# Site-Specific Data

## EVS 248 Environmental Geology and Hydrology

## Fall Semester

Today's lab focuses upon gathering and using soil samples from the site of interest. When drilling test borings and environmental monitoring wells, samples of unconsolidated soils are usually collected and analyzed for grain-size distribution. This distribution gives insight into permeability and infiltration rates.

Grain-size distributions are are often described based on one or more representative measurement, such as the median grain diameter, $\phi_{50}$, the sieve size through which half by weight of the sample passes. Two other common measurements are the mean and standard deviation, a measure of sorting. The Folk method, commonly used for estimating the mean and standard deviation, uses the equations,

$$\mu = \frac{\phi_{84} + \phi_{50} + \phi_{16}}{3}$$

and

$$\sigma = \frac{\phi_{84} - \phi_{16}}{2}.$$

Mean grain size and standard deviation are particularly useful if the grain-size distribution is approximately normal. Additional measurements that may be useful are grain angularity and packing. However, packing is generally disturbed during sampling of unconsolidated samples, though it may be a very important factor, especially if a significant clay fraction is present. Finally, grain-size distribution is often reduced to determining the percentages of sand, silt, and clay, respectively, and plotting those on a ternary plot.

## In Class

The Coastal Laboratory of the Department of Geology and Geophysics, UNO, analyzed samples at one-foot intervals in a core taken by vibracore. The core was taken offshore near Grand Isle, LA, a barrier island. The particle-size data are in the file grainsize.wk1, posted on the class website.

1. Calculate and plot the mean grainsize as a function of depth.
2. Calculate sorting (standard deviation) for each depth using the Folk statistic. Plot mean grainsize versus sorting.
3. Calculate the percentage of sand at each depth. Consider all sediments coarser than $\phi = 4$ as sand. You will have to linearly interpolate to estimate this value. Then calculate percentage silt and percentage clay. For any values with negative weights (due to roundoff error or other problems) use 0 as the value. Plot the point for each depth on the ternary plot online in SoilTextureTriangle.jpg.
4. Use Excel to plot the grainsize distribution for each depth, with cumulative percentage on the y axis and $\phi$ size on the x. How does poor sorting show up on such a graph? differences in mean grain size?