Bericht 1993 über geologische Aufnahmen im Kristallin der Reißeck-Gruppe auf Blatt 182 Spittal an der Drau

VLADIMIR BEZÁK, IGOR BROSKA, MARTIN KOVÁČIK, JAN MADARÁS, FRANTIŠEK MARKO, MARIAN PUTIŠ & PAVOL SIMAN
(Auswärtige Mitarbeiter)

In the field season 1993 an area occupying the western and southern part of the map-sheet ÖK 182 (1 : 50.000) as well as a small area of Tröskaalm in the N has been mapped.

There is a contact of metamorphosed Mesozoic complexes with the crystalline complexes in the southern margin of the mapped area. The crystalline complexes sticking to Mesozoic complexes represent the upper structural unit (complex) in the sense of previous and our actual divisions. We have recognized two lithostructural superposed units (complexes) within the crystalline complexes in the field season 1991–93. They are:

1) the lower monotonous Zentralgneis complex built of porphyric varieties of granites to granodiorites;
2) the upper variegated complex composed of metamorphic and magmatic rocks. The metamorphic rocks (the Inner Schieferhülle) can be subdivided into a few characteristic layers (from bottom to top): grey, usually tiny-porphyric gneiss, banded biotite gneiss, locally enriched by amphibole-biotite gneiss and thin layers of amphibolites, marker thick amphibolites. The sequence can repeat, e.g. an amphibolite layer may be covered again by usually lower members, e.g. by grey porphyric gneiss, or biotite-amphibolite gneiss. In the east margin of the area we have also observed garnet micaschists and serpentinites overlying the marker amphibolite layer. The architecture of the whole crystalline complex is generally monoclinal, represented by apparent parallel schistosity. Both described complexes are arranged in the large-scale brachyanticlinal structure, clearly visible from attitudes of schistosity, forming dome-structures. Due to this fact and to the erosion the lower complex is mostly exposed in the middle part of the dome (NE–SW tending zone between Tröskaalm and Mühldorfer See). The upper complex is best preserved in the limbs of the dome-structure. The nature of the transition between the lower and upper complex is questionable.

Anyway we feel the two above described complexes could represent two nappe structures or a pile of several nappes. There are some indices supporting this opinion, for example the lower and upper complex are lithologically in contrast. On the other hand the lithological differences between the lower and upper complex are not so sharp in details. Even within the upper complex, inside the light metagranites we observed pure types of the lower complex metagranitoids-Zentralgneis. More important are some structural evidences as we suggested. Although the architecture of the whole crystalline is generally monoclinal, we found out that amphibolites above the lower unfolded complex are apparently folded inside the layer. That means, they have different structural styles. It is possible to explain this juxtaposition by overthrusting of the upper complex over the lower complex. However, to solve relations between the lower and upper complex it would be necessary to realize detailed structural investigations, which were not applied within the frame of our geological mapping.

In the southernmost part of the mapped area there was observed a contact of the Mesozoic complexes with crystalline ones. Mesozoic complexes are also metamorphosed, represented by biotite gneiss, garnet amphibolites, phyllites and also metacarbonates, which are out of the area in question. The contact zone is structurally complex.

In the eastern part it seems to be concordant with the schistosity and the Mesozoic complexes (the Outer Schieferhülle) are here superposed above crystalline rocks represented by the upper complex (in surroundings of Trebesing Hütte – Radlgraben valley). South of Gurglitzen (2352 m) Mesozoic rocks are exposed immediately near the contact zone built up by alternating biotite gneiss and phyllites, resembling the metamorphosed flysch sequence. What is more important: NE–SW-tending schistosities of the Mesozoic rocks are steeply dipping and there are intercalations of dynamometamorphosed-mylonitized dykes of acid intrusive rocks, which ought to be at least of Mesozoic age. Slickensides observed here with horizontal striations support the strike-slip nature of this part of the contact zone. The steep character of the contact between the crystalline and the Mesozoic complex southerly from Gurglitzen and Böse Nase is indicated also by gradual steepening of the gneiss schistosity near the contact with dips up to 60°.

Concerning lithology, a lot of the Mesozoic metamorphites are typical by their garnet content. We have found very conspicuous garnet gneiss on the top of the Tandlespitze and in the neighbourhood. They are in the highest position and may belong to the Mesozoic complexes, of course, with question marks.

Mesoscale structures

From structural elements we have followed attitudes of schistosity, joints, mineral and stretching lineations, fold-axes. There have been recognized two distinctive populations of steeply dipping shear joints – NE–SW tending and WNW–ESE tending ones. They accompany a few large (mappable) faults of the same direction, which we have interpreted. Offsets of the faults are negligible. SE–NW tending stretching lineations gently plunging to the SE (up to 30°) measured in crystalline complexes are generally parallel to fold axes measured within amphibolites and gneiss. Occasionally measured stretching lineations within Mesozoic rocks out of the mapped area have similar directions. Kinematic indicators accompanying the shear zones (e.g. rotation of mineral porphyroclasts and S-shaped foliations) indicate the sense of movement generally top to the WNW. Moreover the observable ECC (extension crenulation cleavage) structures support the idea about the predominant NW direction of the tectonic transport. The asymmetric unroofing (relatively quicker updoming of the eastern edge of the dome-structure) caused top-to-W extensional sliding even in the easternmost part of the crystalline basement.

The western area between peaks Zaubernock (2944 m) and Schoberspitze (2573 m)

The whole rock-complex of the area belongs to the Inner Schieferhülle composed of metamorphic and granitoid rocks. The uppermost part of the lithological complex is built by amphibole-biotite light-colored gneiss present round Zaubernock. They are underlain by dark-grey banded biotite and biotite-amphibole gneiss (N of Stapniksee), with some layers of grey often porphyric gneiss, which are intruded by leucocratic granitoids. But a few porphyric granitoid layers are also present. A marker amphibolite layer about 100 m thick is positioned below. This layer (together with gneisseous Schieferhülle) is cropping out again at the surface in the relief-cut (in a "window") at the waterfall N of Zandlacher Hütte. The marker layer of the Inner Schieferhülle with continuation to Sonnblick (2515 m), Rosskopf (2573 m) and Tandlspitze (2633 m) is overlain by Grübelwand – Riedbock – Kammwand higher structural level dominated by alternation of metamorphic and granitoid rocks:

1) due to intrusive contacts, but also
2) due to fold-thrust tectonics.

Dark-grey gneisseous rocks are alternating with amphibolites and both are intruded by veins of leucocratic granites. The uppermost part of the structural level is built by variegated porphyric Zentralgneis (the Kammwand – Schoberspitze crest) with enclaves of the biotite gneiss and amphibolites. The middle part of the structure (Untere Mooshütte, Grübelwand) is built again by porphyric Zentralgneis enclosed in a core of a megafold of the Inner Schieferhülle. Flexural to chevron types of macrofolds are characteristic in the outcrops within this upper structural level. One limb is shorter, often subhorizontal, and the second one is much longer and steeply dipping 50–80° to the S. The folds are combined with middle to steeply dipping thrusts. This structural level continues to Hocheck (2432 m) and Gmeineck (2592 m) areas.

The southern area between peaks Schoberboden (2237 m), Hummelkopf (1930 m) and Rosskopf (2573 m)

The area comprises the common tectonic structure of the crystalline basement and the Mesozoic cover rocks. The crystalline complex is represented by light-colored porphyric granites with a layer of grey gneiss, or fine-grained granites. The Mesozoic complex (the Outer Schieferhülle) includes metabasic rocks (greenschists, garnet amphibolites, metagabbros), moreover metacarbonates and marly schists, but also quartzous metasediments with layers of amphibole-biotite schists. N of Hummelkopf the imbrication structure of the Outer Schieferhülle and granitoid mylonites is accompanied by a leucophyllite layer a few dm to m thick. Further to the W a marker amphibolite layer and other lithological members of the Inner Schieferhülle are cropping out below the granitoid sheet. The lower part of the rock-complex is represented by a typical Zentralgneis. Distinct tectonic contact of the Mesozoic and the basement rocks near Schoberboden reveals a part of the granitoid body, where alternation of massive porphyric Zentralgneis and more leucocratic porphyric types is characteristic.

The Tröskaalm area

The Tröskaalm area of the NE–SW direction represents a contact zone between the relatively monotonous Zentralgneis complex and the Inner Schieferhülle composed of metamorphic and magmatic rocks. Two-mica porphyric middle- to coarse-grained granite to granodiorite (with titanite) a few 100 m thick is dominated at the base of the rock-complex. The contact between Zentralgneis and the Inner Schieferhülle is accompanied by a coarse-porphyric biotite Zentralgneis about 200 m thick. It is a marker granitoid horizon (also in other areas) especially situated near the contact of the lower Zentralgneis complex with the upper Inner Schieferhülle complex. The bottom of the Inner Schieferhülle is built by schistose grey, often tiny-porphyric gneiss neighbouring with (higher) banded biotite gneiss, both types a few tens of meters thick. They are overlain by a marker amphibolite layer (NW of Tandlspitze). Stretched intrafolial isoclinal folds and often symmetric boudinage of competent members in gneisseous rocks indicate a high effect of pure-shear deformation during the vertical uplift. Mineral lineation of biotite: 155–175°/5–10° (NNW–SSE); stretching lineation of tectonic transport: 90–100°/10–20° (E–W to WNW–ESE), with top-to-W, WNW movement; extension crenulation cleavage (ECC): S(shaped)-foliation: 105/10°, C(shear)-planes = 290°/35–40°, with top-to-W extensional sliding.

Quaternary

The evolution of the Quaternary cover commenced during the glacial epoch and was modificated by younger uplift tectonics. Regenerated glaciers formed a huge glacier circus and produced moraine accumulations. We found nice remnants of these in the mapped area (terminal moraine – Stapniksee, under Bockriegel, N of Rosskopf (2573 m) border moraine – surrounding Untere Mooshütte, valley W of Rosskopf, ground moraine – E of Hocheck (2432 m), Reinitzbach – E of Rupperalm (1633 m)). Most of the Quaternary highland cover is represented by well developed fans and bands of boulder-stony debris rimming bases of stony erosional steps and mountain walls. They gradually pass into more clayey ones in the lower levels. In some places (near Untere Mooshütte, Bärenbad, Hohenkareck) are developed high mountain plains often with fens. On the slopes of valleys are developed dejection and fluvial cones. Alluvial deposits are developed only in the bottom of the lower parts of important valleys. We have observed a few meters wide tension gashes (breakoffs) in rocks due to gravitational movements on the east crest of Gurglitzen (2352 m), in the neighbourhood of Stipennock – Tröskaalm. In the areas where the attitude of layering is similar to slope attitude, there is visible sliding of huge blocks down (e.g. southern slope of Hocheck (2432 m)). Some examples (bending of trees) of recent solifluction were observed SE of Untere Mooshütte in the surroundings of the waterfalls.

Southern slopes of Böse Nase are important also from the Quaternary point of view. We observed here large-scale slope-slides well pronounced in geomorphology.

Zeitschrift/Journal: Jahrbuch der Geologischen Bundesanstalt

Jahr/Year: 1994

Band/Volume: 137

Autor(en)/Author(s): Bezak Vladimir, Broska Igor, Kovacik Martin, Madaras Jan, Marko Frantisek, Putis Marian, Siman Pavol

Artikel/Article: Bezak, Vladimir; Broska, Igor; Kovacik, Martin; Madaras, Jan; Marko, Frantisek; Putis, Marian; Siman, Pavol Bericht 1993 über geologische Aufnahmen im Kristallin der Reißeckgruppe auf Blatt 182 Spittal an der Drau 523