THE GEOLOGY OF THE SAXOTHURINGIAN ZONE IN THE SURROUNDING OF ARZBERG & WALDSASSEN; NORTHEAST BAVARIA

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The research area is situated south of the huge granitoid massive of the Fichtelgebirge near to the Czech – German border and exhibits mainly rocks of the saxothuringian zone of the Variscian orogen. The stratigraphic collumn starts with the Alexandersbad–Formation, consisting of now weak metamorphic metagreywackes, arcoses. quartzites and schists with rare interbedded small layers of basaltic rocks. It is overlain by the Wunsiedel–Formation with graphitic schists and carbonates. These two formations form together the so called "Arzberger Serie". Its age and tectonic setting is disputed in literature.

This rocks are in turn overlain by the Waldsassen–Formation of probably Cambrian age, consisting of schists and quartzites. It is followed by the tremadocian Frauenbach–formation, which is here represented by massive quartzites, and the also tremadocian Phycoden–Formation with sandy schists and a only partly developed quartzitic layer on top. The highest member of the stratigraphic collumn is the Arenigian Gräfenthal–Formation, starting with a thin oolithic iron ore layer, which is overlain by dark schists.

During the Variscian orogenesis the rocks were folded and sheared. Only one main deformation event is existent. The folds have amplitudes of some meters and the axes are mainly NW–dipping. The metamorphic overprint of the rocks was generally low.

The rocks within the research area show no tectonic hiatus between the Alexandersbad–Formation and the Wunsiedel–Formation on the one side and the overlying rocks on the other side. There is obviously no "Cadomian folding" existent.

A stratigraphic comparison of the Alexandersbad– and Wunsiedel–Formation shows, that there is a fair correlation with stratigraphic eqivalent rocks of the Saxothuringian zone in east Thuringia and Saxony. It is not necessary to correlate these two formations with the Precambrian rocks of the Barrandium or with the "Bunte Gruppe" of the Moldanubian region. As a consequence a Lower Cambrian age for the Wunsiedel–Formation seems more likly then a Precambrian age.

Within a small area south of Arzberg, at the "Elisenfels" occur rocks of different tectonic deformation. This rocks, mainly paragneisses, are higly deformed and show two main deformation phases. The first phase is represented by strong isoclinal folds with amplitudes of some dm with fold axes wich were NNW–SSE striking. During the second phase these rocks were overprinted by a weaker folding with shallow NW dipping axes, similar to the folds in the surrounding rocks described above. The stratigraphic and tectonic setting of the rocks of this area is up to now uncertain.

GEOCHRONOLOGICAL AND GEOCHEMICAL IMPLICATIONS FOR THE EVOLUTION OF MARGARITA ISLAND, SOUTHEASTERN CARIBBEAN: FROM AN ACCRETIONARY WEDGE TO A CONSERVATIVE PLATE BOUNDARY

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New detailed investigations aimed at unravelling the geological history recorded on the Island of Margarita, Venezuela, allow the formulation of a detailed scenario for this key area of the southeastern Caribbean (STÖCKHERT et al., 1993).

Margarita is part of the Leeward Antilles and is located approximately 25 km north of the Venezuelan mainland. The maximum dimensions are 40 x 70 km. Historically, the metamorphic terrane of the island has been divided into a metabasic unit defined as the La Rinconada Group (LRG), as well as the predominantly metasedimentary Juan Griego Group (JGG), Los Robles Group and Manzanillo Formation (BEETS et al., 1984). A large part of the latter two units is of volcanic origin. Ultrabasic rocks (slices of mantle) metamorphosed and deformed together with these units are usually strongly serpentinized. They occur in all units, but are especially common in the LRG. Non-metamorphic sediments overlying this basal complex are Eocene or younger in age (GONZALEZ DE

JUANA, 1968).

In the western part of the island, the JGG also comprises calc–alkalic orthogneiss, here referred to as the Macanao orthogneiss (MOG). These rocks indicate Permian to Carboniferous ages of intrusion, as shown by preliminary geochronological data [U–Pb zircon ages].

The rocks of the JGG, the metabasites of the LRG (oceanic crust) and the slices of mantle (peridotite bodies) were welded together at a deep level in an accretionary complex along a convergent plate boundary. Relics of HP–metamorphism are recorded in both metabasites and metasediments. After this event, the tectonic position of the Margarita complex evolved from the accretionary wedge into the intermediate crustal level of a magmatic arc, where the calc–alkalic El Salado granite (ESG) (MARESCH, 1975) and possibly also the calc–alkalic Matasiete trondhjemite (MST) (GONZALEZ DE JUANA, 1968) were emplaced at 86 Ma and 114 Ma, respectively [U–Pb zircon-ages]. However, geochemical data also suggest pre–plate–collisional magmatism (BATCHELOR & BOWDEN, 1985) or an ocean–ridge intrusion (PEARCE et al., 1984) for the MST. By contrast, the ESG indicates syncollisional magmatism (BATCHELOR & BOWDEN, 1985) or a "collisional granite" (PEARCE et al., 1984). The low initial $^{87}Sr/^{86}Sr$–ratio of 0.703, calculated from the Rb–Sr whole-rock data for four samples of the MST and the crystallization age of 114 Ma, is in accordance with initial ratios of ocean–floor and oceanic–island basalts (FAURE, 1986). Thus the MST could be interpreted to be a product of the upper mantle, and termed as I–type granite according to the classification of CHAPPELL & WHITE (1974). The initial $^{87}Sr/^{86}Sr$–ratio of 0.709 calculated from the Rb-Sr whole–rock mineral data for two samples of the ESG points to an S–type granite (c.f. CHAPPELL & WHITE, 1974).

By the Early Eocene, collective deformation and a wide–spread metamorphic overprint in an intermediate crustal level ("greenschist" facies) is recorded in all units. Simultaneously, a strike-slip milieu analogous to the present–day situation is indicated. Subsequent rapid cooling and uplift into the brittle regime is indicated by Rb–Sr– (whole rock/white mica) and K–Ar cooling ages (white mica), as well as fission–track ages (zircon) of 50–55 Ma. During the ensuing evolution of the Margarita crustal block, deformation was confined to local mylonitic shear zones and brittle fractures. Undisturbed Neogene and Quaternary sediments indicate relative tectonic quiescence, despite proximity to a major plate boundary.

The ages of intrusion of the magmatic rocks clearly show that the HP–metamorphism suffered by the rocks of the LRG and JGG must be older than at least 86 Ma and possibly 114 Ma. The geochemical interpretation of the ESG data fits the geological evolution of the Margarita crustal block well. The possible affinities of the MST to an ocean–ridge environment or a pre–plate–collisional event, as well as its low initial $^{87}Sr/^{86}Sr$ ratios, indicate the possibility that this intrusion may have evolved independently of the Margarita complex during its earliest history.

The evolution of the Margarita complex can be described in terms of a scenario compatible with the plate–tectonic development for the Caribbean area suggested by ROSS & SCOTESE (1988). Accretion and HP–metamorphism of the Margarita complex could have taken place during the Early Cretaceous at the northeastward–dipping subduction zone, where the Farallon plate passes beneath "Proto–Middle–America" (the arc is referred to as "Proto–Greater–Antilles"), close to the northwestern corner of South America. The remnants of older rocks in the JGG may be attributed to parts of old continental crust fragmented by opening of the Proto–Caribbean during the Jurassic. The mid–Cretaceous change of subduction polarity suggested by the model could be linked to the reorganization transferring the former accretionary complex into a magmatic arc environment. This arc complex is inferred to have moved towards the northeast by southwestward subduction of the Proto–Caribbean during the entire Late Cretaceous, until collision of its northern end with the Bahama platform. The Margarita complex resided at the southern edge of this island arc, close to the transition into a transform boundary. The ENE–WSW–stretching and exhumation recorded by the Margarita complex during Late Cretaceous to Early Tertiary times fits this plate tectonic situation. Finally, since the Early Tertiary, the Margarita complex has formed part of the brittle upper crust now travelling in an eastward direction (relative to South America), essentially as a part of the Caribbean plate.

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BASIC VOLCANICS IN CENTRAL EUROPEAN VARISCAN BASINS – AN APPROACH TOWARDS A MODIFIED GEOTECTONIC INTERPRETATION

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During Devonian and Carboniferous the Rhenohercynian and Saxothuringian basins as well as many others within the European Variscides are characterized by bimodal submarine volcanism. The setting is clearly characterized as thinned continental crust. Usually rifting or back arc spreading is assumed as the major cause. On the other hand, the Rhenoherzynian realm is considered to be a passive continental margin bordering a small oceanic basin to the south, which itself was obliquely subducted towards further south, mainly during Lower Carboniferous.

The most important chemical pattern of the basic rocks will be reviewed to derive some principal processes of magma genesis. The basic rocks were often classified as continental basalts. Yet typically, characterisation of these rocks with commonly used discrimination diagrams fail as most continental basalts do (Wang & Glover 1992). Nevertheless, many basic rocks show strong similarity to E–MOR–basalts (e.g. Schmincke & Sunkel 1987) which occur in present oceanic crust near plume areas often associated with transform faults (e.g. LeRoex et al. 1983). Such magma pathways may cut into continental margins with a small angle, if the spreading axis is at a high angle to the continental margin. Hence concomitant opening of small oceanic basins characterized by strike slip transform motion and a strongly dissected ridge very similar to the present Gulf of California (Saunders et al.1979) is assumed during Devonian and Carboniferous evolution of the Rhenohercynian and Saxothuringian basins.

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INDICATION OF LOWER CRUSTAL ORIGIN FOR THE WEINSBERG GRANITE (SOUTH BOHEMIAN PLUTON, AUSTRIA)

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The intrusives of the composite South Bohemian Pluton cover a large area in the western part of the Bohemian massif in Austria. They consist mainly of different types of granites with only subordinate basic and intermediate rocks such as gabbros and diorites. The coarse grained Weinsberg granite is the most widespread in this area, forming smaller bodies close to the Bavarian border containing dark patches of a quartz monzodiorite.

It consists of two assemblages which are not in mutual equilibrium. The younger one crystallized from a biotite–granite melt with dark colored orthoclase, plagioclase (An~30), quartz, and biotite. Both feldspars show clear magmatic textures and zoning. The older one is formed by a granulitic assemblage of plag(An~50)–opx–cpx with a metamorphic texture. The XMg value range for the cpx from 0.50–0.54 and for the opx from 0.35–0.42. Both pyroxenes are homogenous and are partly re–