quake-forced instability of both the subaerial and subaqueous slopes. This sediment supply is reflected by normal regressive trends within the Lower Sarmatian sedimentary record.

During the Early Sarmatian, tectonic impulses triggered the mobilization of coarse sandy gravity flows in the frontal part of the shoreface in the southern part of the study area. Mass flows eroded the silty–clayey basinal sediments, thus forming sand-dominated breccias rich in mud clasts, interfingering with the marly–sandy laminated basinal facies. Frequent medium-scale water-escape flame structures can be found at the basal contacts of gravity flows with the basinal facies. Some soft sediment deformations, found in the gravity-flow related bodies originated due to frictional freezing of mass flows. The topographic instability is documented by slump folds. In more flatly lying deposits, seismic activity resulted in the formation of complicated liquefaction disturbances.

The northern part of the study area is characterized by very dynamic sedimentation of sandy and gravelly fan-deltaic system. The principal transport direction was measured from east and southeast, depending on the geometries of particular fans.

However, in areas with decreased terrigenous sediment supply, normal eustatic transgressive trend is visible. Here, the sedimentary record comprisses a deepening-upward setting of temperate-water carbonates, represented by bryozoan–algal–serpulid biostromes, upwards passing into offshore clays.

With respect to the above mentioned effects, the paleogeography of the study area shows prograding shorelines at active volcanic slopes and backstepping shorelines between volcanic centres.

Correlation of Karpatian Deposits in the Southern Part of the Carpathian Foredeep

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Karpatian period played an important role for the basinal, tectonic and facies evolution of the Outer Western Carpathians. The Carpathian Foredeep (CF) represents a peripheral foreland basin. During the Karpatian, the areal extent of the CF widely stretched along the flysch accretionary wedge from the today's southern Moravia to Poland (Cicha et al. 1989). The Karpatian deposits are characterised also by considerable thickness. At the eastern margin of the CF (close to flysch nappes) their thickness reached 1,200 m (Čtyroký 1991); therefore, a high sedimentation rate is estimated (Vass et al. 1988). Completely different opinions exist about detailed Karpathian stratigraphy and paleogeography (Jiříček 1995; Cicha 1995, etc.) of Neogene basins on the periphery of Western Carpathians (CF, Vienna Basin). The most complicated situation exists in the southern part of the CF.

The proposed preliminary correlation of Karpatian deposits in the southern part of the CF is based on subsurface data (cores from drill holes, wireline logs, seismic reflection profiles) because of the absence of suitable outcrops.

An unconformity evidently traceable in the Karpatian deposits on seismic reflection profiles in the central part of the basin was formerly interpreted as a result of Upper Karpatian marine transgression (Jiříček 1995); as a result, a completely different evolution of the western and eastern part of the CF basin has been proposed. A revised interpretation of this unconformity as a reflection of a westerly-dipping detachment horizon is proposed in agreement with Tomek (1999). The central part of the Karpatian and Lower Badenian fill of the CF was thrust over the inner part of the basin towards E (thin-skinned thrusting). Inversion of the foredeep is younger than the Lower Badenian and is the evidence with compressional regime.

Erosion and compressional deformation contributed significantly to the relatively narrow shape of the CF. The original, much wider areal extent of the Karpatian and Lower Badenian deposits in the CF is evident. Large volumes of Karpatian and Lower Badenian, especially marginal deposits were eroded. The strong dominance of "basinal" lithofacies (Karpatian schlier, Lower Badenian tegel) also results from this erosion.

Karpatian deposits in the southern part of the CF were deposited in a single basin. Their complicated lithology reflects structural resemblance of the basin during this period. Karpatian fill of the CF can be generally subdivided into several segments traceable across the basin. Multiple evidence of sharp-based sandstones reflecting shoreline deposition in the outer (more distal) part of the basin (Nehyba and Petrová in print) may be also important for industrial exploration. Formation of the accommodation space, stratal geometry and facies distribution within the CF were predominantly governed by tectonic processes within the accretionary wedge. Important role was also played by sea-level changes and sediment supply.

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Deformation and Kinematics of Mafic Dikes in the c. 500 Ma Izera Granites, Northern Izera–Karkonosze Block

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The northern part of the Izera–Karkonosze Block consists mostly of the Izera granites (515–480 Ma, U–Pb zircon; Korytowski et al. 1993, Philippe et al. 1995, Kröner et al. 1997). These granites became heterogeneously transformed to orthogneisses, or to mainly WNW/ NW-trending mylonites. Before the deformational history of the Izera granites and gneisses was completed, they had been intruded by a swarm of mafic dikes of commonly fine-grained gabbroic composition, with predominantly alkaline, within-plate chemistry (Nowak 1998).

Although spread all over the region, the dikes concentrate in a WNW-oriented, at least 60 km long belt. Most dikes belong to a WNW/NW-trending set of subvertical, few centimetres to several tens of metres thick veins, with characteristic representatives exposed near Wrzeszczyn. Mafic dikes in the vicinity of Leśna are less than 5 m thick, strike NE–SW to E–W and dip NW or N at moderate angles. The dikes occurring immediately west of Jelenia Góra are less than 50 cm thick, subvertical, striking NE–SW to N–S. Accordingly, with respect to their attitude all the dikes may be generally classified into three differently oriented groups, which – to some extent – have also been proved to develop different dike/host-rock relationships.

At least 6 types of dike/host-rock contacts, shared by the three groups, can be distinguished. These are: (1) vein and granite host undeformed, (2) vein foliated and metamorphosed to greenschist or amphibolite, granite host undeformed, (3) vein as in type 2, granite sheared along one side of the vein, (4) vein of type 2, granite mylonitized on its either side, (5) orthogneiss boudins inside amphibolitized vein in foliated and mylonitized granite, (6) amphibolitized mafic dike crosscutting the foliated orthogneiss. Mafic veins, even of the same group, have been differently strained and metamorphosed. Strongly heterogeneous deformation of the mafic veins set in granite was localized at the rheologically contrasting vein/host-rock contacts and controlled by vein geometry (length, width, spacing), overall and local temperature, and circulating fluids.

The Wrzeszczyn group of NW-striking dikes developed from mafic magma that intruded mostly into the originally subvertical fractures in the largely unfoliated Izera granite subjected to roughly NE–SW horizontal extension possibly related to Ordovician? rifting (Żelaźniewicz 1994). Less frequently the magma penetrated early mylonitic zones dipping steeply NE or SW, produced in a dip-slip to sinistral oblique slip regime. The first deformation recorded by mafic veins of the Wrzeszczyn group was at least locally accomplished in a dip-slip to oblique-slip regime with the SW walls downthrown. In most cases it was also the very first deformation of the country granite becoming orthogneiss. This event was followed by extensive strike-slip dextral shearing widely experienced by both the vein and the host rocks. The dextral strike-slip shearing occurred at 335–330 Ma and terminated at 325 Ma as shown by mylonites from the Intra-Sudetic Fault Zone (Ar–Ar, white mica; Marheine et al. 2000). Therefore, the widespread deformation and lower amphibolite- to greenschist-facies metamorphism of the Wrzeszczyn dikes coinciding with the strike of this fault zone and occurring close to it, is ascribed to the same event which produced the dextral ductile transpression on the Intra-Sudetic Fault (Aleksandrowski et al. 1997, Achramowicz 1998) in Viséan times.

The Leśna group of dikes crosscuts the pre-existing, N-dipping foliation of the host granitic gneisses. First common deformation of the vein and host rocks occurred in a normal dip-slip to oblique-slip regime. It was mainly localized within the N and NW-dipping schistose and amphibolitized dikes, but it slightly affected the country gneisses. Further deformation under greenschist-facies conditions consisted of ductile dextral strike-slip followed by sinistral strike-slip brittle/ductile overprint.

Thin subvertical veins of the Jelenia Góra group were emplaced into unfoliated granite. No deformation occurred at the vein/host-rock contacts, whereas the veins were internally sheared in semi-brittle sinsitral strike-slip regime. The late sinistral strike-slip shearing on NE-striking structures is found as the youngest deformational overprint in dikes of both the Wrzeszczyn and Leśna groups.

Summing up, the swarm of alkaline, within-plate mafic dikes was subvertically emplaced into the undeformed or locally foliated Izera granite during Ordovician? to Devonian? rifting. The subsequent straining of the dikes was controlled by rheological contrasts in the vein/granite system and by dike geometries. Most of the strain was localized at, and expanded either way from, the dike/host-rock contacts. Their early deformation, although not very extensive, occurred under the tensional regime with the westerly walls being downthrown. This was followed and obscured by the late Viséan, NW–SE-directed shearing in the dextral strike-slip to transpressional regime, and finally overprinted by semi-brittle sinistral strike-slip shears, particularly on NE-striking structures.

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