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Map of Genetic types and Thickness of Quaternary sediments

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Introduction

The Map of Genetic types and thickness of Quaternary sediments was constructed using the first version entitled “Lithogenetic map and Map of thickness of Quaternary sediments at a scale 1:100 000”, on the basis of available archival documentation, (FRASL 1961, FUCHS 1980, HERMANN 1973, BAÒACK″ 1973, HARÈÁR & PRIECHODSKÁ 1985, JANÁÈEK 1967, PLANDEROVÁ 1977, PRIECHODSKÁ & HARÈÁR 1985, PRISTAπ 1981, PRISTAπ & SCHMIDT 1970, PRISTAπ *et al.* 1992, PRISTAπ *et al.* 1993, ˇTEFANOVIÈOVÁ 1993, VASS *et al.* 1983, VASS *et al.* 1979, VAπKOVSK″ 1977, VAπKOVSK″ 1988, VAπKOVSK″ & HALOUZKA 1975, VAπKOVSK″ & VAπKOVSKÁ 1977, VAπKOVSK″ *et al.* 1982, VAπKOVSK″ *et al.* 1984, VAπKOVSK″ *et al.* 1989) the results of new Quaternary geological research, the interpretation of new, and revision of earlier geophysical measurements.

The principles of map construction and of the explanations were agreed at the joint meetings of the Austrian, Hungarian and Slovak partners, as part of international cooperation.

The final map shows the genetic types and the thickness of the Quaternary sediments. The genetic types are shown in colours while the thickness as isolines with values in metres. In that case when a type of sediment overlies another, the underlying one is shown as a colour band. Mainly are shown in those territories where the aeolian loesses and sands have been deposited over the fluvial and proluvial sediments.

The following genetic types are distinguished on the map:

Fluvial sediments:	alluvium (gravel loam)
	terraces
Aeolian sediments:	loesses
	aeolian (windblown) sands
Paludal/swamp sed.:	organic silts, clays
	peat
Limnic sediments:	clays, silts
Deluvial/slope sediments of irregular composition	
Proluvial sediments:	alluvial cones (fragments, blocks, unsorted)
Anthropogenic:	replenishment
	spoil dumps

Main transitional sediments:

Fluvio-proluvial sediments:
periodically dry valleys
Chemogenic-organogenic sediments:
travertines, freshwater lime stones

On the basis of the genetic types and thickness characteristics of the Quaternary sediments the DANREG territory can be subdivided into geological units as follows [BAÒACK″ *et al.* 1993, BRESTENSKÁ 1977, GAΩA *et al*. 1979, HALOUZKA & MINAØIKOVÁ 1977, HORNIπ 1987, HORNIπ & PRIECHODSKÁ 1979, MINÁØIKOVÁ 1968, VAπKOVSK″ 1977, PÉCSI 1959, PÉCSI 1975, PÉCSI (ed.) 1982]:

Terraces:

1. Austrian side:	Danube terraces
	Leitha Hills.
2. Slovak side:	Malé Karpaty Mountains
	Váh, Hron and Ipel'/Ipoly valleys
3. Hungarian side:	Sopron Hills
	Györ–Tata Terrace Land
	Gerecse–Visegrád–Börzsöny Mts

Basins (Fans):

1. Vienna Basin including the Marchfeld
2. Danube Basin (Kisalföld/Podunajská rovina) including Lake Neusiedl/Fertõ
3. Budapest (Pest Plain — northern part of Nagyalföld/Great Hungarian Plain)

The stratigraphic correlation of the geologically separated basins is a great and difficult problem. During the work we used the traditional names and signs and an agreement has been reached about their ages and sequences. The correlation table of the Danube terraces is presented in Fig. 1.

Genetic types of Quaternary sediments and their thicknesses

Vienna Basin

Aeolian deposits: North of, and in the Leitha Hills, they are true loesses. Further to the south they have been redeposited aquatically (“Schwemmloess”); near Wulkaprodersdorf ostracods have been found.

Deluvial deposits: Mostly loams formed by weathering, more or less in situ; north of Winden there is coarse debris.

Fluvial deposits: North of the Leitha Hills and on the Parndorfer Platte (except for the alluvia of local creeks) there are gravels deposited by the Danube and its main tributaries (March, Leitha).

Zohor–Marchegg Depression

The polycyclic sediments of the Zohor–Marchegg Depression show a different and very complicated setting. The polycyclic development of the depression is characterised by alternation of sandy gravels, aeolian sands, inundation loams and clays. Their thickness gradually increases south-westwards to 85 m and in the Austrian territory it exceeds 100 m. The terrace development took place during the Middle Pleistocene in the valleys of Danube and its tributaries. There are morphologically distinct terraces, composed of 3–4, locally up to 5 platforms. The oldest Middle Pleistocene beds are represented by the luΩianskobrutska terrace of the Hron River, by Devínska Nová Ves terrace of the Morava River and by higher medium terraces of the Váh and Ipefl/Ipoly rivers (Mindel).

Fig. 1 Correlation of the gravely members of terraces and fluvial fans

The terrace accumulations are distinctly weathered and loamy sandy gravels. Apart from the Morava River terrace clayey loams, locally with ferricrete, occur at many places above the formation. A huge loessy complex overlies the formation. The total thickness of fluvial sediments and loess exceeds 20, locally even 30 m.

In morphologically lower position there are two, or according to latest interpretations, three terrace stages of the younger section of Middle Pleistocene (Riss), formed due to the action of the Danube and its tributaries, which either form independent stages, or are doubled. The higher middle terrace has been preserved only sporadically and its relation to the main middle terrace is considerably complicated and by no means reliably explained.

Sopron Hills

Synchronously with the eastern foothills of the Alps the area of Sopron Hills was continuously rising during the Quaternary period. Both the south-western unit made up essentially of crystalline schists and the highland comprising Miocene limestone near Lake Neusiedl/Fertõ were uninterruptedly affected by erosion resulting in the formation of 1–2 m thick deluvial and proluvial deposits on their slopes.

The two units are separated by the alluvium of the Ikva brook consisting of 5 m thick fluvial sediments. The valley is skirted by low terraces. As it opens to the margin of the Little Hungarian Plain (Kisalföld, the Hungarian part of Danube Basin) Middle and Lower Pleistocene alluvial fans become the predominant geological features on the surface. The sudden rise in contour-line density indicates very well the margin of the basin.

Malé Karpaty Mountains

The proluvial sediments, shown on the map of the Danube region, are preserved mainly at the western and eastern piedmonts of Malé Karpaty Mts, where they contact the Krupinská planina Plain and Ipeflská kotlina Depression and at the foothills of the Börzsöny stratovolcano. They are represented by the Pleistocene sediments of alluvial (periglacial) cones. The Holocene proluvial sediments are preserved at places where the uplands contact alluvial plains.

The polycyclic development of proluvial sediment has produced five generations of sediment, which occur as a morphological succession in a form of terrace alluvial cones.

As the oldest we consider the occurrences of proluvial gravels at the uppermost part of the Trnavská pahorkatina Upland, north-east of Modra, as well as sporadic occurrences of these sediments at the western foothills of the Malé Karpaty Mts, east of Záhorská Bystrica. The outwashes are residual gravel and blocks of alluvial cones, composed of thick, semioval quartzite and granitoide pebbles from the Malé Karpaty Mts, exposed at relative altitudes of 30 to 60 m.

In a morphologically lower position there are proluvial Middle Pleistocene (Mindel) sediments in the Ipeflská and Dolnoipeflská kotlina depressions and at the western foothills of the Malé Karpaty Mts.

A 2–4 m thick formation of sandy, locally limonitised, grey to grey–yellow gravel occurs at the base of alluvial cones. Within the Ipefl/Ipoly drainage system it is composed mainly of andesitic, semi- to well rounded and non-rounded material. In the surroundings of Záhorská Bystrica and Stupava the composition of the material is dominated by grey and gray-green sandy gravel with the prevalence of granitoid, quartz, quartzite, limestone and sandstone pebbles. The thickness reaches 6 to 8 m.

At the morphological level of the younger part of the Middle Pleistocene there are preserved proluvial sediments of younger, Middle Pleistocene alluvial cones. These locally form fillings of young, Lamaè–Stupava and Pezinok–Modra depressions. The alluvial cones consist of coarse, semi- to well-rounded pebbles, blocks and sandy gravels. The petrographic composition dominated by granitoids, crystalline schists and limestones. Their thickness decreases from the back-land margin (from mouth) towards the margins of the alluvial cones, from 8 to 12 m.

In a lower position there are Upper Pleistocene alluvial cone sediment, with similar composition as the older alluvial cones.

The Holocene alluvial cones composed of loamy and gravely sediments occupy the lowest position at places, where the alluvial plains, uplands and mountains contact each other.

Deluvial (slope) loamy-stony sediments fringe the slopes, where the uplands contact the mountains, and partially where the terraces contact alluvial plains. Most of them occur at the lower parts of slopes, at the margin of the Malé Karpaty Mts, Krupinská planina Plain and Kováèovské kopce Hills, where they form more or less contiguous piedmont envelopes. They are the weathering products of crystalline, Mesozoic and volcanoclastic rocks, displaced due to run-off, solifluction and gravitational movements. Their thickness varies between 1 and 2 m, at the foothills of more exposed slopes up to 15 m.

The sections comprise loamy, in the surroundings of granitoids sandy material with evenly, or randomly distributed angular fragments and blocks of granitoids, limestones and andesites. These are underlain by coarser, locally blocky, unsorted material.

A major part of the mainly underlying, coarse material was formed during a periglacial period (Late Pleistocene), due to intense mechanical weathering. The overlying parts of the complexes are being formed even recently, in a more humid climate.

Danube Basin

Lake Neusiedl/Fertõ

The reports on the counterflush drillings show no significant parts of finer sediment. In the Seewinkel, this report says that the uppermost part of the sediment is fine sand with only occasional gravel layers. The Seewinkel gravels are traditionally considered to be deposited by the Danube (*e.g.* FRASL 1961); FUCHS (1980) contends they are sediments of the River Raab/Rába. FUCHS (1965) described the fluvial sediments along the Wulka as gravels; he does not mention any finer sediment here. South of Sopron, the areas shown as fluvial on the hills are terrace gravels; the alluvia in the recent valleys are fine clastics.

Limnic deposits: clays, mostly of white to light grey colour border the Lake Neusiedl/Fertõ. Near Winden ostracods have been found. They indicate a Late Pleistocene age. In the Sulzbreiten S of St. Margarethen FUCHS (1965) described paludial sediments, limnic limestone and sandy silts containing a rich fauna of ostracods.

Danube Lowland/Podunajská niΩina

Fluvial sediments play a dominant role in the Quaternary geological setting. However, in their underlier, in the central depression of the Danube Basin, transitional, fluvio-limnic sediments crop out. These deserve a brief characterisation.

Fluvio-limnic sediments overlie in the depression various members of the Upper Neogene structure and coincide roughly with the extent of the Gabèíkovo sands. On the whole, the formation is characterised by a cyclic alternation of variegated sandy-gravely sediments with frequent and typical clayey and loamy, 10 to 350 m thick intercalations.

Fluvial sediments overlie the fluvio-limnic formation of the central (Gabèikovo) depression, while in the remaining part of region they are preserved in morphological succession, in a form of terrace stages. Most of them are overlain by a thick loessy cover.

The oldest member, composed of periglacially disrupted sandy gravel with remnants of vertebrate fauna, is the Strekov Member of the Lower Pleistocene Sterkov-Svodin terrace, preserved in the old Valley of ≥itava (HARÈÁR 1967). A similar development of gravel is preserved in the Ipeflská kotlina (Star˝ vrch) and in the Devínská brána, the Star˝ grunt locality.

The Svodin Member, composed of residual gravel and overlain by a mighty loess development is in central position.

The uppermost, Lower Pleistocene sediments, consisting of sandy gravel, make up the Ludina-Bruty terrace of the Hron River and the Lower Pleistocene terrace of Ipefl /Ipoly River at the Kozí, Studen˝ vrch and at Plie πka, at the relative altitude of 90 m.

The Middle Pleistocene in the region is characterised by extensive, predominantly fluvial sedimentation of the Danube River and its confluences — Morava, Váh, Nitra, ≥itava, Hron, Ipefl and their smaller tributaries. The basinal development of the central and Zohor–Marchegg Depression was continued by a synsedimentary downthrow and by sedimentation of the middle fluvial formation, composed of sandy gravel, which make up in the Danube Lowland region huge, flat, alluvial fans (deltas) of the Danube and Váh rivers. Most of the formation represents the earlier and later stages of Middle Pleistocene, covered by prograding, fluvial, Late Pleistocene and Holocene sedimentation.

The middle formation is composed mainly of coarser gravel, sandy gravel and sand. The intercalations of interglacial, clayey, silty and loamy sediments with interglacial fauna (SCHMIDT 1977) occur scarcely. The total thickness of the formation increases from 10 to 160 and more metres.

In the valleys of the Danube, Morava, Váh, Hron, Ipefl/Ipoly rivers and their greater tributaries lower, middle and main terraces predominate. Between Komárno and ˇtúrovo it is termed as "Búè-MuΩfla terrace", while elsewhere as "middle main terrace". The coarsest gravel material occurs at the base of fluvial terrace accumulation, while the gravels are fining upwards and grade generally into medium to fine-grained muscovitic sand and inundation loam, which locally make up the tops of terraces. In most parts they are covered by a sheet of loess. The thickness of the fluvial gravel is 6–10 m, and the thickness of whole complex —12–18 m.

Within the area of lower Hron and Ipefl/Ipoly there are sporadically preserved fluvial gravels of the bottom Middle Pleistocene terrace.

The Upper Pleistocene fluvial sediments cover most of the Danube Lowland. Composed of fluvial gravel of the lower terrace, bottom accumulation of alluvial plains and fluvial gravels of the ≥itn″ ostrov core, they follow, in a form of narrow strips, the Middle Pleistocene terraces of the Danube, Morava, Váh, Hron and Ipefl/Ipoly rivers.

The Upper Pleistocene development is locally terminated by sandy gravels and medium-grained sands of the older, natural levee of the Danube.

Holocene fluvial sediments are represented by the lithofacially varied, laterally, changing upper formation (flood plain cap) of alluvial plains, underlain by Late Pleistocene gravel, which mostly reflects the hydrodynamic changes in streams. The formation is composed of Danube and Mal″ Dunaj sandy gravels of belts between and along river embankments, sands of point bar segments of Holocene natural levees. Their thickness ranges between 1–3 or more meters.

The bulk of alluvial plains and riverbeds consists of unspecified, loamy, sandy-loamy, clayey flood plain sediments. Their thickness reaches 4–5, locally up to 7 m. A characteristic feature is their complicated structure, which reflects the recent movements and their genesis is related to recurrent inundation waves and change in stream configuration.

At the base there is a formation consisting of dark-grey, grey clayey loam, clay and clayey sand. The clayey loams are at many places overlain by dark-grey to black impermeable horizon of alluvial plain soil, with high content of organic matter. Above of the buried soil there is a lithologically more varied, upper formation of clayey, sand-silty to sandy loam.

The monotony of alluvial plains surface is relieved by dense network of oxbow lakes of various maturity stages. The oxbow lakes are filled by nekron mud and by highly humic sandy and clayey sediments, locally with abundant, incompletely decomposed organic matter.

ORGANOGENIC SEDIMENTS

The organogenic sediments shown in the map of the region are represented by moors. There are transitional types of lowland peat moors, which did not surpass the Sphagnum moss of the highmoor bog development stage and in which the typical bog-like development has been maintained until present.

In the Podunajská níΩina Lowland and partly also in the Ipeflská kotlina Depression they develop on the impermeable loamy and clayey alluvial plain sediments of the young depression and in abandoned oxbow lakes. Larger ones occur in the young foothill depression, where the Malé Karpaty Mts and Podunajská rovina contact and where they are preserved among proluvial sediments of alluvial cones, or at their ends. Most of these places are waterlogged areas due to the passage of running waters (the so called "πúr").

Of the important lowland peat bogs in the region, worth of mention are the Jursk″ and the Modransk″ πúr, an extensive flow bog between Senec and Pusté Úflany and another one near the Hajské village. Shallower peat bogs are sporadically preserved in the Nitra River valley and in the Ipeflská kotlina Depression. Of the smaller bogs, developed within the oxbow lakes of the Danube and the Little Danube, worth to mention are the Ohrady, Kamenèiná, Kava, and a round of other moors. Most of peats bogs are very shallow. Their thickness does not exceed 2–2.5 m; greater thicknesses were observed only in old oxbow lakes.

The sedimentation in a number of peat bogs started during the pre-Boreal stage, and in most of them during the Atlantic one. The moors are sporadically underlain by clayey sapropelic sediments, which were paid little attention to date.

Immediately above the clays there is a medium-disintegrated peat, which grades towards the surface into a less disintegrated to fresh peat. The colour of peat is dark-brown to black. The bogs are prevailingly of sedge-reed type with distinct proportion of Hypnum and Sphagnum moss, meadow grasses, bushy plants, characterised by imperfectly decayed vegetal matter.

According to (KRIPPEL 1965) the pollen spectra of bogs are dominated by pollens of recent plants, especially of alder, hazel, beech, poplar, oak and coniferous trees.

Older peats were also found in fluvial sediments of the Middle and Upper Pleistocene. The best-known peat occurrences were found in the foundation trench for the Gabèíkovo hydroelectric power plant.

Aeolian sediments —loesses— are, together with fluvial sediments, the most widespread sediment types in the Danube region. They contiguously cover the regions of Trnavská, Nitrianska, ≥itavská, Pohronská and partially of Ipeflská pahorkatina Upland. The Pleistocene terraces of Danube, Váh, Nitra, ≥itava, Hron and Ipefl/Ipoly, considerably mask the original relief. In contrast, they are almost totally missing in the Záhorská níΩina Lowland. They loessy covers represent complicated complexes with alternating beds of typical loess, loessy sediments and fossil soils. The character of loess changes as well in horizontal, as in vertical direction. They lie subhorizontally to horizontally over smoothly rolling and flat reliefs of uplands and river terraces. More complicated complexes developed on titled banks and river valleys.

The same way, as the structure of loessy complexes changes, so does also the thickness of the cover. In average, it ranges between 5–15 m and 30, at most 40 m (in the surroundings of Svodín).

Within the Váh, Nitra, ≥itava river interfluves are also young, Holocene, moor loesses.

Aeolian sands are the second characteristic type of aeolian Quaternary sediments. Their occurrences are bound to lower-lying grounds of the Danube and Záhorská níΩina lowlands and of the Ipeflská kotlina Depression, where they occur along the major streams. Towards the terraces and uplands the extent of aeolian sands decreases to disappear completely. In most cases the aeolian sands in lowlands overlie the fluvial sediments, alluvial plain bottom accumulations, low terraces and occur only partly on medium terraces and on upland slopes.

The morphology of the aeolian sands is very complicated. The predominating forms are elongated, bow-shaped, arcuate dunes, locally NW–SE and W–E oriented, assigned to several separate belts. The thickness of aeolian sands varies being the smallest in the sands of natural levees. The greatest thickness — 25 m — was observed in the surroundings of Marcelová (Baπov kopec).

As far as the grain size is concerned, the aeolian sands are very fine-grained, dominated by the 0.5–0.25 mm fraction. Coarser grains and fine gravels, but also silt particles, may be locally present.

The aeolian sands are pale-brown to brown-yellow and yellow in colours, often whitened and locally bedded. The bedding is often accentuated by the grain size and by iron component. Most of them are porous and unconsolidated.

A major part of aeolian sands was accumulated during the latest glacial — Würm, however, they were wind-blown also during the Holocene and even recently.

Deluvial sediments

Deluvial, loamy-sandy sediments are known in the area of Neogene sands. Here belong various derivatives of loess and underlying Neogene sands, after being shortly resedimented. Represented by decarbonatised loamy sands, without distinct horizons of fossil soils, they occur on slopes and locally as dellen fillings. Their thickness is 3 to 4 m.

Deluvial loessy loams form a discontinuous and very irregular cover. They cover the slopes and foothills of the Pohronská and Ipeflská pahorkatina Upland and of the upland in the Ipeflská kotlina Depression. They are composed of pale–yellow and yellow–brown decarbonatised loams, in which, apart from a resedimented intercalation, often occur loess and redeposited sediments of the Neogene substratum.

Anthropogenic sediments

As regards their origin and composition, the youngest anthropogenic sediments in the Danube region are heterogeneous. Most of them are related to the construction of flood banks. The greatest displacements and concentrations of soils in the region were made in connection with the construction of Gabèíkovo hydroelectric power plant.

Kisalföld (incl. Gyõr Basin)

During the Quaternary the Gyõr Basin was an intermittently subsiding area filled with the alluvial fan of Danube River (Franyó 1967, Rónai 1986). It is made up mainly of fluvial sand and gravel. In its southern part, in Hanság and the Rába–Marcal Valley paludal deposits, peat occur. Aeolian sand can sporadically be observed covering the fluvial strata as thin blankets. Large anthropogenic replenishment can be found in the surroundings of Gyõr.

Different parts of the basin had different rates of subsidence. The basement of Quaternary sediments drops comparatively steadily eastwards from Leitha Hills and north-westwards from Rába River. It attains its maximum depth in Szigetköz. The thickness of Quaternary sediments attains 414 m and 356 m in the boreholes Lipót and Halászi, respectively [Scharek (ed.) 1991, 1991a]. According to geophysical measurements it can exceed 700 m in the central part of the Szigetköz area. Considerably thick Quaternary sediments can be observed southwards from the Szigetköz, in the Rábaköz area and around the town of Csorna as well, featuring values of 250 m and 350 m in some deep hydrogeological exploratory boreholes.

Gyõr–Tata Terrace Land

During the Quaternary the Gyõr–Tata Terrace Land belonged only temporarily to subsiding areas. It was part of the Danube's alluvial fan till the Middle Pleistocene but following the Mindel glacial it became separated from the steadily sinking regions and terraces formed on its northern margin (Kaiser *et al.* 1998). South of the Danube's terrace hills streams coming from the Bakony Mountains (Bakony-ér, Concó, Által-ér) as well as Early Pleistocene torrents gave rise to a number of fluvial-proluvial fans. Aeolian processes played a significant role in the Pleistocene resulting in the formation of loess, sandy loess, fluvio-aeolian sand and aeolian sand covering the main part of the area. Widespread deluvial sediments accumulated at the foot of slopes in areas dissected by valleys.

The Quaternary deposits form a thin but contiguous cover on the surface except for the southern part of the area where they are interrupted by smaller and larger patches of pre-Quaternary outcrops.

The average thickness of Quaternary sediments ranges from 5 to 15 m. The thicker accumulations are along the Danube, as well as in some N–S striking, comparatively thin zones corresponding to present or one-time abandoned channels of streams coming from the Bakony Mountains.

Gerecse–Visegrád–Börzsöny Mountains

The surface of the Transdanubian Range was intermittently uplifted during the Quaternary period. Sedimentation took place first of all in small intramountain basins, at the foot of slopes and in valleys. At the same time, Quaternary formations are missing on uplifted blocks of higher position with often steep margins.

Fluvial sediments were deposited on terraces and flood-plain surfaces along the Danube and Ipel'/Ipoly rivers, as well as along smaller streams. The main part of the area is covered by loess, sandy loess and slope deposits constituting a thin, discontinuous blanket. Aeolian sand and freshwater limestone are of smaller extent. In the volcanic hills and mountains Quaternary formations are represented by alluvial sediments of streams, deluvial deposits skirting the foot of slopes, as well as loess covering small basins in the southern part of the Börzsöny Mountains.

The thickness of Quaternary sediments amounts to some metres. In general it does not exceed 5 m in basins either. Thicker series can be observed only locally, but their extent is too small to be represented to scale. Some occurrences of freshwater limestone are as thick as 10–20 m, in the vicinity of the villages Dunaalmás and Süttõ even 30–50 m. The thickness of loess amounts to 4–5 m inside the mountains, 5–10 m in some places along the mountain margins. At the same time, the thickness of in-channel and flood-plain deposits of the Danube and Ipel'/Ipoly rivers ranges between 10–15 and 5–10 m, respectively, whereas that of the small streams remains with a few exceptions under 5 m. Proluvial-deluvial deposits in dry valleys are in general 2–4 m thick.

Great Hungarian Plain

Pest Plain

The part of Pest Plain falling on the map sheet was a slightly uplifting area during the Quaternary (Pécsi 1959, Rónai 1986). It was not directly involved in the subsidence of the Great Hungarian Plain, its relative rise in comparison to the Transdanubian Range was, however, insignificant. The combined effect of uplifting and fluvial erosion brought about a step-like terrace system in the eastern part of the area (Pécsi 1957). On its western margin freshwater limestones, due to the action of thermal water rising along active faults, indicate the position of the one-time ground surface.

The area is covered mainly by flood plain and terrace sediments of the Danube, as well as by peat, aeolian sand and stream deposits. Their thickness increases progressively westwards from some to 10–15 m.

As a result of river regulation starting in the Middle Ages and completed at the beginning of the 20th century, as well as of embankment construction, the one-time sophisticated network of in-channel fill deposited by the Danube of lower course character is buried under replenishment occasionally as thick as 15 m in the districts of Budapest situated next to the river.

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