Study Questions from Ch 6 and Ch 2, Nichols, p. 76-88 and p.10-24

1. Describe the various parts of the sedimentary cycle from source rock uplift to lithification (see Fig. 6.1)

2. Describe the 4 main climate zones (climate is defined by temperature, precipitation, and wind patterns). What factors control the global distribution of these climate belts? Why are we interested in this in a sed/strat class?

3. What influence does geomorphology (more specifically, relief, that is slope angle of the surface) have on the production of sediment?

4. What would you think is the relative importance (volumetric contribution) of physical versus chemical weathering in the production of sediment? (Hint, think about the difference between sediment production from a mountain like Mt St. Helens before and after its eruption). Your answer may be quite different if you consider modern earth surface conditions compared to early Paleozoic conditions (pre-land plants) and earlier in earth history.

5. What is the relationship between magmatic temperature stability and susceptibility to surface weathering of the main igneous rock-forming minerals?

6. Equilibrium mineral assemblages are an important consideration for interpretation of the conditions during formation of igneous and metamorphic rocks. Is this concept relevant to sedimentary rocks? Why or why not, or maybe with what considerations in mind?

7. What are the most important detrital particles in sandstone? Why?

8. What are some important miscellaneous or accessory minerals in sandstone?

9. Your text presents a different sandstone classification compared to the Folk, Andrews, and Lewis version I provided for lab work. The main difference is exclusion of the concept of "wacke", *poorly sorted sandstone* in Nichols. Actually, wackes are quite uncommon. This concept might require more discussion! Think about the (rare?) sedimentary processes that might produce "wackes".

10. Distinguish between a "biogenic" and an "authigenic" (orthochemical) component in a sandstone. What are their origins and implications?

11. What is glauconite? Ave you ever seen glauconite?

12. How do the terms "availability", "chemical stability", and "mechanical durability" relate to the occurrence of grain types in sandstone?

13. Why so much emphasis on sandstone petrology compared to mudrock petrology?

14. What is the origin of most clay minerals in sedimentary rocks?

15. What are the names for the common clay mineral groups? What compositional characteristics are in common amongst the clay mineral groups? What are the distinct compositional and structural characteristics of the main clay mineral groups?

16. What are the basic concepts related to x-ray diffraction (XRD) and scanning electron microscope (SEM) analysis? Why are these techniques especially appropriate for mudrock petrology?

17. What is the depositional implication of a clay- (size) rich sediment?

18. Think abut the concept of terrigenous clastic sediment "maturity". What is the basic concept in terms of texture and mineralogy? Does "maturity" mean much for sandstone? For mudstone? What are some obvious limitations to the concept of "maturity"?

An interesting treatment of "The trouble with sedimentary rocks" can be found at Lynn Fichter's www site:

http://csmres.jmu.edu/geollab/Fichter/SedRx/troublewith.html

Also, you might look through:

http://csmres.jmu.edu/geollab/Fichter/SedRx/SimpModl.html

Vocabulary:

1. Hydrolysis, Solution, Oxidation, 2. pH, 3. relief, 4. climate; arid, humid, temperate, 5. in situ, 6. regolith, 7. indurate, 8. Goldich weathering stability series,	9. Arenite, 10. detrital, 11. stable heavy minerals, 12. unstable heavy minerals 13. lithic (or rock) fragments, 14. mud, silt, clay (size), 15. clay (mineral), 16. fissility, 17. suspension (transport), 18. cohesion/flocculation (in clay sized particles), 19. textural and mineralogical maturity