Sidantal

Der Talboden und die Hänge des untersuchten Teils dieses Tales sind bis auf seinen obersten Abschnitt mit Grundmoräne und Ablationsmoräne bedeckt. Große Gebiete dieser Hänge sind von Massenbewegungen erfasst. Die Hauptmasse der Kolluvien bilden eben diese Moränen, frühes periglaziales Blockwerk und verwittertes Grundgebirge. Die größten Massenbewegungen entstanden an den Süd- und Südwesthängen, zwischen Stockaste und Sidanjoch. Weniger zahlreich und kleiner sind die Massenbewegungen an den Nord- und Nordosthängen von Gerennte und Sandegg. All diese Massenbewegungen entstanden höchstwahrscheinlich während der Degradation des Permafrostes in Zeiten der Deglaziation der Täler und sind derzeit inaktiv.

Die End- und Seitenmoränen sind zahlreich. Die größte und am tiefsten gelegene (1400–1560 m SH) bildet in der Umgebung vom Sandeggalm-Niederleger einen hohen und breiten Wall. Der Talboden oberhalb des Walles ist ziemlich breit und mit Alluvien bedeckt; das Tal selbst erstreckt sich mit sanftem Gefälle. Unterhalb des Moränenwalls wird das Tal eng, tief und ist frei von glazialen Ablagerungen. Der Moränenwall ist wahrscheinlich ein Fragment der Gschnitz-Endmoräne, deren orographisch linker, d.h. nördlicher Teil, vollständig durch Massenbewegungen zerstört wurde. Mit demselben Gletscher ist wahrscheinlich ein Fragment der Seitenmoräne zu verbinden, die in einer Höhe von 2000 m SH unter dem Sidanjoch erhalten ist. In den höher gelegenen Kesseln haben sich nur kleine Endmoränenwälle erhalten, unter anderem nordöstlich von Pangert (2050 und 2150 m SH), westlich von Sandegg (2200 m SH) und nordöstlich des Rastkogels (2020, 2350, 2450 und 2550 m SH).

Ein sehr ausgedehntes und steiles Feld von Felsblöcken, das als eine Blockgletscherablagerung interpretiert wird, liegt in einer Höhe von 2400–2700 m SH im Kessel direkt nördlich vom Rastkogel. Kleinere Felsblock- und Blockwerkfelder, Überreste von frühholozänen Blockgletschern, finden sich unter dem Grat Breitenkopf – Roßkopf an dessen Osthängen (2350–2450 m SH) und unter dem Grat des Sandegges (2150–2300 m SH). Zahlreiche und ausgedehnte Blockfelder, die an den Hängen der obersten Partien des Sidantals vorkommen, sind wahrscheinlich die Folge der Frostwirkung in der Endphase der Würm-Vergletscherung und im Frühholozän.

Hoarbergtal

Der Abschnitt des Hoarbergtals, direkt oberhalb der morphologischen Stufe, an der es zum Zillertal abfällt, ist ausgedehnt und weist sanft abfallende Hänge auf. Das Tal ist mit ausgedehnten und mächtigen Moränen aus dem Würm-Maximalstand bedeckt. Oberhalb der Hintertrettalm wird das Tal eng. Die Grundmoräne kommt dort nur im Talgrund vor, die Hänge sind dagegen mit periglazialem Blockwerk bedeckt. Es hat sich dort aber ein deutlicher Seitenmoränenwall erhalten (1950–2100 m SH). Die Gletscherstirn befand sich wahrscheinlich im unteren Teil des Talabschnitts in der Umgebung der Mittertrettalm, in einer Höhe von etwa 1650 m SH und entspricht vermutlich dem Gschnitz-Stadium. Die Endmoräne blieb jedoch nicht erhalten. Darüber, im Hoarbergkar, ist ein deutlicher Endmoränenwall erkennbar, der in der Mitte durch einen Bach geteilt ist. Die ausgedehnte Enddepression ist sumpfig und in ihrem der Moräne am nächsten gelegenen Teil mit Torfmoor aufgefüllt. Der unterste Teil der Moräne liegt in einer Höhe von 2250 m SH. Sie kennzeichnet vermutlich die Reichweite des Gletschers des Daun-Stadiums.

Etwas höher, im selben Teil des Tals, in einer Höhe von 2300–2420 m SH, und im Nachbarkar unter der Wanglspitze (2300–2420 m SH), finden sich einige Überreste von Blockgletschern. Die Verteilung dreier von ihnen, direkt nordöstlich der Wanglspitze, weist auf ihre Etappenentwicklung hin.

Die einzige größere Massenbewegung entstand vermutlich in der spätglazialen Periode im Bereich der Grundmoräne am Nordosthang des Gschößberges. Zur spektakulären Entwicklung der Prozesse der Erosion und proluvialer Akkumulation kam es vermutlich in der gleichen Periode am Südhang der Hoarbergkarspitze. Es entstand eine tiefe und ausgedehnte Rinne, aus der sich ein mächtiger Schuttkegel erstreckt, der einen großen Teil der Mittertrettalm einnimmt. Dieser Schuttkegel trug zur verstärkten alluvialen Sedimentation oberhalb des Hoarbergbachs bei. Ein weiterer, etwas kleinerer Schuttkegel entstand am Ausgang einer anderen, kleineren Rinne im oberen Teil der Hintertrettalm.

Pigneidalm

Der untere Teil der Pigneidalm, oberhalb der oben erwähnten morphologischen Stufe, bildet ein Kar mit ausgedehntem Boden, den eine mächtige Grundmoräne bedeckt, die in zahlreichen Aufschlüssen in Hängen des Talbachs ansteht. Erkennbar ist in ihr eine leicht schräge Schichtung, die subparallel zur Terrainoberfläche liegt. Diese Moräne ist vermutlich dem Würm-Maximalstand zuzuordnen. Ihre erosive Spaltung durch den Talbach erfolgte dagegen erst in der Endphase dieser Vergletscherung, als die Oberkante des Zillertalgletschers unterhalb der Stufe im Tal abgesunken war. Die Folgen dieser Spaltung sind spektakuläre, hohe und steile Hänge im Bachbett und in der Umgebung Pigneidalm – Niederleger.

In oberen Teil der Pigneidalm haben sich schön ausgebildete Moränen und Enddepressionen einiger Kargletscher erhalten. Die Enden dieser Gletscher erreichten in dieser Zeit ihre größte Reichweite (in einer Höhe von 2100–2400 m SH). Sie entwickelten sich wahrscheinlich im Spätglazial oder im Frühholozän. Ein ausgedehntes Feld aus Felsblöcken und Blockwerk, das sich im Kessel östlich vom Gipfel (Kote 2445) findet, ist als Blockgletscher aus derselben Periode zu erkennen.

Bericht 2008 über geologische Aufnahmen von quartären Sedimenten im Zemmtal und Zamsergrund auf Blatt 149 Lanersbach

JERZY ZASADNI

(Auswärtiger Mitarbeiter)

The tributary valleys and cirques of Zemmtal and Zamsergrund were mapped in 2007 (ZASADNI, Jb. Geol. B.-A., **148**/2, 260–262, Wien 2008) and 2008. The area of the southern slope of Tuxer Hauptkamm, between Friesenbergkar and Pfitscher Joch, is a continuation of the author's work in this massif. The investigation was also led in several north exposed glacial cirques and valleys in the Zillertaler Hauptkamm: Haupental, Spiegelkare, Ingentkar and Gunggl. The major part of the area is built of Tuxer Kern crystalline rocks (gneiss, migmatite, metagranite) and only the areas of the Pfitscher Joch, Haupental and the head part of the Gunggl valley are built of Greiner syncline and penninic ocean metasedimentary rocks (schist, amphibolite, serpentinite). The relief of this area is dominated by impressive forms of glacial erosion, typical of Zillertal Alps. The tributary valleys and glacial cirques are hung 200 to 600 m above the floors of the main valleys. Steep walls of glacial troughs and in the main valleys, several hundred meters high, are a prominent morphological zone where no sediments are preserved. The rock walls are an effective source of production of talus, avalanches and rock fall sediments as well as large landslides which fill the main valley floors covering the original glacial sediments. This is particularly visible in the Zemmtal, whereas the Zamsergrund has generally gentler slopes and a better preserved U-shaped cross profile. Hence, the paraglacial processes have less significance there.

Friesenbergkar and Friesenbergalm

Friesenbergkar and Lapenkar constitute a complex and staircase glacial cirque between Hoher Riffler and Gefrorene-Wand-Spitzen. It was partially described by the author in the previous report (ZASADNI, 2008). In the mouth of the Lapenkar there are several distinct and fresh-shaped lateral and latero-frontal moraine ridges assigned to the Egesen stadial. Above Friesenbergsee which occupies the dead ice depression, there is a prominent talus cone which originates as a result of disintegration of the active rock glacier on the rock threshold at 2620 m a.s.l. In the east facing slopes, below Gefrorene-Wand-Spitzen, at 2600–2700 m a.s.l., there are two "Little Ice Age" end moraine ramps of two glaciers – Friesenbergkees and Kleines Riepenkees. The more than 400 m long and up to 200 m high talus-like rolling glacial sediment below these moraine ridges ("fall moraine", *Sturzmoräne*) gives an illusory impression of its extraordinary massive accumulation. A full profile of the sediment is exposed in several gullies, incised in the moraine up to the bedrock. This reveals no more than 20 m of the matrix supported till. The slopes directly below this moraine are characterized by polished rocks, till patches or thin till cover. Coming down to the Friesenbergalm, the moraine cover is more common; even some barely visible ridges of the lateral moraine can be traced at 2400–2200 m a.s.l. in Gamsleiten. East of the Keeskopf at 2450 m a.s.l. there is a well defined, however strongly weathered and blocky Lateglacial lateral moraine of the Kleines Riepenkees.

Riepenkar

The "Little Ice Age" moraines (the Holocene moraine complex in the strict sense of the term) of Großes Riepenkees terminated at 2500 m a.s.l., above Olpererhütte. The moraine geometry points to a subdivision of the glacier tongue into two lobes. The eastern one consists only of one system of the end moraine with similar massive appearance to those mentioned above, whereas the western one reveals several moraine systems in which the youngest (innermost) represents the AD 1850 advance. Directly below Keeskop, at 2700 m a.s.l., the uppermost part of the left lateral moraine is affected by rockglaciation, which is visible as a prominent distension – i.e. the creeping part of a moraine ridge (lateral extrusion). It has an initial ridge and furrow pattern on its surface. A very blocky form occurred also directly below (2475 to 2350 m a.s.l.). It can be attributed to a Lateglacial lateral moraine or a rock glacier of origin similar to the one mentioned above. The best outcrop, up to 7 m high, of the ground moraine is located in the stream gullies below Olpererhütte. It probably represents an accumulation in the terminal part of the local cirque glacier during the last stage of the Lateglacial. Beside the one poorly developed lateral moraine above Riepenbach (2300–2400 m a.s.l.), there are no other Lateglacial moraines in the Riepenkar.

Unterschrammachkar

On the flat top of the truncated spur between Riepenkar and Unterschrammachkar – Schramerkopf – there is a mountaintop detritus, i.e. a frost-weathered blockfield. The lowermost location of this field, at 2550 m a.s.l., marks the maximum elevation of the Last Glacial Maximum (LGM) ice surface in Zamsergrund. Directly below the talus apron, which surrounds the spur, initial forms of relict rock glaciers (talus rock glaciers) appear. They cover the upper part of the trough shoulder *(Schliffbord)* and probably represent forms of permafrost mobility during the final stage of the Lateglacial. In the Unterschrammachkar, the oldest moraine of the Holocene complex is located at 2360 m a.s.l. It is covered by *Rhizocarpon geographicum* lichen (Landkartenflechte) with the maximum thallus size (L_{max}) of 72 mm in diameter. At least two other moraine ridges, older than the AD 1850 stand, can also be traced (average diameter of 5 maximum lichens [L_{max5}:41 mm]). The moraine of the AD 1850 stand is located 200 m upvalley from the outermost moraine (L_{max5} :30 mm). There is also a well developed and very blocky end moraine ridge, 2–3 m high, of the AD 1920 stand, at 2625 m a.s.l. (L_{max} :13 mm). The aforementioned moraine is formed by the largest glacier in this cirque – Unterschrammachkees – located on the south flank of Olperer. However, there are several small moraine ridges or a fresh till cover of the niche or footwall glaciers located below the several hundred meters high east-facing rock walls of Schrammacher. The overdeepened cirque floor below the Holocene terminal moraines is filled with fluvioglacial and debris flow deposits. Only the flat surface of the rock threshold at 2290 m a.s.l. is covered with remnants of the Lateglacial moraine, which has two well developed dead ice depressions, presently occupied by lakes.

Oberschrammachkar

In the glacier forefield in the Oberschrammachkar, the latero-frontal Holocene moraine reaches 2420 m a.s.l. A short section of this moraine has also multiwalled character. Three ridges, which were distinguished, have the following L_{max5} measurement values: 60, 45 and 33 mm. The upper section of the right lateral moraine is rockglacierized, similar to the one in the Riepenkar. Close to it, on the north side of the Kastenschneid rock wall (2560–2640 m a.s.l.) there is an intact rock glacier. It is supplied through the rock falls from the huge breach-like rock failure in the Kastenschneid spur. Remnants of the Lateglacial moraines occur northeast of Kastenschneid at

2220 m a.s.l. and south of Ameiskopf. The later moraine is a very blocky and weathered lateral moraine of the Oberschrammachkees. However, the two transversal moraine ridges which are merging at 2230 m a.s.l. on the trough shoulder in the east of Ameiskopf probably point to the elevation of the coalescing glacial tongues of the main valley (Zamsergrund) and the Unterschrammachkar during the Lateglacial.

Glacial cirque between Kastenschneid and Kellerkopf

The small glacial cirque between two well developed truncated spurs – Kastenschneid and Kellerkopf – carries no Holocene moraines. However, in the mouth of the cirque highly weathered and blocky moraine ridges occur. This moraine complex is subdivided into, at least, three moraines, in which the outermost is the most prominent. The two youngest have a more rock glacier-like appearance, especially in the location below the Kastenschneid rock walls.

Stampflkees forefield

Stampflkees with the area of 1.5 km^2 is the second biggest glacier in the Tuxer Hauptkamm. On its forefield there are also the highest lateral moraines. The right (western) one stands 65 m above background. It begins at 2790 m a.s.l. near Schneescharte where it is partially remobilized by a creeping process. Below ca. 2380 m a.s.l. the lateral moraines divide into 3 to 6 walls. The innermost end moraine – AD 1850 stand – reaches approximately 2250 m a.s.l.; 200 m up valley from the outermost one which reaches 2200 m a.s.l. This outermost moraine (the oldest one) looks like a cordon of huge blocks in the size of 2–3 m without any fine material. These boulders have a dense lichen cover, where individual thalli reach up to 80–90 mm in diameter, which points to an old age. The subsequent younger moraine walls are higher, massive and consist of smaller and more rounded boulders with finer matrix. The lichens on their surface are not larger than 56 mm in diameter. In addition, the upper part of the glacier forefield, in the elevation range of 2530–2700 m a.s.l., occupies the moraine of the AD 1920 advance.

Pfitscher Joch

Pfitscher Joch (2246 m a.s.l.) is a prominent pass which separates Tuxer Hauptkamm and Zillertaler Hauptkamm. For a long time it was considered as a transfluence pass (e.g. PENCK, A. & BRÜCKNER, E., Die Alpen im Eiszeitalter, Tauchnitz, 1199 pp., Leipzig 1909). During the LGM the ice surface in this location reached approximately 2600 m a.s.l. as is indicated by glacial erosion forms in the neighborhood (e.g. truncated spurs: Kastenschneid, Kellerkopf and Grawandkofel). Therefore, the transfluence over the pass is suspected from the East (from Zammsergrund) to the West (to Pfitscher Valley). The roche moutonnées ("Rundhöcker"), whalebacks and glacial polished rock surfaces are well visible there. They are better preserved on the northern side of the pass which has more resistant lithology (Tuxer gneiss). However, in the southern side, the smoothed spur coming from Rotbachlspitze points to glacial erosion above 2500 m a.s.l. The vast area of the pass is strewn with glacial transported boulders of Tuxer gneiss (Lateglacial). Some depressions are covered with a thicker layer of boulders and till, however in most cases the pass is covered with dispersed, rounded or subrounded blocks with an average size of several decimeters. The largest ones are up to 3 m in diameter. On the southern side of the pass, the "strew moraine" marks a well visible, sharp limit – a trimline. It reaches the highest point at 2280 m a.s.l., 200 m southeast of Zollhütte. From this point, it gently descends towards the east and the west and it can be traced over a distance of 1.5 km. The measured azimuths of the glacial striae and groves show probably two stages of development. In some places they are preserved in the same rock surfaces. The older stage is represented by striae, which are parallel to the slope on the south side of the pass (azimuth 220–230°). They are located on both sides of the "strew moraine" trimline. The striae of the younger stage can be found only inside the "strew moraine". They mark the former ice flow direction from Stampflkees location to the Pfitscher Joch. At the Pfitscher Joch it divides into two directions: towards Zamsergund and Pfitscher Valley. Between the striae which indicate the east and south to southwest flow directions, an ice divide can be interpolated. It is located directly at the highest point of the moraine boulders limit. This proves that the moraine cover and the younger striae system can be formed during the same ice advance.

Haupental

Haupental is a wide glacial cirque hanging 200 m above the Zamsergund valley floor. At present it is not glacierized, however at the cirque head below Hochsteller there is a well developed intact rock glacier. This rock glacier descends to 2680 m a.s.l. and is composed by fine slate material with an average block size of several decimeters. An active state of this form can be inferred from its high (15–18 m) and steep frontal slope, permanent snow patches and the ridges and furrow pattern on its surface. The low temperature of spring water (0.4 and 0.5 °C) measured at the foot of the front, evidences the existence of the interstitial ice inside the rock glacier body. The existence of a small "ice glacier" in the rooting zone of the rock glacier during the "Little Ice Age" cannot be excluded. The rest of the cirque floor is covered with talus and debris flow deposits and till mantle. On the west facing slope, between Kleiner Hochsteller and Zamser Egg (Eck), a distinct LGM trimline can be traced. Below the line of well visible *Schliffkehle* talus aprons and an initial form of relict rock glaciers, which are related to the mentioned talus, occur.

Zamsergrund

Zamsergrund is a 5 km long main valley between Schlegeisspeicher (Dam Lake) and Pfitscher Joch. Its U-shaped valley bottom is covered with a moraine, which in some places is strongly modified by sturzstrom and solifluction. The moraine cover on the slopes is usually thin; not more than several meters thick. However, in the valley floor it can be thicker, especially below the mouths of Unterschrammachkar and Oberschrammachkar, where the moraine and alluvial accumulation is enough to dam the valley. Moreover some remnants of the lateral moraine on the trough shoulders can be traced there. One moraine is located southeast of Kellerkopf at ca. 2270–2220 m a.s.l., whereas the second one extends north of Haupental at 2150–2120 m a.s.l. Both forms are gently inclined down the valley. Considering their elevation, they can be assigned to the same stage in which the boulders' trimline at Pfitscher Joch was developed. This indicates that the glacier tongue in the upper part of Zamsergrund during the final stage of Lateglacial was 200–300 m thick. In the upper section of the valley, at Lavitzalm below Rotbachlspitze, an impressive landslide form occurs (rock avalanche). It covers the area of 0.4 km^2 and consists of amphibolite and serpentinite angular blocks in the size of several meters. However a finer matrix is also abundant there. It has two main tongues with visible flowing structure like lobes, steep fronts and ridges and furrow structures. The source area of the massmovement was the north wall of Rotbachlspitze, however a clear landslide niche cannot be observed there. It seems that the mass movement forced the Zamser stream to move towards the opposite slope and cut into the bedrock. In consequence, the upper valley section was dammed and filled with sediments. A silty sand and gravel interlayered with peat is accumulated, in the distal part of the alluvial fan.

Inneres- and Äußeres Spiegelkar

Inneres and Äußeres Spiegelkar are located east of Schlegeisspeicher. They compose twin glacial cirques, which are hung 500–600 m above Zemmtal. The spur which divides these cirques is strongly destroyed by glacial erosion. As it can be inferred from the polished rock surface, the ice has overpassed the spur crosswise from Inneres to Äußeres Spiegelkar during the stage of maximal glaciation. On the northwest slope of the Zumme (2511 m) (the truncated spur which stands directly above Schlegeisspeicher), the glacial polished rock surface reaches the level of approximately 2400–2480 m. This corresponds to the minimal elevation of the ice surface in the Zemmtal during the LGM. There are no modern glaciers and no marks of the Holocene glaciation in the Spiegelkar. However, in both cirques prominent Lateglacial moraines can be found. They were formed by two separated cirque glaciers which did not descend below 2150–2180 m a.s.l. More than one moraine system (2 or 3) can be traced there, especially in the case of Inneres Spiegelkar. Likewise, in both cases distinct aprons of falling moraine material (*Sturzmoräne*) occur in the distal slope of the moraine crests.

Ingentkar

Ingentkar is a north oriented, broad glacier cirque located north of the Großer Ingent and south of the Roßhag power station. It is hung 400–500 m above Zemmtal. In the head part of the cirque, the active rock glacier terminates on the rock threshold at 2420–2495 m a.s.l. Several meters below its front edge (2440 m a.s.l.) there is a spring with water which has a low temperature (0.3°C). The disintegration of this front supplies a huge talus apron which is 600 m long and 250 m high. On the rock glacier surface, a structure of well-developed ridges and furrows can be seen. Additionally, there is a broad, spoon-shaped depression in the rooting zone of this form. This depression, together with the associated left lateral moraine directly below the headwall, evidences the existence of a larger "ice glacier" during the "Little Ice Age". Farther west, at approximately 2660–2700 m a.s.l., there are two other, however smaller, rockglacier-type forms. The lower part of the cirque (1600–2140 m a.s.l.) is covered with moraine mantle with associated moraine ridges of the Lateglacial age. Between 1860 and 2140 m a.s.l. there are two massive lateral moraines. The right one has a double ridge. On its proximal slope, there are subsequent younger and smaller moraines. Similarly, in the foot of its distal slope there is a small (2–3 m high) moraine (the outermost one).

Gunggl

The Gunggl is a north oriented Zemmtal tributary valley. Its perfectly developed glacial trough, 400–500 m wide and 3.5 km long, is hung 300 m above the main valley floor. The upper edge of the troughs head is at the level of 2100 m a.s.l. The flat surface above the edge – the Gunggl Platte – is the bottom of a semicircular amphitheater which consists of concentrically directed glacial cirques. The basins of the individual cirques are in some places separated by highly destroyed spurs. As it can be inferred from the glacial polished bedrock on the top of the Kellerwand spur, the head part of the Gunggl valley was filled with ice during the LGM at least up to the level of 2350 m. There is a clear asymmetry in the cirque development on both sides of the glacial trough. The cirques are located only on the east facing side of the valley, below Bretterkopf, Trenker and Nördliche Kellerspitze (five cirques), while the west facing slopes are only sculptured by avalanches. The Holocene moraines and rock glaciers occur only in the head of the Gunggl valley, below the north facing headwalls. There are four individual cirque glaciers, which were able to form distinguishable moraines during the cold stages of the Holocene. The westernmost one had the smallest extent. The latero-frontal moraine of this glacier spans between 2400 and 2580 m a.s.l. Only one simple maximal moraine system can be marked there, however a ridge of the AD 1920 advance can be seen too. Also, in the forefield of the next east Ochsner Kees, there are no moraines older than AD 1850. The end moraine of Ochsner Kees is located at approximately 2270 m a.s.l. and, in addition to this, 350 m upvalley, there is an end moraine of the AD 1920 advance. Worth noting is also the lateral extrusion at 2520–2530 m a.s.l. formed in the right lateral moraine. A much more complicated configuration of latero-frontal walls can be seen in the Östliche Ochsner Kees forefield. Most parts of the glacier are presently covered with debris. The Holocene highstand moraines are piled up only 300–400 m from its terminus. In the massive moraine bastion one can distinguish three moraines older than AD 1850. In this case, the AD 1920 moraine is close to the maximal ones; however it was formed by a considerably thinner ice tongue. Moreover, it is composed of much more blocky and angular material than the maximal ones. Also, as in the case of the Ochsner Kees forefield, the upper part of the right lateral moraine is rockglacierized, which is manifested in the initial lateral extrusion (distension) at 2450 m a.s.l. The last glacier forefield is located below the almost vanished Melkerschartenkees. The lower part of this forefield is covered with a moraine mantle. The lowermost part of the end moraine (2450 m a.s.l.) is thicker. It has a steep and approximately 20 m high rockglacier-like front. On its surface, some ridge and furrow structures, depressions and instable blocks can be seen, which, together with the low spring water temperature below the frontal slope (1°C), suggests the presence of permafrost in its body. Close to this form and west of it there is a barely visible moraine older than the AD 1850 advance moraine. Directly above the AD 1850 moraine, at 2550 m a.s.l., an end moraine is located with two folded, 2–3 m high ridges. It probably represents the stacked moraine of the AD 1890 and the 1920 advances (L_{max}: 10 mm). Farther east, at approximately 2630 m a.s.l., an active distention is present below the talus cone. Likewise, two other rock glacier forms are located east of Großes Ingent at ca. 2600 and 2620 m a.s.l. The larger one is 300 m long, 150 m wide and has a 40 m high frontal slope. The measurements of the water temperature below this front reveal a low value (0.0 °C and 0.4 °C). The most interesting rock glacier form is located directly below the moraine bastion of Östliche Ochsner Kees, approximately 350–450 m down the valley, at 2180 m a.s.l. Its morphostratigraphic position suggests, undoubtedly, that it has the same provenance as the moraine bastion above; however its formation clearly predates the accumulation of the moraine, which means it can be older than most of the Holocene fluctuations. It is composed of serpentinite and gneiss rocks. Both the front and the rim edges have very fresh forms as well as the ridges and furrows on its surfaces. However, the existence of the initial soil and grass cover on the frontal slopes points to its inactivity. The rim slopes are 15 to 20 m high, whereas the frontal slope is several decameters high and falls directly towards the steep rock threshold of the trough head. A prominent depression exists in the central part of the rock glacier. In this place there is no lichen cover in contrast to the edge parts or the boulder aprons below the rim slopes where individual thalli have up to 170 mm in diameter. There are no springs around this form, however it is worth noting that much of the water drained from the glaciers above, is conducted under this form and outflows below the frontal slope giving the beginning of a large stream. A vast area of the Gunggl Platte is covered with talus, alluvial and debris flow deposits. Only on the cirque floor, south of Kellerwand and in the Plattenkar, some Lateglacial moraines are preserved. The glacial trough of Gunggl is filled with interlocked alluvial and talus cones with the exception of its mouth (1400 m a.s.l.) where glacial sediments can be seen.

Blatt 154 Rauris

Bericht 2008 über geologische Aufnahmen auf Blatt 154 Rauris

Gerhard Pestal

Im Berichtsjahr wurden die in den vorangegangenen Jahren begonnenen Revisionskartierungen des gegenständlichen Kartenblattes fortgesetzt (Pestal, Jb. Geol. B.-A., **148**/2, 262–264, Wien 2008). Dabei wurden in der Salzburger Region „Rauriser Tal“ zwei räumlich und thematisch getrennte Gebiete untersucht. Die Aufnahmen konzentrierten sich zum einen auf die Seidlwinkl-Decke und zwar auf den Abschnitt zwischen dem mittleren Seidlwinkltal und dem oberen Krumltal. Zum anderen wurde in der Glockner-Decke ein nordwestlich von Wörth gelegener Bereich bearbeitet.

Der im nördlichen Teil der Seidlwinkl-Decke bearbeitete Bereich erstreckt sich an der östlichen Talseite des Seidlwinkltales von der Bockkarhütte über die Bockkaralm ins Rettenkar und weiter ins Gamskarl. Weiters umfasst er den Grat zwischen dem Schaflegerkopf, dem Sagkogel und dem Gamskarkogel und erstreckt sich über die östliche Flanke dieser Berge ins obere Krumltal bis in den Bereich Rohrmooseralm – Bräuhütte. Es handelt sich um jenen Bereich, in dem die geologische Karte der Sonnblickgruppe (Exner, Chr., Geologische Karte der Sonnblickgruppe 1:50.000, Geol. B.-A., Wien 1962) an die qualitätsvolle Manuskriptkarte des Seidlwinkltales grenzt, die Günther Frasl in den Fünfzigerjahren für die Geologische Bundesanstalt kartierte. Südlich anschließend folgt das Detailgebiet, welches Johann Alber (Seriengliederung, Metamorphose und Tektonik des Hocharngebietes – Rauristal/Salzburg, Univ. Wien 1976) im Rahmen seiner Dissertation bearbeitete und in seiner geologischen Karte des Hocharngebiets dokumentierte. Diese bekannten Kartierungen wurden großteils übernommen, in einigen Abschnitten aber auch ergänzt und auf den aktuellen Stand gebracht. Die Ziele der Nachbearbeitung lauteten wie folgt:

Vorrangig wurde an der Schließung der Kartierungslücken in den vorhandenen Manuskriptkarten gearbeitet.

Die Aufnahme wichtiger Leithorizonte wie beispielsweise der Wustkogel-Formation oder der Seidlwinkl-Formation wurde auch auf den Bereich der Sonnblickkarte ausgedehnt und diente unter anderem der Entschlüsselung der tektonischen Situation im Stirnbereich der Seidlwinkl-Decke.

Neuaufnahmen erfolgten in jenen Bereichen des Ostflügels der Seidlwinkl-Decke, die es nun ermöglichen, die Piffkar-Formation und die Schwarzkopf-Formation exakt von der Brennkogel-Formation zu trennen.

Im Anschluss an die Kartierungen der Jahre 2006 und 2007, die unter anderem die Vorkommen der **Wustkogel-Formation** südlich und westlich des Seidlwinkltales dokumentierten (siehe Pestal, 2008), konkretisierten die Aufnahmen des Jahres 2008 ihre Fortsetzung östlich des Seidlwinkltales ins oberste Gamskarl und über den Felsgrat in die dem Krumltal zugewandte Ostflanke des Gamskarkogels. Im N-Teil seines Gipfelaufbaues (Kote 2588) und in der nördlich folgenden Scharte befinden sich bedeutende Vorkommen weiß-grünlich gesprenkelter, plattiger bis grob gebankter Arkosegneise und Phengitquarzite. Es ist dies der Gesteinsbestand des permischen Anteils der siliziklastischen Metasedimente. Ihr in die Untertrias gestufter Anteil, die weißen bis blassgrünen, feinkörnigen, dünnplattigen Quarzite finden sich lediglich als isolierte Späne in einigen nordöstlich des Gamskarls gelegenen Vorkommen.

In der klassischen Seidlwinkl-Decke bildet die Wustkogel-Formation den Kern einer kilometergroßen Liegendfalte mit prächtig entwickeltem Hangendschenkel und deutlich reduziertem Liegendschenkel. Diese Struktur entwickelt sich nördlich des Mäuskarls von einer Liegendfalte in eine große N- bis NE-vergente Tauchfalte. Diese setzt sich östlich des Seidlwinkltales mit nach NW fallender Achse ins Gamskarl fort. In der östlichen Flanke des Gamskar-