Major 1

GY 402: Sedimentary Petrology

Grain Size Group Project: Advise and Guidelines

The Project: In Geology, we strive to teach you not only practical techniques, but also interpretation skills. In this, the first of the major projects in Sedimentary Petrology, you will have an opportunity to think as well as learning one of the major sedimentological techniques. It is a group project, so you are also going to learn how to work with others.

Step one of this project is the development of the question (or if you wish, proposing an hypothesis). Try to select a topic that you are interested and a question that can be resolved via grain size analysis. During our cross park trek, I will try to suggest a few ideas. If one sounds interesting to you, see if one or more* of your colleagues are also interested in that topic. The come and see me and I'll try to help you to develop it. You will write up the hypothesis as part of a separate writing* assignment.

Step two of the project involves collecting the samples. It is necessary to limit you to 5 samples per person in the group (a team of 2 will collect 10 samples) in order to reduce the time involved in lab work. The type of sampling is rather diverse. Grab sampling, soft sediment piston coring and hand augering are all possible. You will be given individual guidance for sample collection.

Step three is the lab work. Read the manual **before** you start processing your samples. This is tedious, but simple work and you will receive "training" once you are ready to go.

Step four is data interpretation. I have no idea what your sediment samples will be, nor what your grain size distributions will show, but there is always something worth discussing in these projects. Once you finish your grain size analysis, enter your raw data into the Excel spreadsheet that you will get from the class website. Do **not** screw around with any of the pages of the spreadsheet with the exception of the first one. Print off the data pages and show them to me before you do anything else. You may have to tweak the data before you print off the histograms and ternary plot.

Step five is the write-up. This is where the (W) component of the course comes in and where you make (or break) your grade. The write up will consist of the following sections:

Title Page
Abstract (1/2 page)
Table of Contents (1 page)
Introduction (1/2 page)
Methodology (1 to 1 ½ pages)
Results (1 page; includes a summary table)
Discussion (2+ pages)
Conclusions (1 page)
Appendices (your excel data sheets, ternary plot and histograms)

* A partnership of 2 people is ideal for this exercise but I will permit up to 4 people per group. I'm just going to expect more from a group of 3 or 4 than I will of a group of 2.

In a separate writing assignment, you were asked to compare and contrast the abstract, introduction and conclusion sections of a typical scientific paper. Remember that when you write up your grain size paper.

The next section discusses what I expect from you in each of the sections of the paper.

<u>The Write-up</u>: The title page should follow standard format. The title should be positioned near the center of the page. The name(s) of the project team member(s) should follow the title. Both should be centered on the page. The date and name of the class should be placed near the bottom of the page and should also be centered.

> **An Analysis of Grain Size Character Versus Slope at the USA Library**
>
> Joe Student
> Jennifer Student
>
> January 27, 2008
> GY 344: Sedimentary Petrology

The next page should have the title at the top and the participants names again centered below it. The abstract be positioned below this. The abstract should be a concise summary of the project including any conclusions that you made. It should be written in past tense. For example:

> **Abstract**
>
> Five samples were collected from an inclined slope adjacent to the USA Library in order to determine grain size variation related to slope. The samples were analyzed using the pipette and sieve method. In general, there is a fining down slope from sandy silt to clayey silt….etc

The introduction will follow the abstract. It will produce a brief overview of the project and should catch the readers attention. Most importantly, the introduction <u>must</u> include a statement of purpose. For example,

> **Introduction**
>
> Slope erosion is a chronic problem around the world, including the University of South Alabama. Sediment washing away from steep inclines finds its way into rivers, lakes and wetlands and can result in habitat loss… etc.
>
> The purpose of this study was to determine if grain size is a variable in slope erosion near the USA Library. Conclusions made in this project may be applicable to other areas suffering similar erosion problems….etc.

The methodology section must outline where (and why) you selected your samples, how you obtained them, and how you processed them for grain size analysis. Focus on the field work rather than the lab work and include a map if possible. For example:

> **Methods**
> Five 1 kg sediment samples were collected with a shovel from a gully along the east side of the USA Library (Figure 1). Samples 1, 2 and 3 were obtained from the top of the gully where the slope was steepest. Samples 4 and 5 were collected from the base of the gully where the slope was more gentle (Figure 1)…etc.

Limit you discussion on the lab work to the following statement (and feel free to cut and paste this into your report if you want to. There is <u>no need to acknowledge me if you do this</u>).

> Samples were processed in the Sedimentology Laboratory at the University of South Alabama. Approximately 50 to 100 gram splits were extracted from each of the samples and allowed to air dry under a fan for 1 to 2 days. Once fully dry, 5 to 15 gm splits were obtained from each sample, weighed to 4 decimal places, and placed in individual shaker bottles. A 10 ml solution of sodium hexametaphosphate and approximately 100 ml of RO water was placed in each bottle and they were allowed to sit over night. The next day, the bottles were placed in a bottle shaker and agitated for a minimum of 8 hours before being transferred to settling columns. Grain size analysis was done using the pipette and sieve method according to procedure outlined in Haywick (2006). Data was processed using an Excel spreadsheet (Haywick 2006).

The results section should be short and to the point. It is best if you summarize your results in a table rather than in writing and then (succinctly!) discuss the key points of those data. Be careful to <u>not</u> interpret your data here. Do that in the discussion section. This is also a good place to discuss any errors that might have occurred in your methodology. For example:

> **Results**
> Grain size data for samples collected in this study are summarized in Table 1. In general, all of the samples are sandy, but sand content and dominant grain size decreases down slope… etc. Data for sample three may be somewhat in error. A minor spill during sieving resulted in loss of approximately 10% of the sand+gravel fraction.

Table 1: Summary of Grain Size Data in this Study

Sample	Folk (1954) Name	Sheppard (1954) Name	% sediment each fraction			
			Gravel	Sand	Silt	Clay
1	gzS	gS	0.25	85.00	14.75	0.00
2	zS	S	0.00	80.00	17.00	3.00
3	zS	zS	0.00	75.00	20.00	5.00
4	sZ	zS	0.00	45.00	46.00	9.00
5	sZ	sZ	0.00	40.00	51.00	9.00

The discussion section is where you interpret your results. Depending upon your question, your data and the amount of supporting research you do, you might have a lot of material to discuss here. Go for it. Here is where you try to explain the data that you obtained. Here is where you discuss possible scenarios and ultimately, address the question you originally proposed in the introduction. I have to be honest with you. With few exceptions, the data you collect will not be sufficient to fully answer your question. That's okay. Part of this exercise is to learn how to improve your scientific reasoning and how to better plan research activities. It is okay to conclude that you don't have enough data or that your sampling strategy was less than perfect. You can address this issue in the conclusions section.

The conclusions section gives you an opportunity to summarize your study. Do not just reproduce your abstract. Did your data confirm or refute your question? If you had it to do over again, what would you do the same and what would you change?

Lastly, come the references. Make sure that where necessary, you properly cite materials that you used in your report. Proper scientific referencing quotes the authors' last name and the date of publishing in parentheses. For example, (Haywick, 2006) or (Smith and Jones, 1995). Do not include page numbers. In the event of 3 or more authors (e.g,, Smith, Jones and Haywick, 1998), use the following: (Smith *et al.*, 1998) for text citations. For further examples, refer to any geological publication. Do not use any other style of citation despite what your other professors, teachers or English instructors state. This is a geology class. Use our style for both citations and bibliography references.

Speaking of which, here are examples of the style of reference citations to be used in your bibliography.

References

Bathurst, R.G.C., 1975. Carbonate Sediments and Their Diagenesis. Elsevier, New York, 658p.

Benson, D.J., 1982. Late-stage moldic porosity in the Smackover Formation of Alabama. *Geological Society of America,31st Southeastern Section Meeting, Washington D.C.*

Benson, D.J., 1985. Diagenetic controls on reservoir development and quality, Smackover Formations of southewest Alabama, *Gulf Coast Association of Geological Societies Transactions,* 35, 317-326

Choquette, P.W. and James, N.P., 1990. Limestones- the burial diagenetic environment. *In* I.A. McIlreath and D.W. Morrow, *(eds)*, Diagenesis, *Geoscience Canada Reprint Series* 4, 75-111

Heydari, E., 1997. The role of burial diagenesis in hydrocarbon destruction and H2S accumulation, Upper Jurassic Smackover Formation, Black Creek Field, Mississippi. *American Association of Petroleum Geologists Bulletin*, 81, 26-45.

Tew, B.H., Mink, R.M., Mancini, E.A., Mann, S.D. and Kopaska-Merkel, D.C., 1993. Regional geologic framework and petroleum geology of the Smackover Formation, Alabama and panhandle Florida coastal waters area and adjacent federal waters areas. *Geological Survey of Alabama Bulletin 154.*, 60p.

Vinet, M., 1984. Geochemistry and origin of Smackover and Buckner dolomites (upper Jurassic), Jay Field area, Alabama – Florida. *In* D.G. Bebout, C.H. Moore, W. Ventress and J.L. Carney, *(eds)*. The Jurassic of the Gulf rim. *Gulf Coast Section, Society of Economic Paleontologists and Mineralogists 3rd annual Research Conference Proceedings,* 365-374.