

G8081 Sedimentology (field work)

Description of clastic sediments

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Practical lesson outline

Sedimentary profile analysis (profile will be specified)

- 1) Deposits description: (textures, structures, layer thickness, mineralogy...).
- 2) Personal field notes preparations
- 3) Final work has to be finished in Corel, or other relevant application
- 4) Profile interpretation.
- 5) Final has to be sent via email.

Clastic deposits research step by step

1) Localisation (GPS, map), photo documentation

2) Distinction of sediments (pelites, aleurites, psamites a psefites).

3) Shape and description of each sedimentary layer bases (narrow base, through, transtions changes, vertical changes between each layers, lateral stables or through, thickness).

Later, procedure differ in coarse grained and fine grained deposits.

Psaamite, aleurite and pelite deposit body

1. Shape of each sets buil whole body (horizontal base, through base etd.), sets thickness. Term sers means each body which include inner bedding. Whole sedimentary bedding may be built by one ore more sets.

2. Type of bedding, thickness of beds or lamines in every sets

Psefitic body

1) Prevailing fraction (granules, pebbles, cobbles, boulders).

2) Sorting

3) Bedding type (if presented)

4) Measuring of few biggest clasts

5) Clast supported structures or matrix supported structures.

6) Gravel clasts orientation in sediments

7) Roudnes of clastics material

8) Petrografy of deposition materials

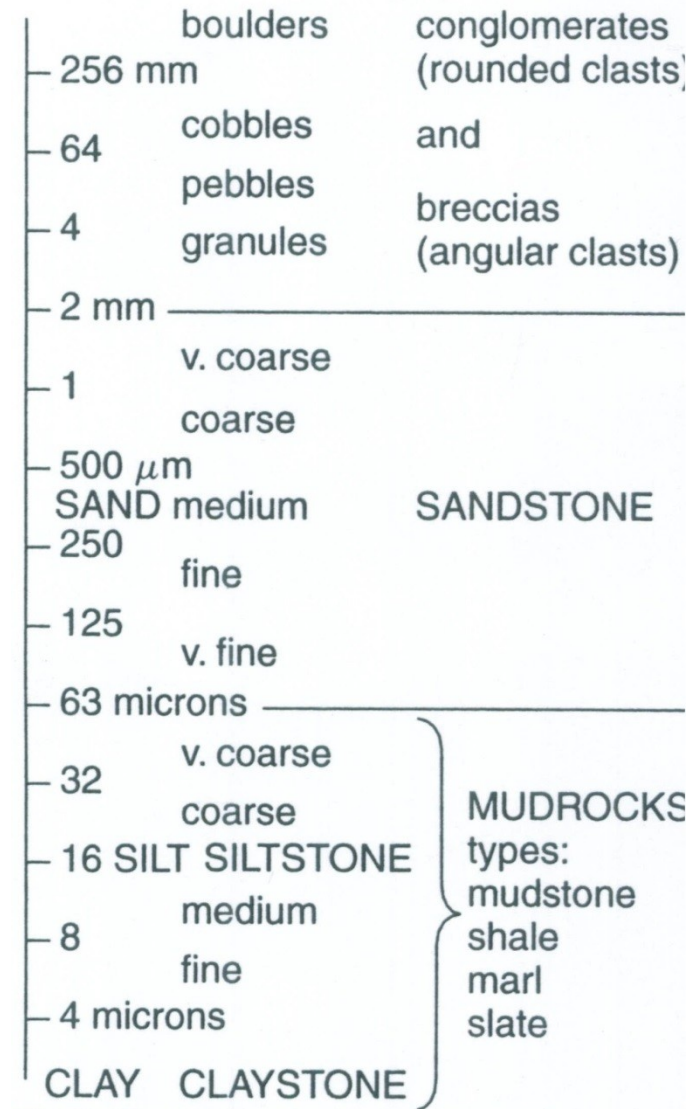
Roudnes – portion of each cathegory in %. On outcroop is neccesary mark sqare (0,5-1m) in which marking of all visible clasts is neccesry. Results are finalised in bar chart

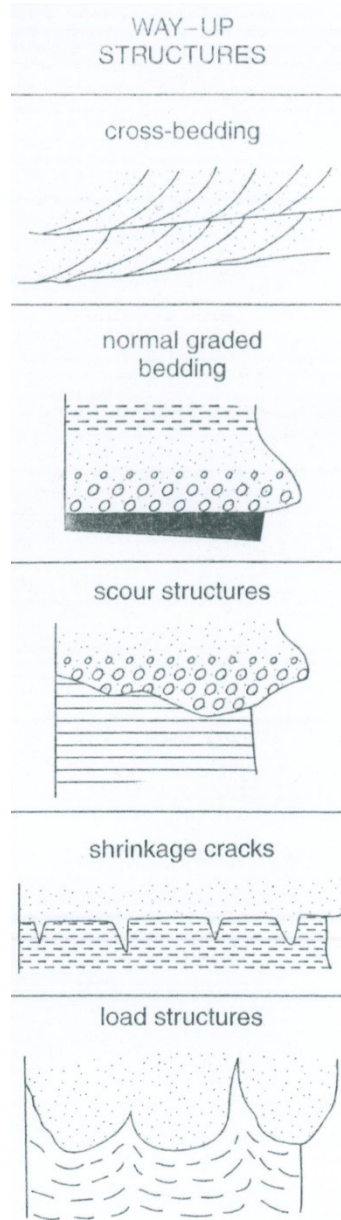
Petrography – in the some square determine of clasts. Results are presented in pie chart.

Never také out clasts from conglomerates. Work just on those, which are visible.

Use meter as a scale if taking picture. Picture withnout cant be used.

Classification of clastics sediments



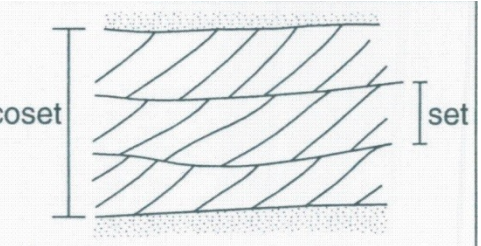
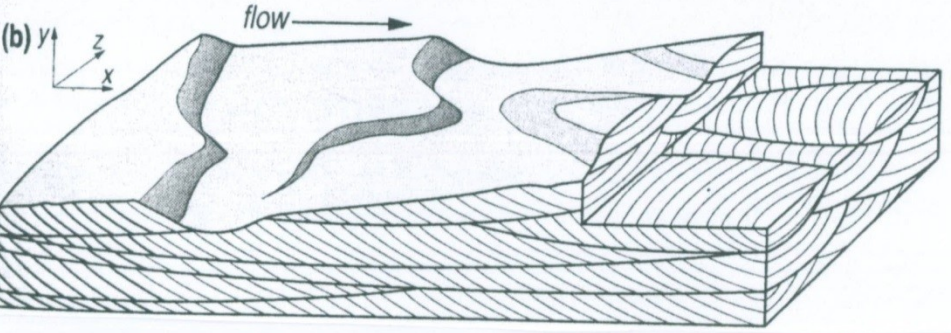
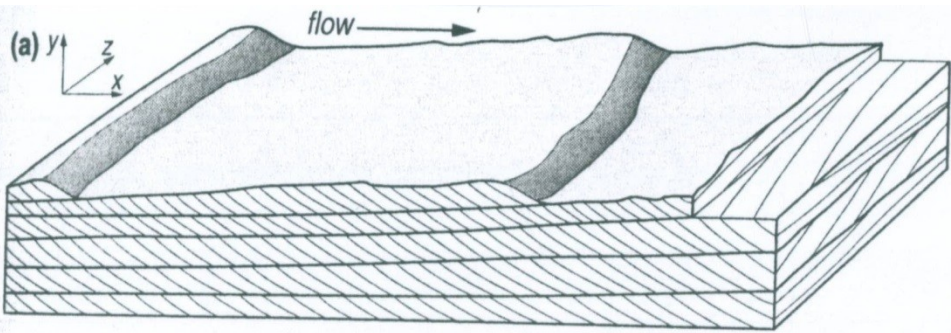


Character of bases:
flat bases
through bases (scour structures)

Shape of sedimentary units:
laterally large extend units,
laterally terminate units,
thickness of units.

a) Planar cross bedding (lamination) – straight and flat or slightly inclined bases of sets. Bedding (lamination) is inclined below high angle for bases.

b) Trough cross bedding (lamination) – Trough cut-off bases and conformably curved bedding (lamination)



Cross bedding deltaic foresets
- large thickness – large thickness.



Horizontal bedding (lamination)
Occurs on aleurite, psamite and psephite.



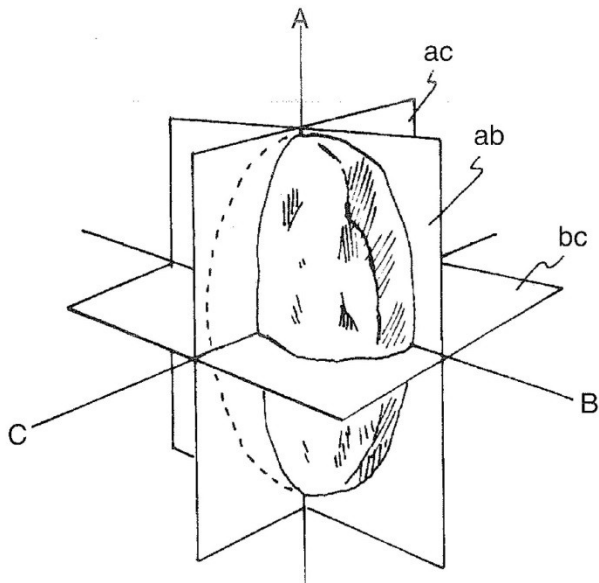
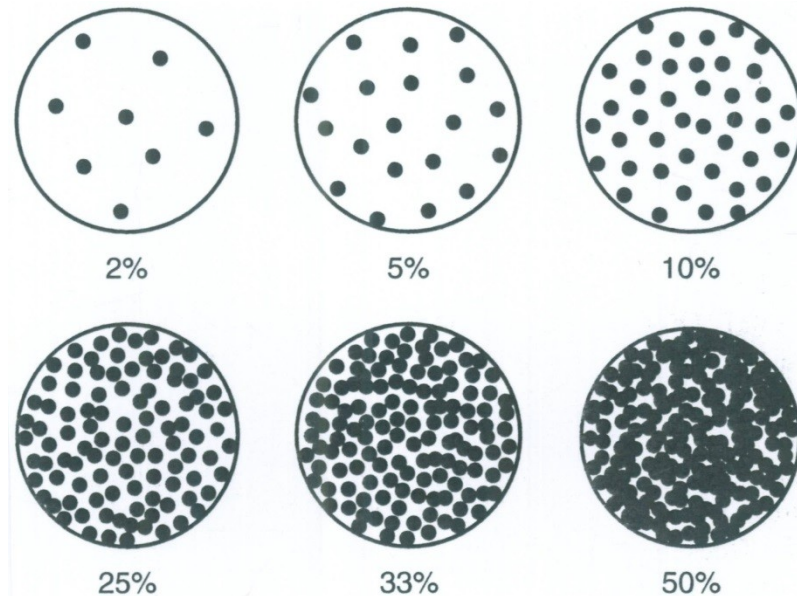
Psefites granulometry

Granules: 2-4 mm

Pebbles: 4-64 mm

Cobbles: 64-256 mm

Boulders: nad 256 mm



Axis of clasts

A-axis – longest

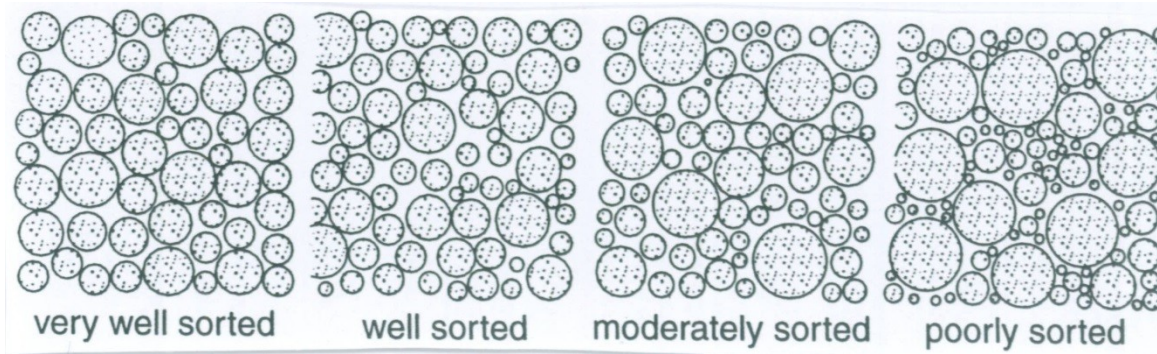
B-axis – middle

C-axis - briefest

Macroscopic estimation of volume particals in dektop (may be used for assesment of share most coarse clastics in sediments)

We have measure larges clasts or a lot of other larges clasts as well as average and most common size.

Sorting



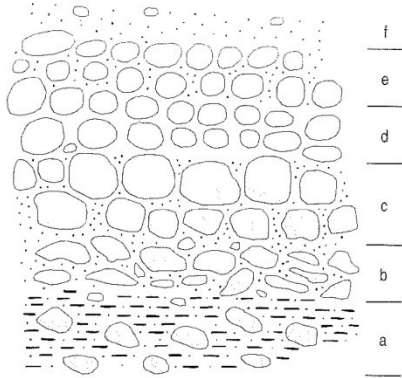
Sorted conglomerate



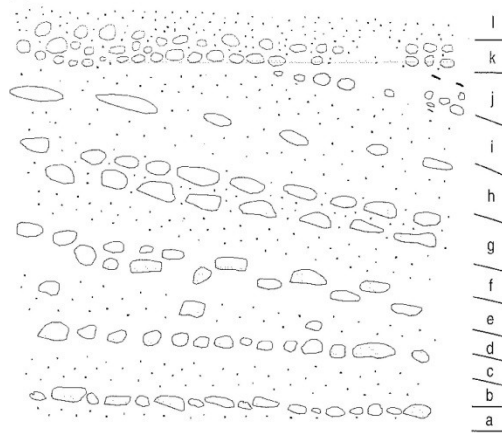
Unsorted conglomerate

Bedding of psephite

(a) Horizontal stratification



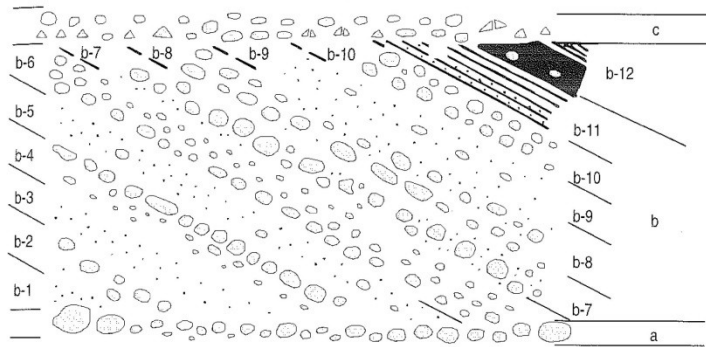
(b) Horizontal and inclined stratification



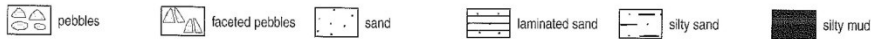
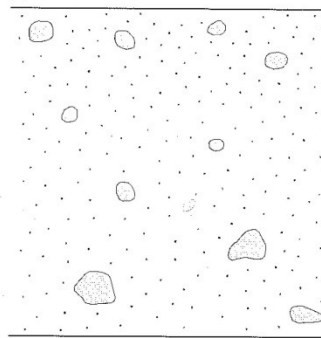
- a) Horizontal bedding
- b) Inclined bedding
- c) Planar cross bedding and trough cross bedding
- d) Massive structure (unstratification)

Difference between inclined and cross bedding is measured on bow of layers. Inclined bedding is under 34° . This is valid for all clastics sediments.

(c) Horizontal and cross stratified beds near the angle of rest



(d) Unstratified unit

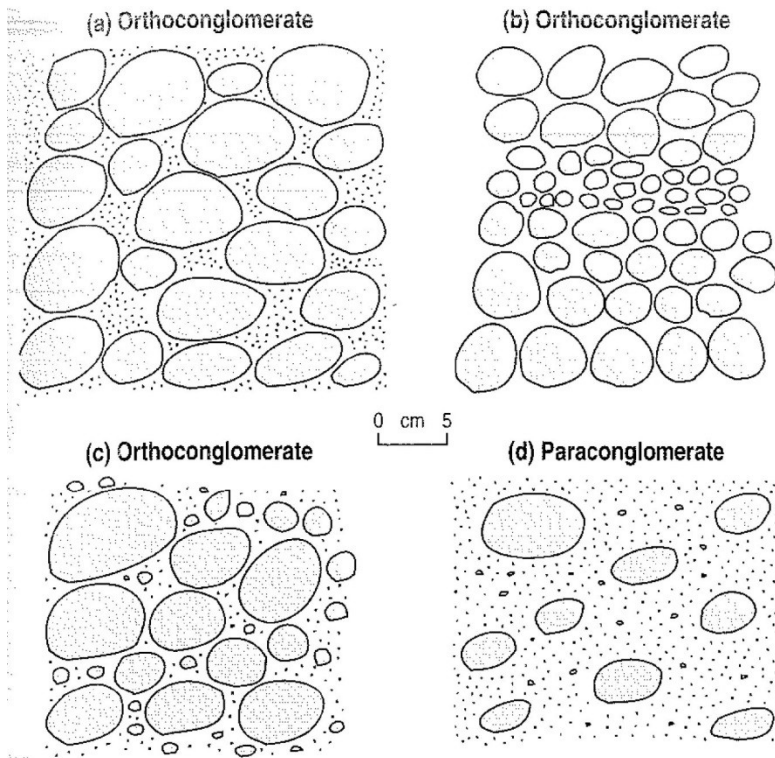




Inclined bedding

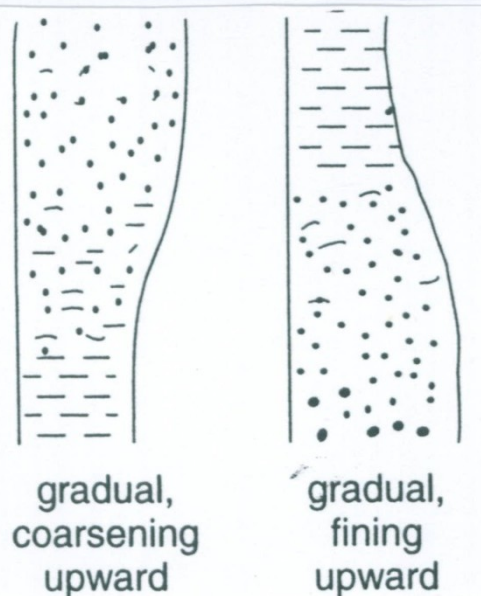


Masive structure, on uppermost part of section is horizontal bedding.



Clast supported structure (a, b, c)
Gravelly clasts on contact each other.

Matrix supported structure (d)
Gravelly clasts not contact each other, individual clasts are among by finegrained matrix.

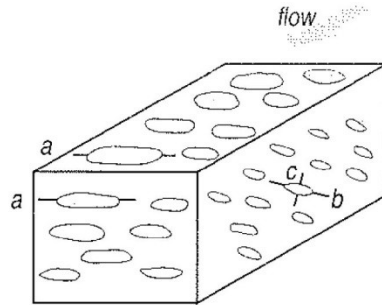
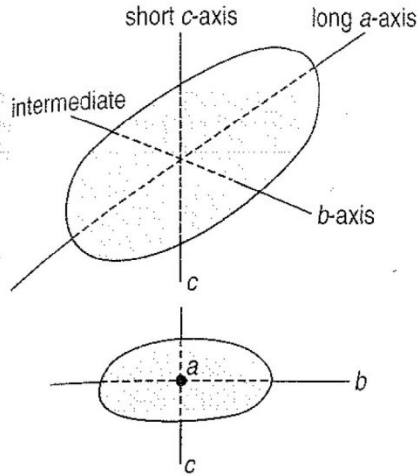


Inverze grading
Sediment coarsening from base to top.

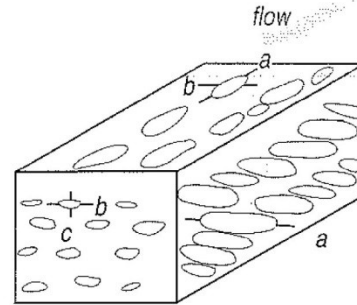
Normal grading
Sediment fining from base to top.

Clasts fabric

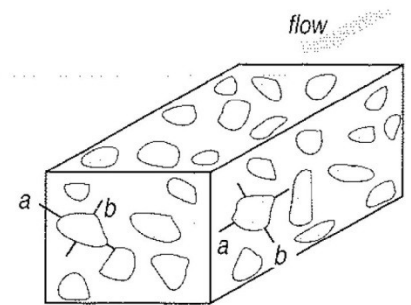
(a) Axial nomenclature of clasts and fabrics



Ordered fabric *a* (transverse),
b (imbricate)



Ordered fabric *a* (parallel),
a (imbricate)



Unordered fabric

Clasts fabrics: orientation according face, defined by a-axis and b-axis.
Horizontal or inclined orientation parallel with flow.
Imbrication – oriented against flow.

Large clasts are flat bedded and oriented parallel with flow.

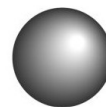


Clast supported and matrix supported.
Both types of structures alternate within psephites.

Roudness

high sphericity							6
low sphericity							
	0	1	2	3	4	5	6
	very angular	angular	subangular	subrounded	rounded	well-rounded	

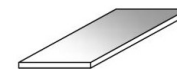
Shape



sphere
 $S = I = L$



rod
 $S = I < L$



blade
 $S < I < L$



disc
 $S < I = L$

Isometric (sphere or cubic)

A-axis = B-axis = C-axis

Rod

A-axis is dominant, B and C-axis are distinctively shorter.

Blade

A-axis is dominant, B-axis any shorter, C-axis is clear briefest.

Diskovity

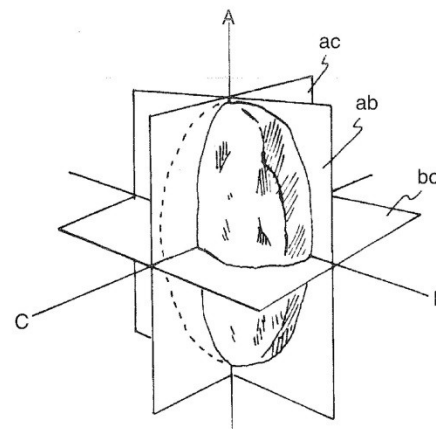
A-axis = B-axis, c-axis clear briefest.



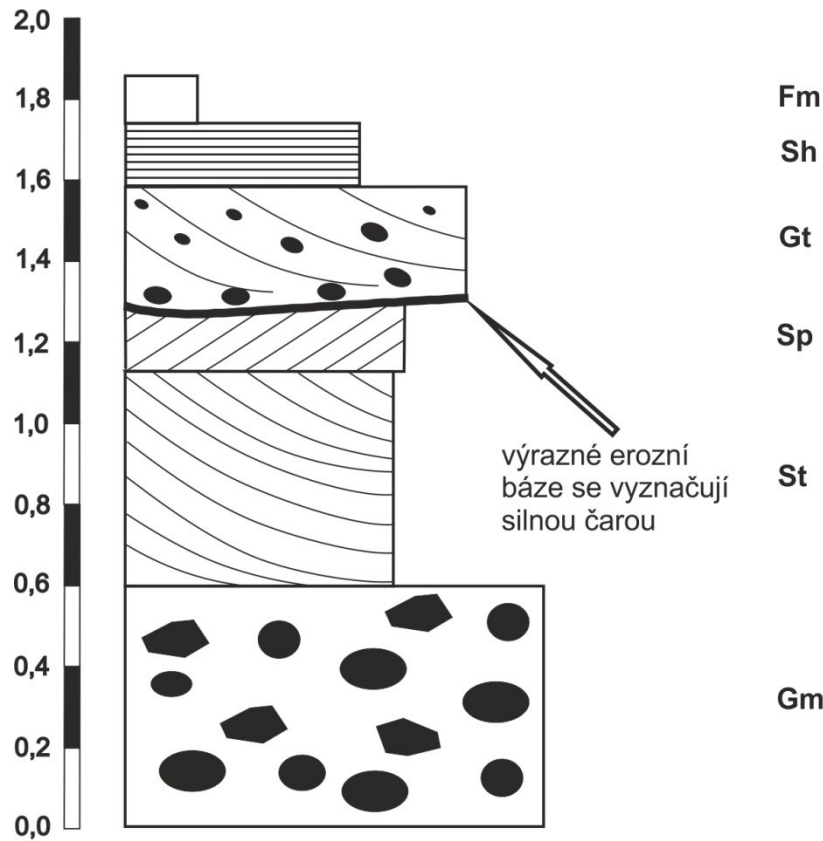
Subrounded clasts



Angular and very angular clasts.



Profile drawing



Main bodies can be marked by number, however it is not necessary.
 Lithofacies can be marked by codes. Please use types, which are in picture.
 Facies – sediments which can be characterised by specific sign what is different from deposits in overlies and underlies
 Lithofacies – lithological character signes, in our case layering

člen	C	Si	S	Gg	Gp	Gc	B	litofacie	popis
					G				

vodorovná škála:

C - Clay
 Si - Silt
 S - Sand
 Gg - Gravel-granules
 Gp - Gravel-pebbles
 Gc - Gravel, cobbles
 B - boulders
 kolonky C, Si lze shrnout do jedné F - fines

litofaciální kódy:

Gm - Gravel, massive - masivní štěrk (slepenec)
 Gt - Gravel, trough cross-bedded - korytovitě zvrstvené štěrky (slepence)
 St - Sand, trough cross-bedded - korytovitě zvrstvené písky (pískovce)
 Sp - Sand planar cross-bedded - šikmo planárně zvrstvené písky (pískovce)
 Sh - Sand, horizontally bedded - horizontálně zvrstvené písky (pískovce)
 Fm - Fines (silt, clay), massive - masivní jíl-silt.

Použitá literatura

- Collinson J., Mountney N., Thompson D. (2006): Sedimentary structures. – 292 pp., Terra Publishing, 3. vydání.
- Evans D., J. A., Benn D. J. I. (2004): A Practical Guide to the Study of Glacial Sediments. – 266 pp., Arnold.
- Tucker M. (2003): Sedimentary rocks in the field – John Wiley, 3. vydání