

**Geol. 111G Lecture Exam 2 Review**  
**Exam March 12, 2009**

**Sedimentary Rocks**

Processes involved in formation

1. weathering
2. erosion and transport: transporting medium-wind, water, ice, gravity
3. deposition: depositional environment. proximal vs distal to source of material
4. lithification: compaction + cementation

Soils: Definition

Soil horizons: A, B, C,

Mature vs. immature soils

Factors that influence soil development: climate (rainfall and temperature), parent material, time, topographic relief, vegetation

Soil types-Pedalfers, Laterites, Pedocals

**Weathering and Erosion**

Definition of Weathering

Types of Weathering

Mechanical

Mechanical Exfoliation or Pressure Release

Frost Wedging

Thermal Expansion

Crystal Growth

Root Expansion

Chemical

Dissolution

Hydrolysis

Oxidation

Mineral Stability and Weathering - relationship to igneous minerals crystallization series

Sedimentary Rock Features

Texture (size, sorting, and rounding of grains)

Structures

Bedding, cross-bedding

Mudcracks

Fossils (trace and body)

**Sedimentary Rock Classification**

Detrital or clastic

Classification based on grain size

clay - claystone, mudstone, or shale

silt - siltstone

sand - sandstone

pebble, cobble, and boulder - referred to as conglomerate or breccia

depending on clast roundness

Proximity to source (grain size, rounding, and sorting)

Proximal (close) to Source

Coarse-grained

Angular grains

Poorly sorted

Distal (far) from Source

Fine-grained

Rounded grains

Well sorted

Sedimentary Rock Classification

Non-detrital or chemical precipitate

Classification based on composition:

Calcite - limestone

Dolomite - Dolostone

Evaporite Minerals

Halite - rock salt

## Gypsum - rock gypsum

### **STRATIGRAPHY and RELATIVE GEOLOGIC TIME**

#### Stratigraphic Laws or Principles

1. original horizontality
2. stratigraphic superposition
3. cross cutting relationships
4. faunal succession
5. inclusion

#### Unconformity

##### Definition

Types: angular, nonconformity, disconformity

Correlation: lithostratigraphy, biostratigraphy

Geologic time scale

### **METAMORPHIC ROCKS**

Metamorphism Definition - processes by which rocks undergo a change in mineralogy or texture or both in the solid state

Metamorphic processes and variables -

temperature increase - burial, magma injection, plate subduction, friction

pressure increase - lithostatic (burial) & directed (tectonic zones, faults)

fluid increase - fluids derived from groundwater, hydrothermal fluids or dehydration of subducting plate

composition of the host rock- sedimentary versus igneous

Metamorphic grade - temperature dependent; but pressure must increase also

Low grade = 200 - 400 degrees C

Medium grade = 400-550 degrees C

High grade = greater than 550 degrees C

Metamorphic Index Minerals

Chlorite - low grade

Muscovite - upper end of low to medium grade

Biotite - upper end of low to high grade

Amphibole - medium grade

Garnet - medium to high grade

Pyroxene – upper end of medium to high grade

Staurolite – medium grade

Andalusite - low grade; Kyanite - Medium grade; Sillimanite - High grade

Classification of Metamorphic Rocks -

Foliation - alignment of elongate minerals, indicates directed pressure

Foliated textures: Slaty, Phyllitic, Schistose, Gneissic

Foliated Rocks: based on protolith mineralogy and texture

Protolith = shale, low grade=slate, low-med. grade=phyllite, med. grade=schist, high grade=gneiss

Protolith = basalt; low grade = greenschist, med. Grade = amphibolite; high grade = granulite

Non-foliated Rocks - based on composition of protolith

Calcite - marble

Quartz – quartzite

Types of Metamorphism –grade and metamorphic facies

Contact- low grade (greenschist facies)

Burial –low grade (greenschist facies)

Regional –Low to high grade (greenschist, amphibolite, granulite facies)

Plate Tectonics and Metamorphic Rocks

Convergent plate boundary - contact, burial, regional

Divergent plate boundary - contact and burial