

GEOL 334: Sedimentology and Stratigraphy

List of Main Topics, Second Half of Course

This is not a comprehensive list, it is intended to jog your memory and facilitate studying. Course outlines are provided on the web. Complete notes, all class handouts, and homeworks are the best record of what we have covered in class and may be covered on the exam.

Depositional Environments:

Continental Environments (focused on):

- Alluvial Fans
- Braided Streams
- Meandering Streams (know for each: their setting, processes, and depositional products)

Marginal-Marine Environments:

- Deltas: high sediment supply. Delta lobes prograde into standing water, then abandoned.
- Beaches: wave and current energy produces well sorted sand, beach-face profile
- Barrier Islands: beach ridge and dunes separated from coast by low-energy lagoon
- Estuaries: = drowned river valleys, low sediment supply, typical of transgressive coastlines
- Tidal Flats: low-energy mud flats between low and high tide

Siliciclastic Marine Environments

- The Beach to Shelf Transition. Fair weather wave base, storm wave base (and significance)
- Processes of Siliciclastic Continental Shelves. (a) Tide-dominated, (b) Storm-dominated.
- Major processes of marine shelf transport and deposition ... in fair weather, during storms.
- Ancient deposits of storm-dominated shelves, similarities and differences with turbidites

Stratigraphy Concepts:

Key Concepts in Stratigraphy: what is stratigraphy and why do we study it?

- Lithofacies, examples of lateral and vertical facies changes
- Unconformities – four different types. What are they, and how do they form?
- Walther's Law – what does it say, what does it mean, and why is it important?
- Transgression and Regression – precise definition of these terms

The main controls on transgression and regression are: **(1) *Relative Sea Level***, which is a combination of: (i) global eustatic sea level; and (ii) tectonic subsidence or uplift of the crust. **(2) *Rate of Sediment Input***, controlled by climate, size of drainage area, tectonics. Dynamic balance between these parameters; understand the nature and outcomes of interactions.

Sequence Stratigraphy. What are sequences, sequence boundaries? How do they form? Use of Sequence Stratigraphy in Relative Sea-Level Analysis. Boggs Figure 13.18. Parasequences, parasequence stacking patterns, and *dynamic controls on their formation*. Some controversy over the use of sequence stratigraphy to interpret *global* sea level.

Global Cycles in Stratigraphy

First-Order; Second-Order; Third-Order; Fourth and Fifth-Order Stratigraphic Cycles. Know the basic time scale of the different types of stratigraphic cycles, and the most likely processes that drive them. Milankovitch climate variations, and resulting stratigraphic cycles.

Sedimentation and Tectonics

Plate-tectonic settings and processes that create large sedimentary basins (see class handout). In class we focused on strike-slip related basins, esp. pull-apart basins (e.g., Death Valley).

We also discussed different types of basins formed at “Andean-type” convergent margins, including trench, trench-slope, forearc, and foreland basins.