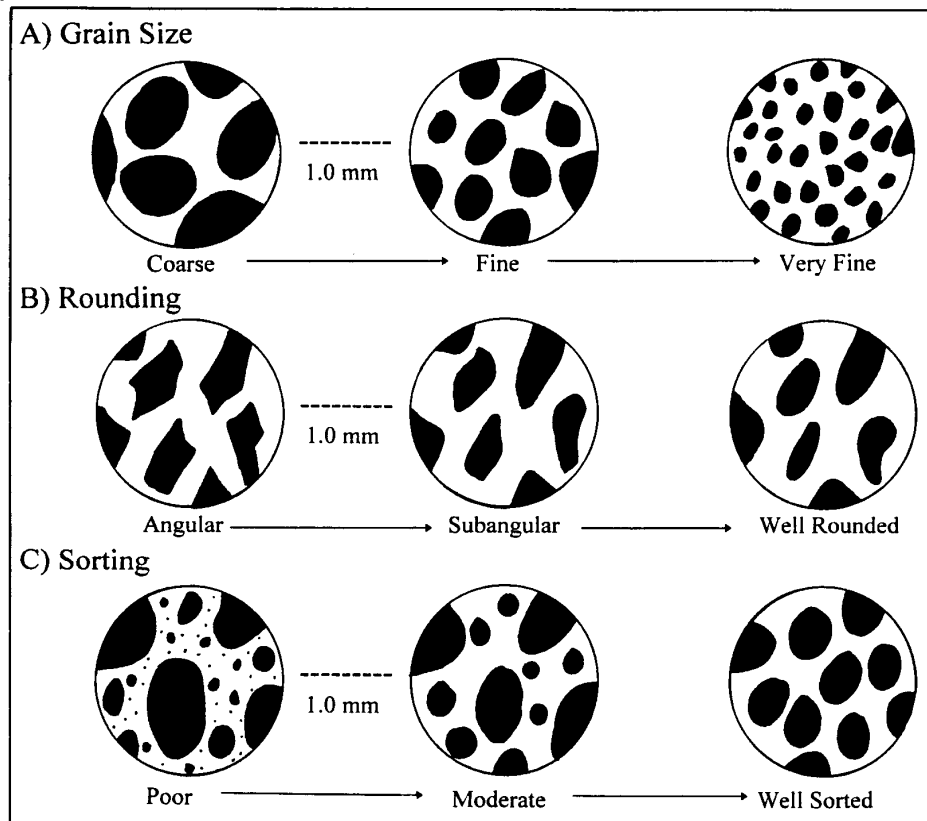


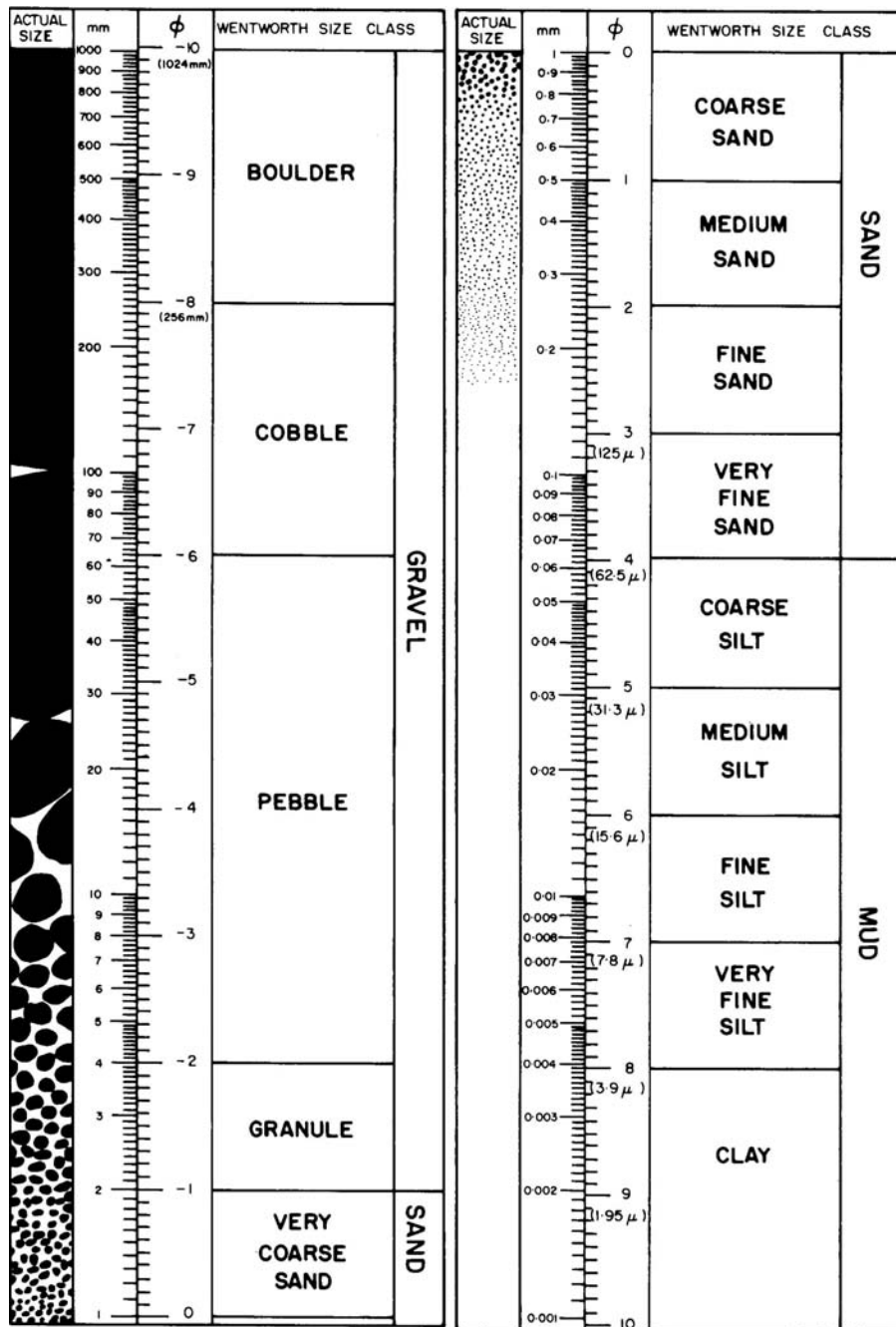
GY 402 Sedimentary Petrology
Lecture 2: Summary of Important Grain size Parameters

Grain Size (mm)	Sediment Name		Rock Name	
Coarse ↑ ↓ Fine	-- 64 --	boulders	GRAVEL	CONGLOMERATE (rounded clasts) or BRECCIA (angular clasts)
	-- 16 --	cobbles		
	-- 2.00 --	pebbles		
	-- 1.00 --	v. coarse sand	SAND	SANDSTONE
	-- 0.50 --	coarse sand		
	-- 0.25 --	medium sand		
	-- 0.125 --	fine sand		
	-- 0.063 --	very fine sand	MUD	SILTSTONE
	-- 0.004 --	silt		CLAYSTONE
	-- 0.004 --	clay		MUD-STONE

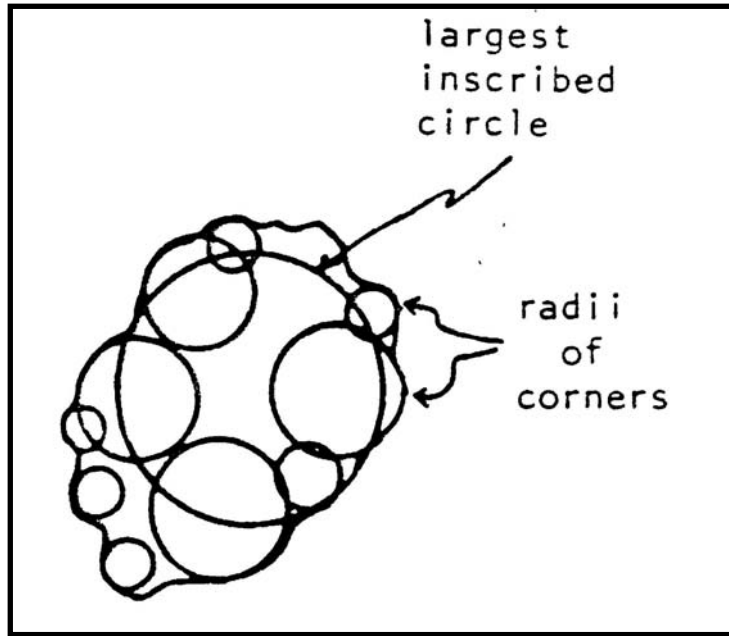
Simplified classification of grain size in sedimentary rocks (Haywick, 1999)



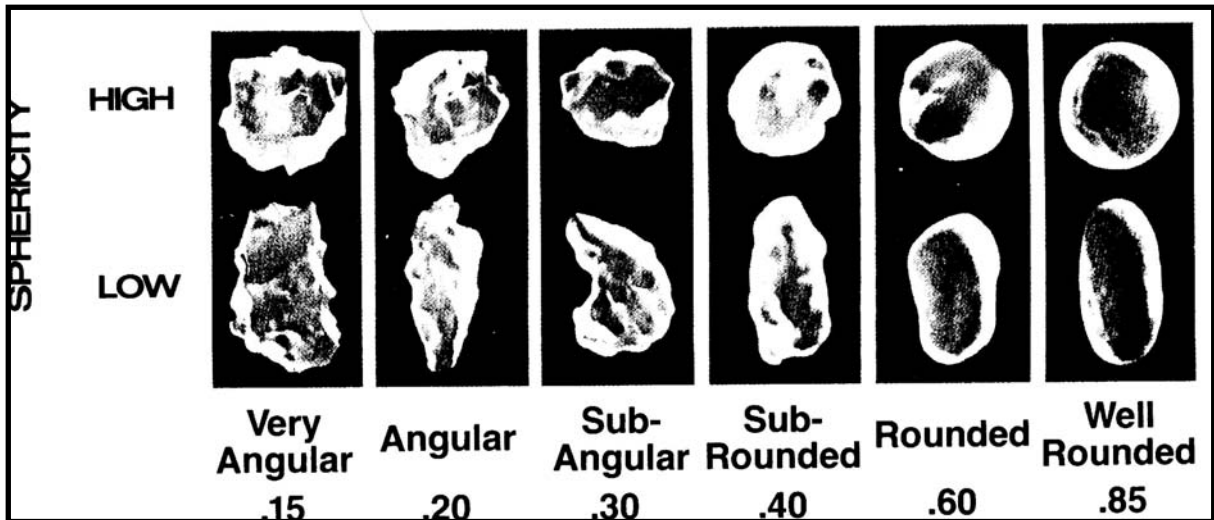
Visual estimation of important sedimentary parameters (Haywick, 1999)



Udden-Wentworth Grain Size Scale (Wentworth, 1922)

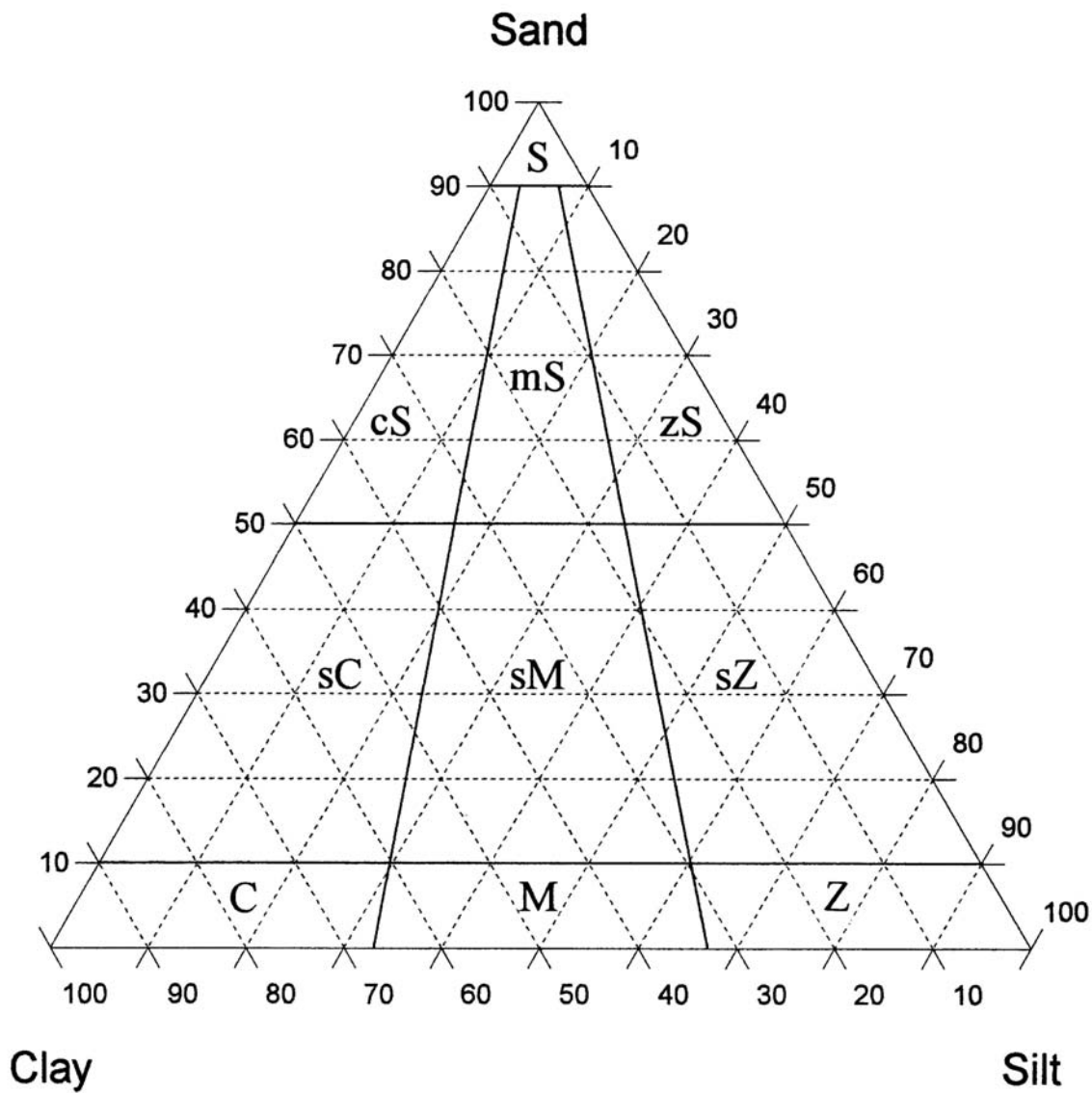


Grain Rounding Determination-“Quantitative” (Folk, 1980)



Grain Rounding Determination-“Qualitative” (Powers, 1953)

Grain Size Ternary Plot 1
Sand-Silt-Clay (Folk, 1954; 1980)



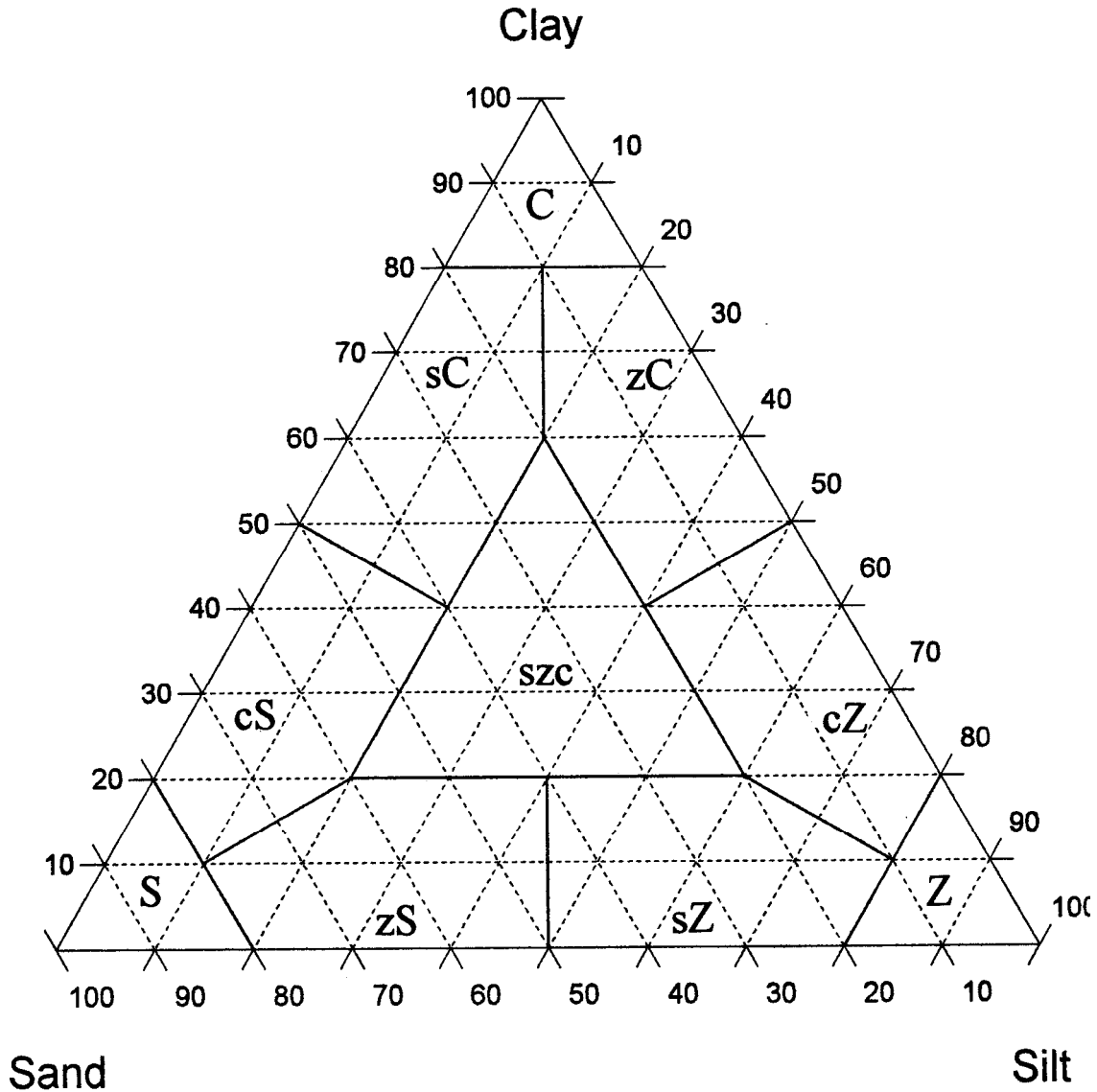
Symbol Index

C-clay; Z-silt; M-mud; S-sand;
sC-sandy clay; sM-sandy mud; sZ- sandy silt;
cS-clayey sand; mS-muddy sand; zS-silty sand

Folk, R.L., 1954. The distinction between grain size and mineral composition in sedimentary rocks. *Journal of Geology*, **62**, 344-359.

Folk, R.L., 1980. *Petrology of Sedimentary Rocks*. Hemphill Publishing, Austin, TX, 184p.

Grain Size Ternary Plot 2
 Sand-Silt-Clay
 (Derived from Krumbein and Sloss, 1963; Picard, 1971 and others)
 (Preferred method of Haywick)

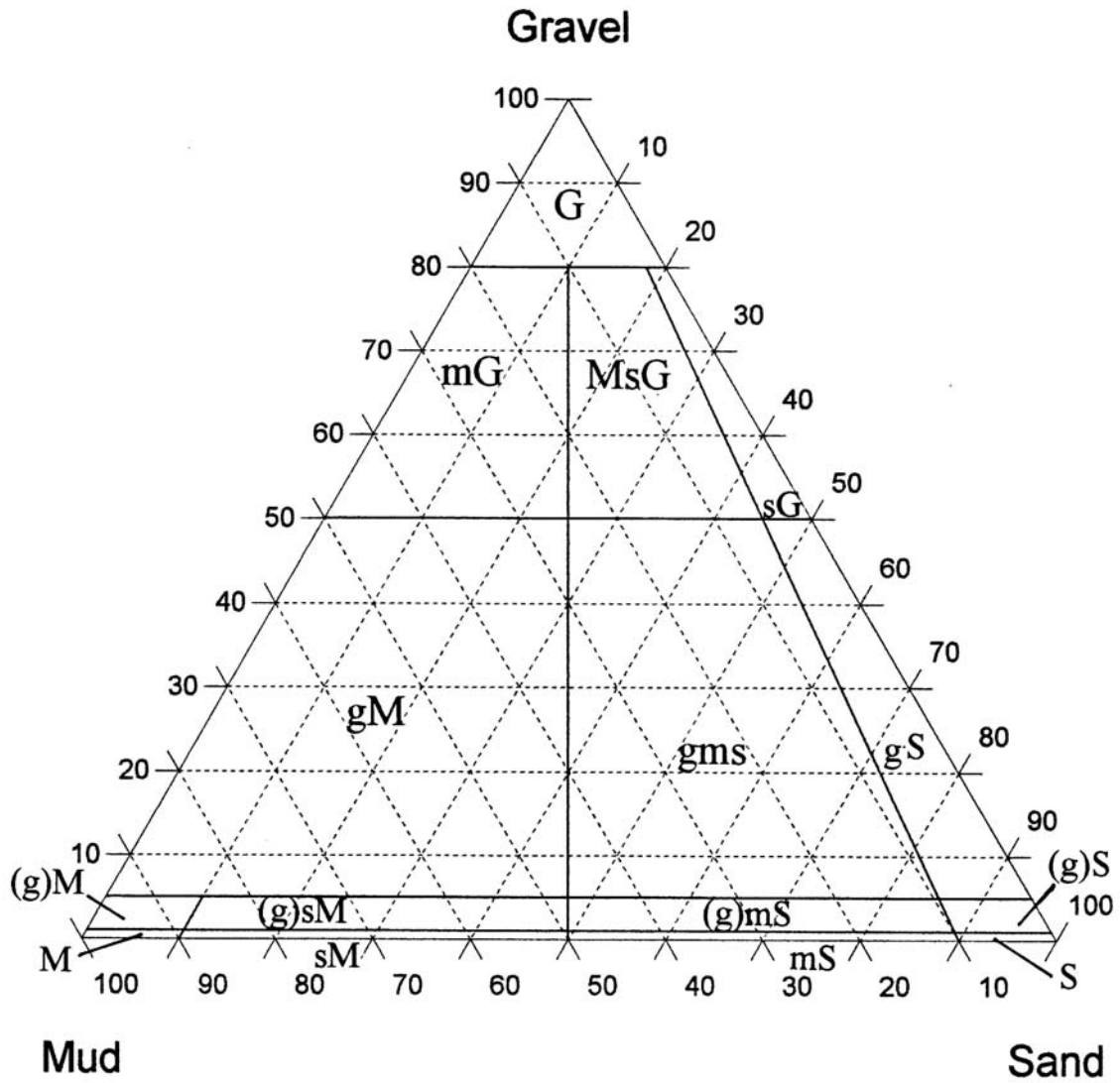


Symbol Index
 C-clay; Z-silt; S-sand;
 sC-sandy clay; zS-silty sand; sZ- sandy silt; zC- silty clay
 cS-clayey sand; szc-sand-silt-clay; cZ-clayey silt

Krumbein, W.C., & Sloss, 1963. *Stratigraphy and Sedimentation* (2nd edition), W.H. Freeman and Co. 660p.

Picard, M.D. 1971. Classification of fine-grained sedimentary rocks. *Journal of Sedimentary Petrology*. **41**, 179-195.

Grain Size Ternary Plot 3
Gravel-Sand-Mud (Folk, 1954;1980)



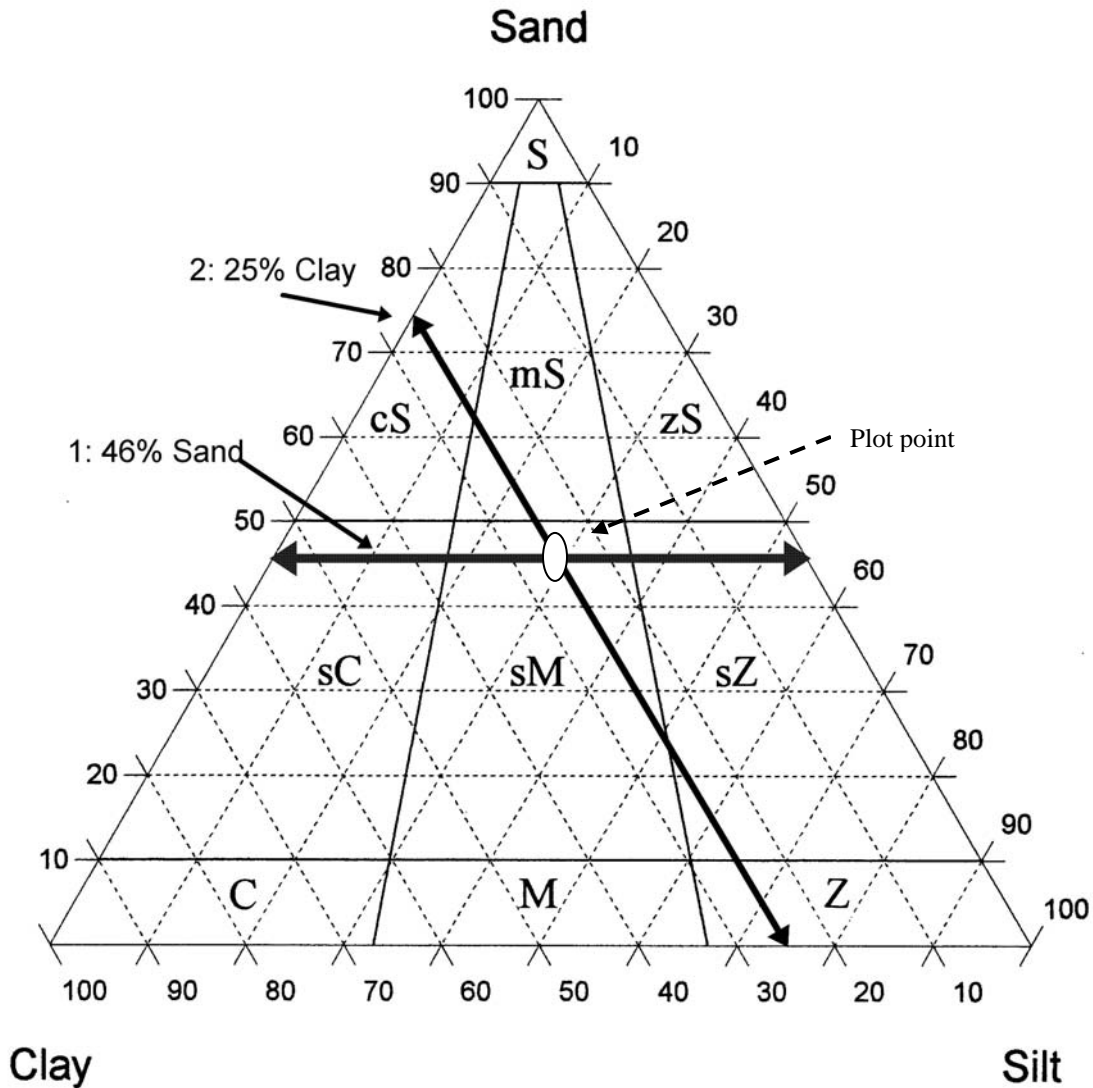
Symbol Index

M-mud; G-gravel; S-sand; sM –sandy mud; mS-muddy sand;
 (g)M-slightly gravelly mud; (g)S-slightly gravelly sand;
 (g)sM-slightly gravelly sandy mud; (g)mS-slightly gravelly muddy sand;
 gM-gravelly mud; gms-gravelly muddy sand; gS-gravelly sand;
 mG-muddy gravel; MsG-muddy sandy gravel; sG sandy gravel

Folk, R.L., 1954. The distinction between grain size and mineral composition in sedimentary rocks. *Journal of Geology*, **62**, 344-359.

Folk, R.L., 1980. *Petrology of Sedimentary Rocks*. Hemphill Publishing, Austin, TX, 184p.

How to plot on a grain size ternary diagram
(Folk sand-silt-clay diagram)



Example data point: Sand: 46%; Clay 25%; Silt: 29%

Plotting on ternary plots is relatively straight-forward, provided that your data is in the right format. All ternary plots require 3 data points that total 100%. For grain size analysis, this can be sand + silt + clay or gravel + sand + mud*. Since we have 4 basic sediment size fractions, you have no choice but to ignore one of those fractions when plotting up grain size data. Pick the ternary diagram that best suits your sediment data.

To plot data, first start with the component at the top of the ternary diagram. In this case it's sand (46%) which is read along the left side of the triangle. Then plot one of the other 2 remaining points. I chose clay (25%). This value is read on the bottom axis. The 2 lines cross at one point. The percentage of silt at this point should be 29% (which it is). This is the only place where this sample can plot and in this case, the sample is sM (sandy mud).

* mud is defined as silt+clay. If your sample contains a lot of gravel, add the silt and clay fractions.

TABLE 3-1 DESCRIPTIVE MEASURES OF SEDIMENT-SIZE DISTRIBUTION
ACCORDING TO SEVERAL AUTHORS

Measure	Trask†	Inman	Folk and Ward
Median	$Md = P_{50} \ddagger$	$Md_{\phi} = \phi_{50} \S$	$Md_{\phi} = \phi_{50}$
Mean	$M = \frac{P_{25} + P_{75}}{2}$	$M_{\phi} = \frac{\phi_{16} + \phi_{84}}{2}$	$M_z = \frac{\phi_{16} + \phi_{50} + \phi_{84}}{3}$
Dispersion (sorting)	$So = \frac{P_{75}}{P_{25}}$	$\sigma_{\phi} = \frac{\phi_{84} - \phi_{16}}{2}$	$\sigma_I = \frac{\phi_{84} - \phi_{16}}{4} + \frac{\phi_{95} - \phi_5}{6.6}$
Skewness	$Sk = \frac{P_{25}P_{75}}{Md^2}$	$\alpha_{\phi} = \frac{M_{\phi} - Md_{\phi}}{\sigma_{\phi}}$ $\alpha_{2\phi} = \frac{\frac{1}{2}(\phi_5 + \phi_{95}) - Md}{\sigma_{\phi}}$	$Sk_I = \frac{\phi_{16} + \phi_{84} - \phi_{50}}{2(\phi_{84} - \phi_{16})} + \frac{\phi_5 + \phi_{95} - 2\phi_{50}}{2(\phi_{95} - \phi_5)}$
Kurtosis	$K = \frac{P_{75} - P_{25}}{2(P_{90} - P_{10})}$	$\beta_{\phi} = \frac{\frac{1}{2}(\phi_{95} - \phi_5) - \sigma_{\phi}}{\sigma_{\phi}}$	$K_G = \frac{\phi_{95} - \phi_5}{2.44(\phi_{75} - \phi_{25})}$

†The formula for kurtosis was proposed by Krumbein and Pettijohn. Many workers have used the square root of Sk rather than Sk itself as a measure of skewness.

‡ P indicates a percentile measure, measured in millimeters.

§ ϕ indicates a ϕ percentile.

From Blatt, Middleton and Murray, (1978)