GEOS 315 Sedimentology/Stratigraphy
Fall 2011

Laboratory 2
Sedimentary Textures – Sieve Analysis

The textures of sedimentary rocks are used to interpret the processes that went into creating the rock, specifically – aspects concerning the source, the type and duration of transport, and the physical conditions that existed in the depositional environment. One of the reasons that we can make textural interpretations is because of the study of sediments in modern depositional environments. This type of analysis of loose sediment typically involves a grain size study using a stack of U.S. standard sieves. For this lab you will study and describe a sample of sand, run in trough a stack of sieves, graph and perform descriptive statistics on your results, and then interpret your results.

Procedure:

1. Examine and describe your sand sample noting the components and the texture (grain size, sorting, roundness, etc.)
2. Clean the sieves…..bang them gently on the table or floor, and use the brush **DO NOT TOUCH THE !$#*ing screens with your fingers!!**
3. Weigh your sample (to the 0.1 g) and record this in the data table.
4. Nest the sieves with the largest on top and the finest and the pan on the bottom (lid, 10, 18, 35, 60, 120, 230, pan).
5. Put your sample in the top, and then put the stack in the shaker for ten minutes.
6. Take the sieve stack out of the shaker and place it on the table
7. Take a piece of notebook paper and fold a crease down the middle and carefully dump the contents of the sieve on the paper, and then transfer it to a container.
8. Weigh the contents of each sieve and record it in the data table.
9. Clean the sieves and return the sample to its original container.

What to do with the data:

1. Calculate the weight percent of each size fraction and record it in the data table (copy the data table to a spreadsheet in excel). Also calculate and record the cumulative weight percent of the coarsest to the finest material.
2. Copy the data table to a spreadsheet in excel, construct a frequency curve and a cumulative arithmetic curve for your sand data. Percent should be on the y-axis and Phi size should be on the x-axis, with at least 10 subdivisions between each Phi size.
3. Calculate the descriptive statistics (see figure 1) and record it on the data table, then interpret what these tell you.
4. Compare your results to a group that was analyzing sand from a different environment? **What were the major differences in the data, and why were the results different?**

Sample Location and Environment_____
Sample Description:

Screen size (Phi)	Weight of Sand with container (grams)	Weight of container (grams)	Weight of sand (grams)	Cumulative weight of sand (grams)	Weight percent of sand	Cumulative weight percent of sand
-1						
0						
1						
2						
3						
4						
5						

Initial Weight of sample_____
Total Cumulative weight _____
Loss_____

Descriptive Statistics: (show calculations and give number and name)

Mode:_____

Median:_____

Mean:_____

Standard Deviation (sorting):_____

Skewness:_____

Graphic mean	$M_Z = \frac{\phi_{16} + \phi_{50} + \phi_{84}}{3}$	(1)
Inclusive graphic standard deviation	$\sigma_i = \frac{\phi_{84} - \phi_{16}}{4} + \frac{\phi_{95} - \phi_5}{6.6}$	(2)
Inclusive graphic skewness	$SK_i = \frac{(\phi_{84} + \phi_{16} - 2\phi_{50})}{2(\phi_{84} - \phi_{16})} + \frac{(\phi_{95} + \phi_5 - 2\phi_{50})}{2(\phi_{95} - \phi_5)}$	(3)
Graphic kurtosis	$K_G = \frac{(\phi_{95} - \phi_5)}{2.44(\phi_{75} - \phi_{25})}$	(4)

Source: Folk, R. L., and W. C. Ward, 1957, Brazos River bar: A study in the significance of grain-size parameters;

Figure 1. Equations to calculate descriptive statistics of grain sizes (from Folk and Ward, 1957)

	U.S. Standard sieve mesh	Millimeters		Phi (ϕ) units	Wentworth size class
GRAVEL		4096		−12	
		1024		−10	Boulder
		256	256	−8	
		64	64	−6	Cobble
		16		−4	Pebble
	5	4	4	−2	
	6	3.36		−1.75	
	7	2.83		−1.5	Granule
	8	2.38		−1.25	
	10	2.00	2	−1.0	
SAND	12	1.68		−0.75	
	14	1.41		−0.5	Very coarse sand
	16	1.19		−0.25	
	18	1.00	1	0.0	
	20	0.84		0.25	
	25	0.71		0.5	Coarse sand
	30	0.59		0.75	
	35	0.50	½	1.0	
	40	0.42		1.25	
	45	0.35		1.5	Medium sand
	50	0.30		1.75	
	60	0.25	¼	2.0	
	70	0.210		2.25	
	80	0.177		2.5	Fine sand
	100	0.149		2.75	
	120	0.125	⅛	3.0	
	140	0.105		3.25	
	170	0.088		3.5	Very fine sand
	200	0.074		3.75	
	230	0.0625	1/16	4.0	
MUD — SILT	270	0.053		4.25	
	325	0.044		4.5	Coarse silt
		0.037		4.75	
		0.031	1/32	5.0	
		0.0156	1/64	6.0	Medium silt
		0.0078	1/128	7.0	Fine silt
		0.0039	1/256	8.0	Very fine silt
MUD — CLAY		0.0020		9.0	
		0.00098		10.0	Clay
		0.00049		11.0	
		0.00024		12.0	
		0.00012		13.0	
		0.00006		14.0	