GY 402: Sedimentary Petrology

Lecture 8: Sedimentary Facies

Instructor: Dr. Douglas W. Haywick
Last Time

- Sedimentary sections
  1. Important sedimentary data
  2. Examples of sedimentary sections
  3. Perdido field trip
Important sedimentary data

- Scale *(always use the metric system)*
- Grain size *(clay, silt, sand, gravel)*
- Lithology *(quartz arenite vs. litharenite vs shale etc.)*
- Mineralogy *(when important variations occur)*
- Paleontological
- Sedimentary and biogenic structures
- Palaeocurrent orientations
Important sedimentary data

- Obvious sedimentary trends (e.g., fining upward sequences)
- Bedding/Bed thickness (thin, medium, thick)
- Lamination (thin, medium, thick)
- Bedding contacts (sharp, gradational, scoured)
- Lateral variations (e.g., channels etc.)
- “Facies” interpretations
- Anything else that you can think of
Sedimentary Sections

So what makes a “good” section good and a “bad” section bad?

1) **Accuracy**. Does the section convey the important info?
2) **Clarity**. Can you see what the author wants you to see without clutter?
3) **Attractiveness**. Do you want to put it up over your Justin Bieber poster above your bed?
4) **Correct format**. Follow the rules!
Sedimentary Sections

Sedimentary Sections

Our Next Field Excursion

Sun Feb 11: 9:00 am to 5:00 pm
Depart: LSCB Parking Lot
Destination: Perdido, AL
Purpose: Group work, real outcrop access
Limited Van Space: sign up sheet will be posted

**Bring:** Sturdy boots, **hard covered note book**, hammer, pencils, hand lens, tape measure, small ruler, back pack. Lunch, water, bug spray, digital camera, $$$. 
Today’s Agenda

- Sedimentary Facies
  1. What are facies
  2. Defining characteristics of facies
  3. Facies and depositional environments
Sedimentary Facies

Why do sedimentologists collect all this data in the first place?
Sedimentary Facies

Why do sedimentologists collect all this data in the first place?

Ultimately, it is in order to interpret the **environment of deposition** of the sediment/sedimentary rocks.
Sedimentary Facies

There are literally dozens of different depositional environments that cover every imaginable marine and non-marine situation. And in most cases, there are multiple varieties of each basic environment of deposition.
Sedimentary Facies

There are literally dozens of different depositional environments that cover every imaginable marine and non-marine situation. And in most cases, there are multiple varieties of each basic environment of deposition.

For example, rivers come in at least 3 “flavors”:

1) Meandering
2) Braided
3) Anastimosing
Sedimentary Facies

Sedimentologists also need to consider the full range of variability within each depositional environment.
Sedimentary Facies

Sedimentologists also need to consider the full range of variability within each depositional environment. For example, a braided river channel has deep areas, flats and bars (longitudinal and transverse).
Sedimentary Facies

When you look closely at braided river depositional systems, it is clear that they consist of a lot of subcomponents. Not just a channel and a floodplain. So we lied (again!) in GY 111.
Sedimentary Facies

Ultimately, depositional environments are the sum of their various components and each of those components are distinguished from one another on the basis of geological characteristics.

The components that collectively define depositional environments are called sedimentary facies (or just facies).
Sedimentary Facies

Defining characteristics for facies include:

- Grain size
- Lithology
- Mineralogy
- Paleontology
- Sedimentary and biogenic structures
- Palaeocurrent orientations
- Obvious sedimentary trends
- Bedding (Bed thickness)
- Lamination
- Bedding contacts
- Lateral variations
- Anything else that you can think of
Sedimentary Facies

Facies can, and will, repeat vertically through a sedimentary sequence, but may vary in character as a result of environmental and/or evolutionary change through time.
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E.g., fossil content.
Sedimentary Facies

Facies may also change laterally through a deposit as a result of changing environments with distance at the same time.
Sedimentologists distinguish component facies in the outcrops that they are examining. Sometimes they go overboard.
Then they determine which depositional environment best fits this variety of facies.

This is called:

**Facies Modeling**
Facies modeling is best done back at your lab/office where you can think about your data.
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And drink a few beers to help you think about your data.
Facies Modeling

And interpret what your data is implying
Upcoming Stuff

**Homework**
Write 3 due Thursday

**Today’s Lab**
Grain Size; show me your analysis results

**Online**
Lecture 9: Walter’s Law

**Thursday Lecture**
Lecture 10: Mature Thin Sections

**Thursday Lab**
Activity 3: James Sed Section

More
GY 402 Sedimentary Petrology (W)
GSSA Writing Assignment Three
Grain Size Project; Introduction and Results

Introduction: Well by now, you should all be aware of the structure and context of the introduction of a term paper. The introduction provides a brief overview of the topic (including the location of the study site), expressly states the purpose of the project, and more or less catches the attention of the reader. Because it is outlining the intent of the project, the purpose statement in the introduction is written in future tense.

Another important section of a term paper is the results section. Follow the format that I gave you in an earlier handout about paper structures. Be sure to include a summary table of your results, not just the printouts generated by the grain size spreadsheet. They, by the way, are best put in an appendix at the back of your report. Do NOT add any interpretations to your results in the results section of the paper. That happy task is done in the discussion section of a paper.

Your Task: I would like you to write up the introduction and results section for your grain size research project. Your introduction will probably exceed one page and your results section (with tables, select histograms, ternary plots etc.) will likely not exceed 2 pages (typed, double spaced, 12 pitch Times Roman font). I do not expect to see a complete results section at this time. I know that some of you are still doing analyses and/or are still working on these data. However, it is in your best interest to give me what you have… you will need a bit of help to interpret your data. Once again, I want to see one write up for each 2 person team. Same rules and procedure as last time:

The assignment is a team effort, requires a GSSA cover letter and is redo-able (see webpage one for the guidelines concerning resubmissions).

Due date/Revision date: refer to the due dates page on the website/calendar.
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