Weathering and Sedimentary Rocks

The Rock cycle...

-the production of sediment
-the chem break down of other rocks
-make fragments of chem solutions
-transport deposit some of the fragments or ...??

1) Definition : Weathering

** listen to recording

-break things down physically and chemically
-you should not confusion weathering with erosion
-weathering is institue break down, in place, does not involve transport
-when transport becomes a significant component it is usually **missed
-largely in place

2) typees of weathering

-chem...altering the chem composition of rocks
-in many cases it'll break down
-transform to something else
-chem weathering as a way of making rocks and bi products of chem reactions more stable on the surface
-especially igneous rocks, they're all fundamentally unstable at the surface. They form at temp and pressure conditions
-chem weathering is tranforming rocks to be more chem stable on the surface
-one of the bi products is also clays

-physical (mechanical)
-make smaller and smaller particles, call the particles clast or clastic sediments
-whole family or subfamily of clastic rocks

-theres a point where you cants break it down any smaller
-very difficult to break silt into clay
-reason: is very hard conditions where they can come in contact and breakdown further
-terminal clay size is around the silt boundary
-to get clays you need chem weathering

3) Factors affecting the types and rates...

-climate controls moisture regimes,
-high moisture, high rates of chem weathering
-high moisture and high temp, rates of chem weathering are quite high
-climate will also affect mechanical breakdown
-cold climates where theres moisture, multiple frosting and melting

-rock structure
-patterns of joints or fractures or weaknesses
-fractures allow for water to trickle down
-if water trickeles down the crack with weather the crack can expand and constrict
-oints or fractures are areas of weakness

-chem composition
-some rocks are more stable
-basic composition of the minerals determines the rate at which they will change

Physical and Chemical weathering are complimentary...

-ex: you take a chunk of rock of 4 square units
-if you split it you increase SA
-in the process of spliting through mechanincal brakdwon were increasing the SA, more SA where chem reactions and chem changes can take place

-wherever you have a fracture, this is just a big surface, increase in SA

4) Chem weathering

-Dissolution
-alter the appearance of rock by dissolving them
-ex: tombstones

-Oxidation
-affect mafic minerals
-by product is rust
-in many rocks it produces a weathering rind
-chemical altered from the outside in
-the darker part is the rock that hasn't been chemically altered
-chemically altered within the surface (picture)

-Hydrolysis
-dissociation of water molecules
-feldspars react strongly with hydrolosis
-one of the by products of hydrolosis are clays
-clay size particles

Sensitivity to chemical weathering
-reverse bohens rxn series and you've got...?
-quartz is one of the most stable on the surface

Physical Mechanical weathering
-ex of rocks that expand and contract repeatedly
-the more they do that the easier the chem breakdwon will be

5.1

-freezing and thawing cycles
-you can split enormous bolder if theres water that tickleates and freezes and then thaw if can split the rock
-rate is variable
-few years to a few hundred of years
-which conditions will be ooptimal for this type of weathering? = cool climates, high moisture,
-where? effective in high mountain settings

5.2

-expansion and extraction of rock surfaces through the growth and dissolution of salt crystals
-through evaporation salt is precipitated back into a solid form
-where? = salt water, oceans. Rocky cliff, waves crashing sprays and salt gets dipersed through those sprays and it dries
-which conditions?

5.3 Thermal jonting

-minerals, when you heat a mineral to melt, they increase in size but never turn up the temp enough to melt, then it cools off and contracts again
-Where? desserts, forest fires
-mechanically weather because of the cycles of heating and cooling

5.4

-usually affects batholiths
-layers, sheetts, called pressure realese jointing
-were realeasing pressure
-weight of verlying material
-batholiths you can only see them if everything is eroded
-rocks are expanding from the release of pressure

5.5 Biogenic Weathering

-roots growing between
-connections to climete? dont need specific climate conditions

6) A few definitions

-sedimentary rocks out of fragments and out of solution
-make solution into solid form
-if we can gather **
-you can't have sedimentary rocks without weathering before hand

6.1

-think of them as a thin but extensive layer on the surface of the earth
-dominate by area
-we interact with sed rocks more than ig rocks
-they form errrywhere
-sed rocks are important for reconstucting changes, enviro changes
-useful archives of climatic or enviro changes
-diff sed rocks are produced under diff climates
-we depend on them
-source rocks means that they are rocks that are the source of hydrocarbon or water or gas. The gas found is prodiced within that gas layer. **
-host: ex: oil moving into sedimentary layer
** 46 min
-most of the time will be horizontal

7)
B) any agent that will mobilize the material and deposits is it in a place where it can accumulate.
C) begin the process of lithification, loose sediment into solid rock. First comonent is compaction, we compress the fragments and get rig of the spaces. You compact it by adding layers on top, the layers of fragments or clasts compress the ones underneath

D) then you need to bind these fragments together. Gonna have to have some sort of binding agent called cement, cement can be some sort of dissolved material. If that water conttains dissolved minerla,s they will precipitate and fill in the spaces, they will bind the whole rock together. In time the entire package will solidify into solid piece of rock

E) in the process of binding and precipitating in between the grains, because of pressure, some minerals may crystalize. Occurs in some cases. Lithification can occur without recrystalization

Cement vs. Matrix

-if yu have a rock thats composed of clasts, fragments, in between you might be able to discern theres some sand. Sand filling the spore space filling the portions in between the clasts, and some silt particles and clay paticles fill it in as well. You cant'g get any smaller than clay so the next thing that fills the spaces in is cement

-you can make sed rocks out of precip
-we arent actually binding fragment
** listen
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7.1

-important to see how fragments change as theyre being transported
-they will begin to roud
-overall the longer the distance transport or the time they will be modified, one modification is rounded. Remove any sharp edges around the clasts.

-sorting
-works especeoally well when you have efficient moving
-two transport processes: wind and water
-think of sorting as civing
-preferentially remove some grain sizes
-call rocks that are poorly srted rock thats have a big range of grain sizes
-if youve got a rock that contains only sand grains or gravel thats a well sorted rock
-the degree of sorting also tends to improve with time and distance

-water is especially good at civing or filtering
-wind is good at that too
-ice is a terrible mechanism to sort
-ice is not turbulent

-fining
-change in size
-get smaller as you increase the transport time or distance
-the longer you transport fragments, rocks come in contact and they break and split apart and that happens over and over and you find that there are major patterns of decreasing fragments
-decreasing trend as you move downstream