ser Faltenstrukturen fallen mit 30° bis 35° nach WSW bis SW ein. Die Streichrichtung und Steilstellung der Kleinfaltenachsen lässt auf eine Entstehung der Falten durch SE–NW-Einengung und die spätere Verkippung der Achsenflächen durch N–S-Einengung schließen.

Die Überschiebungsfläche ist in Richtung Westen nicht mehr weiter verfolgbar. Vermutlich wird der Versatz an der Störung in den Nordalpinen Raibler Schichten durch Faltung kompensiert.

Östlich der Einmündung des Jagdgrabens in das Hinterautal ist die Überschiebung unter Hangschutt- und Talablagerungen verborgen. Die Ausbisslinie der Überschiebungsfläche verläuft vermutlich unterhalb der Hangschuttkegel der Nordwand des Reps nach Osten in Richtung Rossloch.

Aus dem Kartenbild, den Geländeverschnitten und den oben beschriebenen Kleinfalten lässt sich folgern, dass die Überschiebung vermutlich im Zuge der prä-gosauischen (eoalpinen) SE–NW-Einengung gebildet wurde und durch die paläogene N–S-Einengung überprägt wurde.

Diese Annahme wird auch durch die weitspannige Antiklinalstruktur im Bereich es Gumpenkopfs, im Hangendblock der Überschiebung bzw. des höheren Überschiebungsastes gestützt. An den Schichtlagerungswerten ist neben einer kompressiven Überprägung in N–S-Richtung auch eine etwa NE–SW streichende Faltenachse erkennbar, die vermutlich mit der älteren, prä-gosauischen Einengungsphase zusammenhängt.

Abschiebung südwestlich des Moserkars

Südwestlich des Moserkars werden, wie eingangs erwähnt, dickbankige Riffschuttkalke des Wettersteinkalkes durch Kalke der Reifling-Formation überlagert.

An einer etwa N–S streichenden, subvertikalen Störungsfläche sind Lagunenkalke des Wettersteinkalkes im Westen gegen dickbankige Riffschuttkalke und die stratigrafisch darüber folgende Reifling-Formation im Osten abgeschoben. Der Wettersteinkalk ist im Bereich der Störung an zahlreichen kleineren Störungsflächen zerlegt und bereichsweise kataklastisch deformiert. Der Vertikalversatz an dieser Abschiebung dürfte mindestens 200 m betragen.

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Blatt NL 32-03-30 Mayrhofen

Bericht 2015 über geologische Aufnahmen quartärer Sedimente auf Blatt NL 32-03-30 Mayrhofen

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(Auswärtiger Mitarbeiter)

During 2015 Quaternary sediments and landforms were mapped over an area of 106 km² in the Stillupgrund valley (68 km²) and in an area located in the northeastern corner of the UTM map sheet NL 32-03-30 Mayrhofen (total 38 km²). The Stillupgrund is a 15 km long tributary of the Zillertal valley located south of Mayrhofen. The head of the valley reaches the Zillertaler Hauptkamm mountain crest (Großer Löffler, 3,379 m). The valley is entirely dissected in the Zentral gneiss lithology and shows a typical high Alpine relief comprising straight, deeply incised glacial troughs and hanging tributary cirques. Due to the steep terrain, Quaternary sediments only occur in the valley floor and in the hanging cirques. The valley morphology shows a clear asymmetry. The northeastern side of the valley possess wider and longer cirques in comparison to its southwestern side. The area in the northeastern corner of the map sheet includes the northern and western slopes of the Hochfeld (2,350 m)–Torhelm (2,452 m) massif that extends between Zillertal and Schwarzachgrund valley. In this area, the middle and upper sections of four smaller tributaries of the Gerlosbach valley were mapped: Gerslossteinbach, Schönbergbach, Zaberbach and Weißbachl valleys. The mapping area includes also cirques located NW from the Brandberger Kolm (2,700 m)–Hochsteinflache (2,769 m) crest in the upper section of the Schwarzachgrund valley (Schafkar and Falkenkar) and cirques and slopes in the middle section of the Zillergrund valley located north

and northeast from Häusling (Mitterwandkar, Gamskar and Egglkar). Most of the area in the northeastern corner of the map sheet is built up of metasedimentary, schistose rocks of the Venediger and Glockner nappe systems. Only the crest located south of Brandberger Kolm summit is built up of resistant Zentral gneiss (Ahorn gneiss).

Last Glacial Maximum (LGM)

In the Stillupgrund valley the highest position of glacial erosional landforms indicates the LGM ice surface elevation between 2,200 m at the valley mouth to ca. 2,450 m in the valley head. In the lower section of the valley a flat, ice-moulded area (Filzenalm) can be traced up to ca. 2,200 m close to Filzenkogel summit (2,227 m). In the middle section of the valley the glacial trimline is best recorded as truncated spurs in the topography: 2,270 m in Popbergeggl, 2,310 m in Nofertenschneid and 2,300 m in Zwieselegg. In the valley head, the maximum elevation of ice erosional landforms reaches 2,440 m on two spur ends: Rosswand and the spur standing directly above Elsenklamm cirque. In the valley, there are also several spurs which bear evidence of ice erosion on the top of the spurs ridgeline. Conserning the LGM ice surface reconstruction this type of spurs shows a minimum ice surface elevation in the trunk valley. The best example of this type of landform is the Hennsteigenkamm spur end (2,290 m) located between Nofertenkar and Madereggkar cirques. Ice moulded spur ends also occur at Weißkareggl (2,170 m) and Seichenkopf (ca. 2,140 m).

On the western slope of the Hochfeld massif (2,350 m) the glacial trimline is situated at an elevation range of 2,170–2,200 m. On the ridge stretching from the massif to the east (east from Geiskopf summit) the trimline elevation reaches 2,240 m. The ridge shows a clear sign of glacial erosion on a distance of 700 m (ZASADNI, 2014), thus the top part of Hochfeld summit is an example of a palaeonunatak. This means during the LGM it was surrounded with ice. In the area around Abiskogel (1,700–1,800 m) and Kotahornalm alp (1,650 m) several Ahorn gneiss erratic boulders were mapped. The boulders have an a-axe length in range of 0.4 to 3 m and occur at a similar elevation as the Ahorn gneiss erratic boulder field in Laberg alp (ZASADNI, 2014). A maximum elevation of mapped erratics (ca. 1,800 m) in the western slope of Hochfeld massif is close to the upper limit of continuous till cover. Glacial till comprises only local lithology and in lower elevation it reaches several meters of thickness. This is best evidenced in an artificial outcrop located at the forest road, 600 m west from Kotahornalm alp at an elevation of 1,390 m.

In the Schwarzachgrund valley, a certain evidence of a glacial trimline occurs on the major ridgeline, which borders the valley from the east. A sharp limit between arête-like morphology and an ice smoothed ridgeline is located there 150 m south of Khelkopf summit (2,230 m) at an elevation of 2,240 m. In the upper section of the valley, the trimline can be observed at 2,410 m, 550 m northeast of Auf der Röte summit. In the middle section of the valley, on the top of the flat mountain surface located north of the Schwarzachalm alp (Mitterleger alp, ca. 1,900 m) several Hochstegen marble erratic boulders occur. The boulders were likely transported by the LGM glacier from Brandberger Kolm summit or Schafkar cirque areas where outcrops of this lithology occur on steep rock walls.

Lateglacial moraines and relict rock glaciers

An approach of assignment moraines to the Gschnitz moraine system is based on morphostratigraphic criteria (ZASADNI, 2014). Gschnitz moraines always occur down-valley from Egesen moraines at elevations not higher than 1,800–1,900 m. Gschnitz stadial equivalent moraines occur only in the area located in the northeastern map sheet corner, in all of five north exposed tributaries of the Gerlosbach valley. A distinct laterofrontal moraines stretch between 1,600–1,840 m in the Gerlossteinbach valley in the Gerlossteinalm alp. A well-developed right-handed lateral moraine, 5–10 m high, is also observable in the Schönbergbach valley. Its upper position reaches 1,590 m. Less distinguishable is the left-handed lateral moraine in the Zaberbach valley located 1,400 m north of Seichenkopf summit (ca. 1,700 m). In the Weißbachl valley, a Gschnitz glacier right-handed lateral moraine occurs outside the mapping area, in the lower section of the valley (1,300–1,400 m). This section of the valley is also filled with thick till deposits deeply dissected by the local stream. In the mouth of the Schwarzachgrund valley, at the Opferstock (1,200 m) one of the best developed terminal moraine of the Gschnitz stadial in the Zillertal Alps occurs. The moraine morphology reveals at least two glacial advances with a left-handed smaller, indistinct outer moraine and a several tens of meters high inner moraine. The terminal moraine zone is located outside the mapping area, 700 m north of the UTM Mayrhofen map sheet border.

The Egesen stadial moraines always occur down-valley from the Holocene moraine system. In the Zillertal Alps, the maximum elevation of Egesen moraines ranges from 2,200 to 2,500 m, but mostly they occur close to 2,400 m. In contrast to the Gschnitz moraines, Egesen moraines are often spatially connected with relict rock glaciers.

Egesen moraines and their associated till cover occur in most of the 16 hanging cirques in the Stillupgrund valley, but the best developed moraine sequence can be observed in five right-handed valley side cirques exposed to SW: Popbergkar, Hasenkar, Nofertenkar, Madereggl-kar–Weißkar and Sonntagskar. The cirque floor where the Egesen latero-frontal moraines and the till cover occur, is commonly separated from talus or Holocene moraine sediments by a bare, ice-moulded rock zone, particularly in Nofertenkar, Madereggkar and Sonntagskar cirques. The maximum elevation of lateral moraines is recorded in Hasenkar (2,420 m) and Nofertenkar (2,440 m) and the lowest elevation of moraines occurs between 2,000 m (Madereggkar) and 2,240 m (Nofertenkar). The Egesen moraine sequence is subdivided into one, two or three major moraine groups (Egesen I–III) and up to six individual moraines in total. The best spatial separation of individual moraines occurs in the Madereggkar–Weißkar cirque in vicinity of the Madereggalm alp where six moraines are arranged into three groups (each group has two moraines). The second and third group (Egesen II and III) show much more distinct morphology with heights between 10–20 m than the first group (Egesen I). In the southern part of the cirque (Weißkar), the moraine sequence disappears, and only a terminal moraine with a high distal slope (40 m) occurs. In smaller cirques the Egesen moraine sequence displays only one (Nofertenkar cirque) or two moraine groups (Popbergkar cirque). The distribution of moraines in most of the glacial cirques indicates that during the Egesen ad-

vance glaciers in tributary cirques did not reach the bottom of the main valley. A different situation exists in the area of the Stillupgrund trough end. A lateral moraine and thick till accumulation located on the right-handed side of the glacial trough, 400 m NE of the Stapfenalm alp, at an elevation range of 1,750–1,780 m, indicates a former presence of a ca. 100 m thick glacier in the upper section of the valley. The valley glacier was feed with ice coalescing from the neighboring hanging cirques: Sonntagskar, Eiskar and Löfflerkar. In these cirques Egesen terminal moraines are absent and the distribution of two lateral moraines of Sonntagskar and Eiskar glaciers located north and southwest of Kasseler Hütte (2,080–2,250 and 1,930–2,000 m, respectively) and a lateral moraine in the lip of Löfflerkar cirque (2,030–2,110 m), implies a configuration of a former glacier mass which descended steeply from cirques towards the Stillupgrund trough end. The terminal moraine of the glacier in the main valley floor is not visible. It is likely buried below a thick accumulation of talus and debris flow material covering the glacial trough floor.

Egesen moraines are often built up of large, angular boulders that were passively transported by glaciers. Such deposits are particularly observed in smaller cirques as Popbergkar, Hasenkar and Nofertenkar. In the Stillupgrund valley relict rock glaciers are rare. They are preserved only in the lower section of the valley in smaller and lower elevated cirques, which were less glaciated during Egesen stadial as higher elevated cirques located closer to the valley head. In Popbergkar and Nofertenkar cirques relict talus rock glaciers occur at the base of north exposed rock walls in an elevation range of 1,900–2,300 m. A north exposed relict rock glacier occurs also in Rebenzaunkar cirque, 1,500 m NE of Birbergspitze summit at an elevation range of 2,000–2,080 m.

In the area located in the north-eastern corner of the map sheet Egesen moraines are rarely preserved with exception of several distinct 20–40 m high moraines and associated relict rock glaciers which are located in three cirques above Zillergrund valley, southeast of Brandberger Kolm summit: Mitterwandkar, Gamskarl and Egglkar. In this area Egesen moraines are stretched in elevation between 2,060–2,080 m (elevation of frontal moraines in Mitterwandkar and Egglkar cirques) and 2,440 m (maximum elevation of lateral moraine in Egglkar cirque).

Relict rock glaciers assigned to the Egesen stadial occur also in the top part of the Hochfeld massif. An exceptionally thick accumulation of tongue-shaped rock glaciers occurs on the foot of Gerlossteinwand rock wall, up-valley from the Gerlossteinalm alp. Two talus derived rock glacier tongues descend there to 1,720 m. A frontal slope of the rock glacier located in the eastern side of the valley reaches 80 m high. Three smaller talus rock glaciers are located also in high elevated glacial cirques located north from the Hochfeld summit. Fronts of these rock glaciers occur in an elevation range of 2,070–2,090 m.

Holocene moraines and intact rock glaciers

In the mapped area Holocene/Little Ice Age moraines occur in the hanging cirques in the upper part of the Stillupgrund valley: Maderegglkar–Weißkar, Sonntagskar, Eiskar, Löfflerkar and Lapenkar. Spatial distribution of latero-frontal moraines shows an apron pattern of former glaciers which descended concentrically from cirques towards the end of the glacial trough. After the 1850 advance some of these glaciers almost despaired. This is particularly the case in Maderegglkar–Weißkar and Sonntagskar cirques. However, also one of the largest glacier in the valley – Östliches Stillupkees – records extraordinary vanishing and disintegration into small ice bodies during the recession after the 1850 advance. The area of the glacier decreased from ca. 1.8 to 0.5 km^2 in the last 160 years.

In the Stillupgrund valley 19 forefields of individual glacier lobes can be distinguished: six in the Maderegglkar–Weißkar cirque, three in the Sonntagskar cirque, five in the Eiskar cirque (forefields of Östliches and Westliches Stillupkees glaciers), three in the Löfflerkar cirque (forefield of Löfflerkees glacier) and two in the Lapenkar cirque (forefield of Lapenkees glacier). Terminal moraines are located in an elevation range between 1,920 m at the forefield of Löfflerkees glacier to ca. 2,580–2,600 m at forefields of small glaciers in the Maderegglkar–Weißkar cirque. Slopes of terminal moraines in Eiskar and in Maderegglkar–Weißkar cirques reach more than 100 m of height. In most cases moraines in forefields show a single outer moraine wall interpreted as the Holocene moraine prism that superimposed the Little Ice Age glacier advance in 1850. In few cases however, older than 1850 advance moraines are distinguishable as the outer moraines. They exhibit more degraded morphology, denser vegetation cover and they show crosscutting relationships with fresher and more distinctly developed inner moraines. Older than 1850 advance moraines occur in two forefields in the Maderegglkar–Weißkar cirque, two in the Sonntagskar cirque and in the forefield of Östliches Stillupkees glacier. In the forefields of Löfflerkees and Westliches Stillupkees glaciers recessional moraines formed during 1920 and 1980 re-advances are also preserved.

In the Lapenkar cirque, NE from Lapenscharte col a complex sequence of Holocene glacial/periglacial landforms occurs. A latero-frontal moraine (likely of Holocene age) extends there 250 m down the valley from the rock glacier front. The rock glacier clearly exhibits two front-generations: the lower (older) one at an elevation of 2,340 m is likely inactive and the upper (younger) one at an elevation of 2,400 m is certainly active. A small intact talus rock glacier occurs also in the upper part of the Birbergkar cirque at 2,660 m, 400 m SE of Birbergspitze summit.

In the area located in the north-eastern corner of the map sheet, landforms assigned to the Holocene system occur solely in the upper part of the Schwarzachgrund valley. The Holocene system comprises there only intact rock glaciers. The largest one occurs in the SE part of Falkenkar cirque. It reaches 650 m of length and 120 m of width and descends to 2,310 m. Two active fronts can be distinguished in this landform. In the upper part of Schafkar cirque two small talus rock glaciers occur. Both of them are 130 m long. Their fronts descend to 2,380 and 2,510 m. The last rock glacier in this area occupies a bottom of a narrow and deeply incised cirque located 600 m east of Brandberger Kolm summit. A presence of a spoon shaped depression and ice patches in the upper part of the cirque points out, that this rock glacier was feed by small glacier during the Little Ice Age (debris rock glacier).

Mass movement landforms in the Stillupgrund valley, due to resistant Zentral gneiss lithology, landforms and sediments associated with mass movements are rare. The exception is the northern part of the Popbergkar cirque and slopes descending from the Filzenalm alp toward the south, where more schistose lithology occurs. In the Popbergkar cirque, 750 m long landslide extends down the Sonnwand slope from the Popbergschneid crest, 900 m SW from Ahorn Spitze summit. A tongue-shaped mass of openwork blocks and well-developed scarp with secondary gravitational cracks characterizes another landslide located 500 m west from Filzenkogel summit.

In the area located in the north-eastern corner of the map sheet landslides are more common. A large landslide (1.1 km^2) occurs on the western slope of Hochfeld massif, north from Hollenzberg summit. There the tongue-shaped landslide mass is 2,300 m long and reaches Zillertal valley bottom in Eckartsau village (600 m). The landslide has a prominent main scarp below Hollenzberg summit at an elevation of 1,550 m and close to Labergalm and Karlalm alps at elevations of 1,700–1,720 m. On the same slope another landslide mass extends down the valley between the Karlalm alp towards northwest along an unnamed stream. It records 2,000 m in length and 150–200 m in width. The landslide shows prominent ridges at its margins. The main scarp of the landslide occurs east from the Karlalm alp, at 2,100 m. Another landslide occurs also further towards northeast, in the Kotahornalm alp. It begins at 1,900 m on the western slope of Gerlossteinwand massif with a 20–40 m high main scarp. Morphological features like top trenches, cracks and gravitational faults, typical of deep sated gravitational deformation, occurs also on slopes on the eastern side of the Zaberbach valley (E and NE from the Tödtengrubenalm Hochleger alp) and in the Schwarzachgrund valley, on the top and on the SE slopes of the mountain located north from the Obere Schwarzachalm alp. In the latter location, deep sated gravitational deformation is also associated with two tongue-shape landslide masses that reach the valley bottom in the Obere Schwarzachalm alp and 800 m north from the Untere Schwarzachalm alp.

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Blatt NL 33-01-19 Neukirchen am Großvenediger

Siehe Bericht zu Blatt 121 Neukirchen am Großvenediger von ELIJAH DIPPENAAR

Blatt NL 33-02-01 Kirchdorf an der Krems

Bericht 2015 über geologische Aufnahmen im Gebiet Schillereck (Oberösterreichische Voralpen / Sengsengebirge) auf Blatt NL 33-02-01 Kirchdorf an der Krems

THOMAS HORNUNG

(Auswärtiger Mitarbeiter)

Die geologische Kartierung mit der Arbeitsbezeichnung „Schillereck“ auf UTM-Kartenblatt „NL 33-02-01 Kirchdorf an der Krems“ des Jahres 2015 erfolgte von März bis November 2015. Die Gebietsgrenzen verlaufen von Molln im Norden entlang der Straße nach Ramsau gegen Osten bzw. Süden folgend bis zum Militär-Schießübungsplatz Hopfing im Talschluss unter der Mauer des Sengsengebirges. Von dort in einer geraden Linie nach Westen über das Schillereck und Spering bis zum aufgestauten Klauser See. Die Westgrenzen verlaufen vom Klauser See in den Pertlgraben auf den Sattel zwischen Dorfer Berg und Windberg, nach Effertsbach wieder westwärts bis zur Steyr und von dort flussabwärts bis nach Molln.

Zum Zeitpunkt der Aufnahme standen folgende Karten- und Literaturwerke der GBA zur Verfügung:

- Historische Manuskriptkarte von Österreich 1:75.000 (GEYER & ABEL, 1913).
- Geologische Manuskriptkarte des Gebietes Dorfer Berg – Wallergraben 1:10.000 (EBERT, 2000).
- Geologische Manuskriptkarte des Gebietes Spitzberg – Schwarzkogel 1:10.000 (SUER, 2000).
- Geologische Karte von Oberösterreich 1:200.000 (KRENMAYR et al., 2006).
- Erläuterungen zur Geologischen Karte von Oberösterreich 1:200.000 (RUPP et al., 2011).

Naturräumlicher und geologischer Überblick

Das ca. 55 km^2 große Kartierungsgebiet umfasst den westlichen Bereich des oberösterreichischen Sengsengebirges. Den „Rückgrat“ des Areals und gleichzeitig seine höchsten Erhebungen bildet der Hauptkamm des Sengsengebirges vom Spering (1.605 m) und Schillereck (1.748 m). Die bewaldeten Vorberge dominieren Großer und Kleiner Spitzberg (1.394 bzw. 1.366 m). Nördlich des das Gebietszentrum durchfließenden Paltenbaches erhebt sich der 1.108 m hohe Eibling als höchste Erhebung. Den tiefsten Punkt des Gebietes definiert die Steyr an der Nordgrenze des Untersuchungsraumes knapp westlich von Molln.