

Sediment Geochemistry (OCN/GG 644) Course Outline -- Spring 2006

Date	Day	Lecture #	Topic
Introduction and Fundamentals: General Diagenesis and Organic Matter Diagenesis			
11-Jan	Tu	1	Introduction, discussion of course structure and topics to be covered
13-Jan	Th	2	Diagenetic physical and biological processes-A (derive diagenetic eqn - to w/o compaction)
18-Jan	Tu	3	Diagenetic physical and biological processes-B (derive diagenetic eqn - from w/ compaction to BBL diffusion)
20-Jan	Th	4	Diagenetic physical and biological processes-C (Einstein eqn, bioturbation, benthic flux, summary)
25-Jan	Tu	5	Diagenetic Chemical Processes I-A: Equilibrium & Homogeneous Rxns (K _{eq} & a to introdxn of radioactive decay eqn.)
27-Jan	Th	6	Diagenetic Chemical Processes I-B: Homogeneous & Microbial Rxns (derive r-decay eqn., sed rates, hierarchy of ox)
1-Feb	Tu	7	Diagenetic Chemical Processes I-C: Homogeneous & Microbial Rxns (hierarchy of ox, G- & power model, geogr distrib of ox)
3-Feb	Th	8	Organic matter reactivity and preservation-A: sources and source signals (C:N:P, δ ¹³ C)
8-Feb	Tu	9	Organic matter reactivity and preservation-A (cont'd.): sources and source signals (C:N:P, δ ¹³ C, van Krevelen diagrams, lignin)
10-Feb	Th	10	Organic matter reactivity and preservation-A (cont'd.): sources and source signals (C:N:P, δ ¹³ C, van Krevelen diagrams, lignin)
15-Feb	Tu	11	Organic matter reactivity and preservation-B: redox state and sediment accumulation rate
17-Feb	Th	12	mini-lecture #1: OC Burial in Marine Sediments: Productivity or Preservation?
22-Feb	Tu	--	Ocean Sciences Meeting, no class
24-Feb	Th	--	Ocean Sciences Meeting, no class
1-Mar	Tu	13	Organic matter reactivity and preservation-C: OC:SA, O ₂ -Exposure time
3-Mar	Th	14	mini-lecture #2: Hierarchy of oxidants in sediments: Departures from the Classical Sequence
8-Mar	Tu	-	Guest Lecture: Redox reactive trace element diagenesis
10-Mar	Th	-	Guest Lecture: Paleoceanography

Fundamentals: General Diagenesis and Precipitation & Dissolution

15-Mar	Tu	-	Diagenetic Chemical Processes II-A: Precipitation and Dissolution
17-Mar	Th	-	Mid-term review
22-Mar		-	Mid-term Exam

24-Mar		15	Diagenetic Chemical Processes II-B: Authigenic Processes (definition, list of examples, the Fe-S system, FE and S authigenic minerals)
29-Mar	Tu	-	Spring Recess
31-Mar	Th	-	Spring Recess
5-Apr	Tu	16	Diagenetic Chemical Processes II-B: Authigenic Processes (definition, list of examples, the Fe-S system, FE and S authigenic minerals)

Diagenesis of Marine Sediments: Case Studies & Global Cycles

7-Apr	Th	17	Mineral authigenesis and organic matter decomposition-A (stoichiometric nutrient regeneration, phosphorites, disseminated CFA)
12-Apr	Tu	18	mini-lecture #3: Bacterial vs. mineral control of benthic P flux
14-Apr	Th	19	Mineral authigenesis and organic matter decomposition-B vivianite, biomineraliz, global P-cycle, BIFs, C:N:P ratios (sanudo-wilhelmy), other authigenic minerals)
19-Apr	Tu	20	mini-lecture #4: Modeling effect of continental processes on marine C, P, Fe cycles, and atmospheric O ₂ : impact of assumptions
21-Apr	Th	21	Deltaic Sediments: Case Studies (fluidized bed reactor; reverse weathering); Fe-biogeochemistry, redox oscillations
26-Apr	Tu	22	Permeable Sediments; Benthic photosynthesis (C-fix'n, pH, O ₂); Gas Hydrates

Carbonate Systems

28-Apr	Th	23	Carbonate system chemistry, bottom water saturation state, Carbonate sediments today: distribution, lysocline and CCD, biogenic nature of carbonate sediments, trap fluxes
			Benthic carbonate dissolution: stoichiometry, pore water chemistry, & respiration-driven dissolution above the saturation horizon
3-May	Tu	24	Andreas Andersson: guest lecture
5-May	Th	25	Review Session
10-May			FINAL EXAM: 12:00 - 2:00 pm

Class: Tuesday & Thursday, 1:30 - 2:45 pm, MSB 315

Instructor: Kathleen Ruttenberg

Office Hours: Wednesdays 1:00-2:00, or by appointment, MSB 222, 956-9371, kcr@soest.hawaii.edu

Required Readings: Excerpts from various texts and scientific journal articles, TBA

Final grade = mid-term exam (25%); final exam (30%); homework or in-class assignments (25%); class participation (20%)