GY 402: Sedimentary Petrology

Lecture 17:
Sandy Fluvial Depositional Environments

Instructor: Dr. Douglas W. Haywick
Last Time

Volcaniclastic Sedimentary Rocks

1. Origin of volcaniclastic sedimentary rocks
2. Classification of volcaniclastic sed. rocks
3. Thin section petrography
Volcaniclastic sedimentary rocks

Air fall

course  fine
Volcaniclastic sedimentary rocks

tephra

ingimbrite

tephra

ignimbrite
Volcaniclastic sedimentary rocks are sedimentary rocks…

… they follow sedimentary rules

Parallel laminations

Channel lag
Vitric\Crystal Tuff

ppl

vitric fragments

quartz

rock frag

xn

1.5mm
Today’s Agenda

Sandy Fluvial Siliciclastic Environments

• Meandering river dynamics
• Sedimentary facies
• The model (vertical sections)
Meandering Rivers

- Sinuous, single channel drainage systems
Meandering Rivers

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- Typically form on low gradient alluvial plains
Meandering Rivers

- Sinuous, single channel drainage systems
- Typically form on low gradient alluvial plains
- Sinuosity depends on gradient
Meandering Rivers

- Are characterized by a distinct suite of facies and processes
  - Oxbow lakes
  - Levees
  - Floodplains
  - Cut banks
  - Point bars
  - Yazoo streams
  - Cutoffs
Meandering Rivers

- The channel meanders across the **flood plain**
Meandering Rivers

- Deposition occurs on the inside of meander loops (point bar)
Meandering Rivers

• Large point bars may consist of numerous **accretionary ridges**
Meandering Rivers

- Erosion occurs on the outside of meander loops (cut bank)
Meandering Rivers

• Meandering river channels are asymmetrical (deepest near cut bank)
Meandering Rivers

- Water velocity is greatest where the channel is deepest resulting in a “corkscrew” flow pattern.
Meandering Rivers

- Vortices can be either singular or complex.
- Either way, it results in a “sieving” action during point bar deposition.
Meandering River Facies

- Sediment eroded from the cutbank is transported onto the point bar where the current is slower.
Meandering River Facies

- The result is a classic fining upwards trend in point bars.

Meandering River Facies

- The bottom of the channel is frequently characterized by a channel lag of gravel and/boulders
Meandering River Facies

- Sedimentary structures change from bottom to top from parallel lamination, through large current ripples to small current ripples.
- Frequent trough cross stratification
Meandering River Facies

- Trough cross stratification is common for both large and small current ripples and implies a scalloped depositional surface.
Meandering River Facies

- Expect a lot of evidence of plants near the tops of point bars and in flood plain facies (roots, carbonaceous bits, leaf imprints etc.)
Meandering River Facies

- Apart from deposition in channels, rivers (meandering and braided alike) periodically flood resulting in sedimentation on flood plains
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- Apart from deposition in channels, rivers (meandering and braided alike) periodically flood resulting in sedimentation on flood plains
Meandering River Facies

- Flood plain deposits are mostly laminated shales with plant fossils
- Sometimes **paleosol** horizons can be found
Meandering River Facies

- Sand deposition frequently occurs on the floodplain along **levees** and **crevasse splays**

![Diagram of meandering river facies](image-url)
Meandering River Model

Meandering River Model

- Channel sand sequences are commonly truncated indicating **cut offs**
- Abandoned channels (oxbows) get filled in with mud (an excellent sedimentary petroleum trap!)

Meandering River Model

- High sinuosity promotes more frequent cutoffs and abandoned channels

- More frequent cut offs result in less continuous sand bodies.

Upcoming Stuff

Homework
1) Write 5/Activity 7 due today by 5:00 PM today
2) Volcaniclastics lab due by 5:00 PM today
4) Major 2: Perdido sections by 5:00 PM tomorrow

Lab This Week:
Volcaniclastic thin sections
4:00 PM today: Instructor candidate presentation

Next Week:
Spring Break
GY 402: Sedimentary Petrology

Lecture 17: Sandy Fluvial Systems

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