base of the Staré Město Unit is characterised by the occurrences of spinel peridotites. Above, banded amphibolites intruded by a Variscan tonalite sill are present. Mylonitic gabbro occurs at the top of the sequence (Parry et al. 1997). Small part of the Staré Město Unit lies in the area of Poland, in the vicinity of Bielice village. This area is formed chiefly by banded amphibolites (northern part) and amphibolitic schists of the Velké Vrbno Dome (southern part). Concordant intrusions of syntectonic tonalites and granodiorites are present in the banded amphibolites (Wierzchołowski 1966).

Banded amphibolites are medium- to coarse-grained and often have stromatitic migmatite structure. The amphibolites consist of dark amphibole-rich layers alternating with light, tonalitic ones, rich in plagioclase and quartz. The amount of opaques is significant. Accessory apatite and titanite are common. Sparse K-feldspar, garnet and biotite are locally present. Amphibole has a composition of tschermakite or, rarely, Mg-hornblende. The Mg/(Mg+Fe) ratio ranges between 0.55–0.75. Amphibole grains are zoned; their cores are enriched in silica relative to the rims. Plagioclase is oligoclase or andesine; few albite and K-feldspar grains are present. The anorthite content most often decreases towards the rims. Plagioclase grains with inverted zoning are rare. The cores of garnets have a composition close to $Alm_{66}Spe_6Py_{15}Gr_{13}$ and rims $Alm_{62}Spe_3Py_{19}Gr_{16}$. Opaques are represented mainly by ilmenite or iron hydroxides. Some amphiboles in banded amphibolites are replaced by secondary chlorite, plagioclases are strongly sericitized. Prehnite occurs locally, filling fissures or replacing plagioclase.

The amphibolitic schists of the Velké Vrbno Dome are fine- to very fine-grained and foliated. They consist of green amphibole, plagioclase and quartz, plus subordinate opaques, chlorite, prehnite and pyroxene, epidote. Accessories are apatite, titanite and biotite. The amount of opaques strongly differs at the individual exposures. The rock is locally markedly rich in pyroxene and epidote, which form layers separated from the amphibolitic part of the rock. Amphibole is not zoned and has the composition of ferrotschermakite, tschermakite or rarely Mg- or Fe-hornblende. Plagioclase is characterised by anorthite content increasing towards the rims. Opaques are mainly ilmenite or iron hydroxides. Prehnite and chlorite most often fill fissures or replace plagioclase and hornblende. Chlorite fills tensional fissures in plagioclase grains.

Subordinate intercalations of amphibolite-chlorite schists occur in the amphibolitic schists. The amphibolite-chlorite schists are fine-grained, strongly foliated. They are composed of euhedral amphibole porphyroblasts situated in fine-grained chlorite-amphibole matrix. Chlorite occurs in the pressure shadows around the porphyroblasts, too. Accesory opaques are very common. Larger amphibole porphyroblasts exhibit strong zoning. Their cores have the composition of actinolite (0.6–0.8 atoms of Al per formula unit mf = 0.8–0.85), whereas the rims are composed of tschermakite or rarely pargasite (1.8–2.4 atoms of Al per formula unit mf = 0.7–0.75). The smaller amphibole porpyroblasts are not zoned and have the composition of pargasite. The amphiboles from the matrix have the composition of Mg-hornblende. Their cores are enriched in silica relative to the rims.

The amphibolitic rocks of the Polish part of the Staré Město Unit underwent amphibolite-facies metamorphism. The temperature of peak metamorphism for amphibolitic rocks has been calculated at 650–750 °C using plagioclase–amphibole thermometry (Holland and Blundy 1994). The garnet–biotite thermometry (Ferry and Spear 1978; Williams and Grambling 1990) yields temperatures between 680–800 °C for banded amphibolites. Pressures estimated using garnet–hornblende–quartz–plagioclase barometry (Kohn and Spear 1990) yield 8–9.5 kbar for banded amphibolites and amphibolitic schists. This metamorphic event was followed by uplift under greenschist-facies metamorphism, accompanied by brittle deformation.

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Microstructural Studies of the Jawornickie Granitoids, Rychlebské Hory – Preliminary Data

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Polymetamorphic rocks of the Złoty Stok–Skrzynka tectonic zone, SW Poland, have attracted much attention because they may possibly provide important clues to understanding the character of the boundary between Lugicum and Moravo-Silesicum. The origin of this zone was connected with the development of the Ramzová Thrust according to E. Bederke (1929), or, this zone was linked with the Niemcza Shear Zone according to H. Cloos (1922). The Złoty Stok–Skrzynka tectonic zone is comprised of multiple-deformed, medium-grade metasediments, gneisses and amphibolites. This zone is pervasively injected by dikes and sills of the Jawornickie Granitoids. At a map-scale these dikes and sills are aligned SW–NE, parallel to the general trend of the tectonic zone. Despite the widespread effects of the Variscan Orogeny in this part of the Sudetes, some of its details, such as the amount of deformation episodes, spatial development of structures, the duration of the event, and the effects of granite emplacement processes are poorly understood. Don and Gotowała (1980) and Muszer (1989) recognized four stages, Cwojdziński (1977) recognized five stages, and Dumicz (1988) seven stages of deformation in the Złoty Stok–Skrzynka tectonic zone. According to Cymerman (199,6), "a majority of tectonic structures observed in the Złoty Stok–Trzebieszowice shear zone generated as the result of progressive deformation under the conditions of deformational partitioning". The Jawornickie granitoids are considered to be syn-tectonic on the basis of the field structural observations in the country rocks (Burchart 1958; Cwojdziński 1977). However, Burchart (1958) proposed D_1, and Cwojdziński (1977) proposed D_2 and D_3 as contemporary with phases of granitoids emplacement. According to Muszer (1989) solidification of the Jawornickie granitoids took place between D_3 and D_4. The lack of data on the internal structures of the dikes and sills makes these models hypothetical. Structures from both the granites and the country rocks are required for an emplacement model to be established. In regions with complex deformation histories, the internal fabric of granite plutons may preserve a record of the strain field and kinematics associated with the syn-emplacement tectonic event. An accurate interpretation of the internal structures of granite requires a detailed study of its microstructures in order to determine if the deformation took place in the magmatic state or in the solid state.

Dike and sill swarms of the Jawornickie granitoids are composed of up to three different rock types – granodiorites, tonalites and monzonitic granites (Burchart 1958). At the regional scale, contacts of the main dike 1–1.5 km thick, and of smaller granitoid dikes, parallel the country rock foliation. However, at the mesoscale these dikes locally crosscut the main foliation in the country rocks. A penetrative, homogeneous mesoscopic-