




- Sedimentary rocks are composed of:
 - Fragments of other rocks (**CLASTICS**)
 - Chemical precipitates

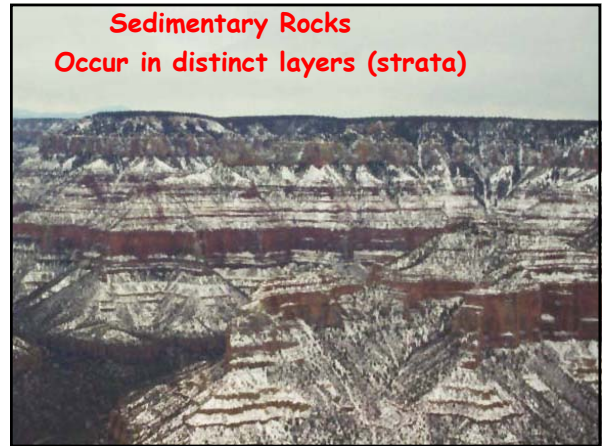
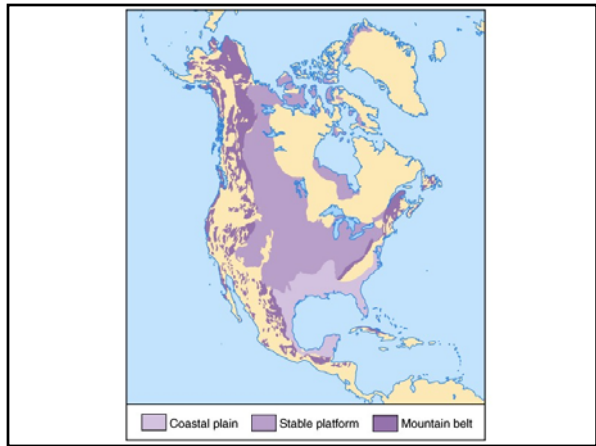



3. Organic matter or biochemically produced materials

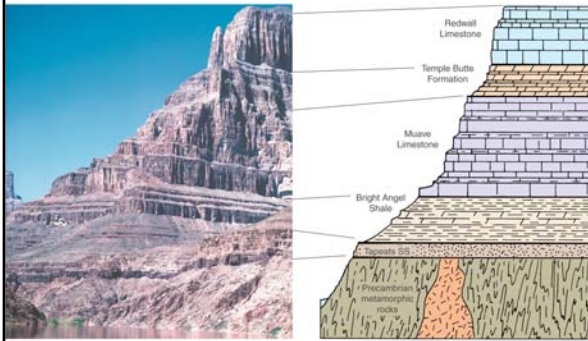


The Nature of Sedimentary Rocks

- Sedimentary rocks are common at the Earth's surface
 - Cover ~75% of the continents
 - Cover nearly all of the ocean floor



Layers are easily identified



-Major layers are called formations

Smaller layers defined by "bedding planes"



Gradation in grain size, composition or physical features may vary

Sedimentary rocks contain evidence of their environment of formation



Ripple Marks on Bedding plane



Mud Cracks on Bedding plane



Animal fossils



Plant fossils

Classification of Sedimentary Rocks



Classified by texture and composition

2 major Textural categories

1. Clastic



2. Chemical and Biochemical



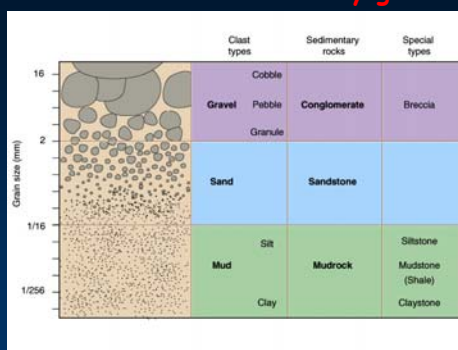
Clastic Sedimentary Rocks

Particles transported by water, wind, ice and:



QuickTime™ and a
Sorenson Video decompressor
are needed to see this picture.

Clastic rocks are subdivided by grain size



Grain size ranges for classification of common clastic sedimentary rocks

Grain size is controlled by:

- Size of grains in source rock
- Energy of transport process
- Weathering and erosion during transport

Common clastic sedimentary rocks
Conglomerate



Common clastic sedimentary rocks
Sandstone



Common clastic sedimentary rocks
Mudrock or Shale
-Siltstone
-Claystone



Chemical/Biochemical Rocks

Formed from ions in solution to form a solid



Chemical Sediments - Precipitate
from water inorganically

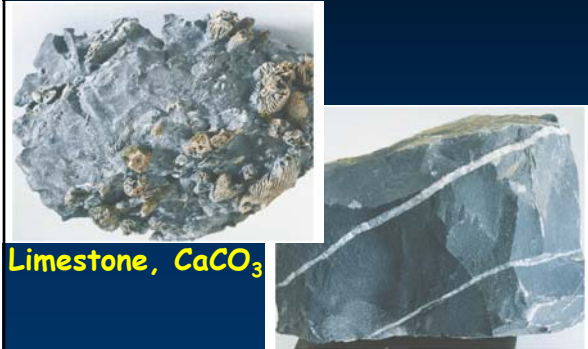


Salt Casts - 260
Millions Year Old

Gypsum - 250
Millions Year Old



Biochemical Sediments - Formed during the growth of organism



Limestone, CaCO_3

Chert Microcrystalline SiO_2

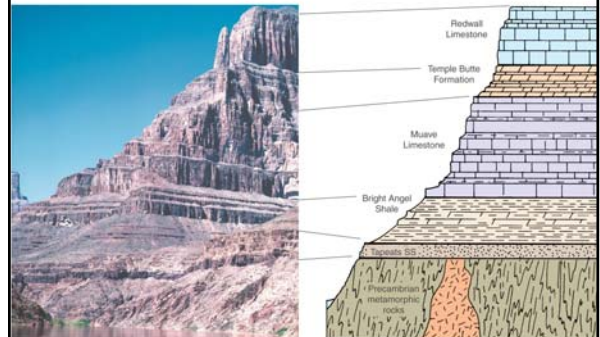


Sedimentary Structures



- Strata or beds
 - Distinct layers having variations in texture, color or physical properties

Layers are easily identified



- Major Strata are called formations
- Contain numerous individual strata

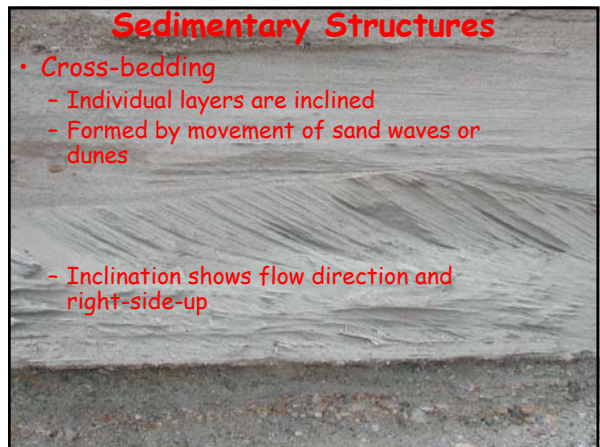
Sediment Transport

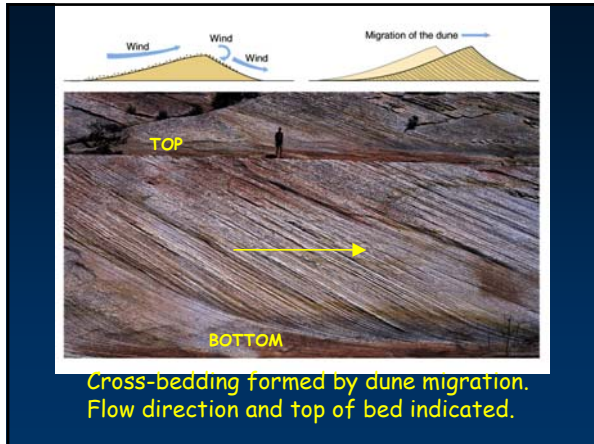
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Creep, Saltation, and Suspension

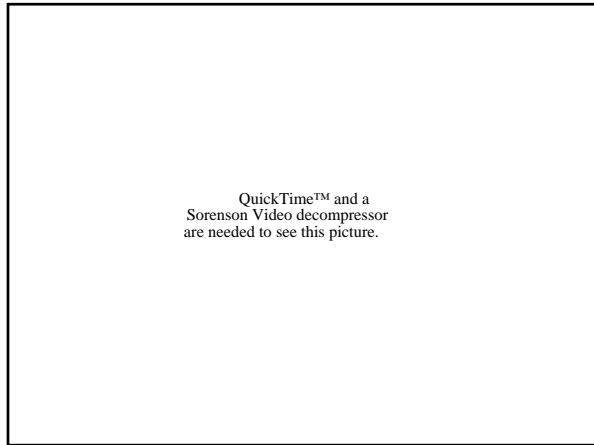
Sedimentary Structures

- Cross-bedding
 - Individual layers are inclined
 - Formed by movement of sand waves or dunes
- Inclination shows flow direction and right-side-up





- **Cross-bedding**
 - Formed by movement of sand waves or dunes
 - Inclination shows flow direction and right-side-up
- Projector 7_1



Sedimentary Structures

- **Graded bedding**
 - Progressive change in grain size upward through a bed
 - Fining upward

Graded bedding

- Commonly formed by turbidites
 - Subaqueous flows of "muddy" water
 - Coarsest particles settle first

Turbidite sequences

QuickTime™ and a
Sorenson Video decompressor
are needed to see this picture.

Surface impressions



- Fossils or Trace Fossils
 - Indicate paleo-environment
 - May provide
 - Depth of water
 - Temperature and salinity
 - Relative age of rock



Sedimentary Systems

- Work on Earth's crust
- Energy drives system to change
 - Solar
 - Chemical Potential
 - Gravity
- Systems include:
 - Weathering
 - Transportation
 - Deposition
 - Lithification

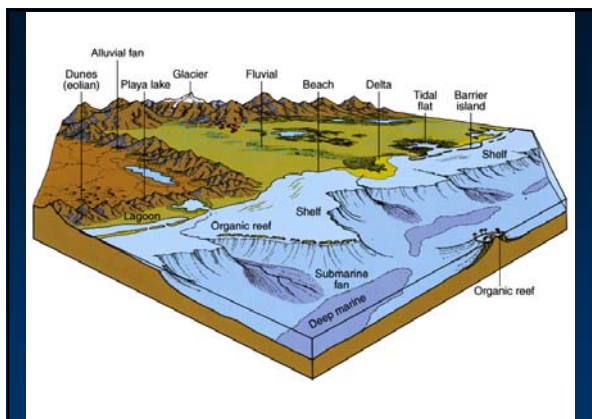


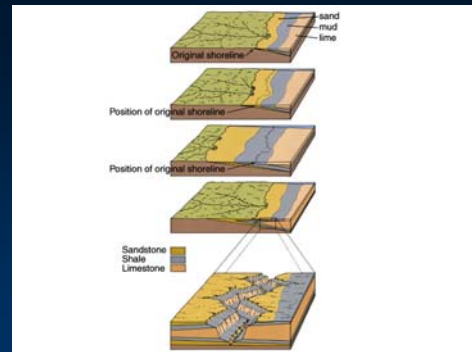
Diagram of major sedimentary systems

Stratigraphic Sequences

- Sequences - Groups of formations bounded by erosional surfaces
 - 17,000 formations within the U.S.
 - Each formation is distinct in time, place and rock type
 - Sequences of formations relate changes in depositional environments

Stratigraphic Sequences

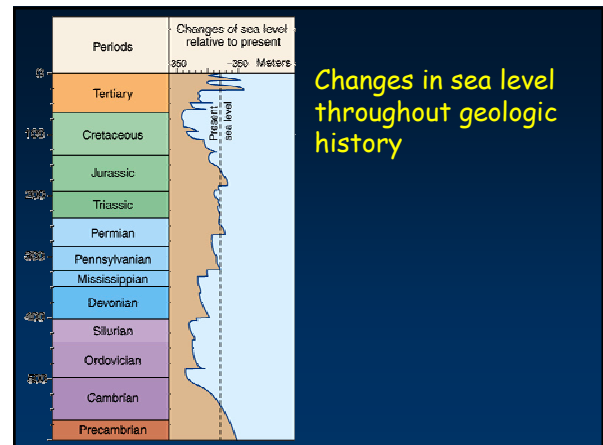
- Advance and retreat of shallow seas
 - Common example of a stratigraphic sequence
 - One cycle consists of
 - Sandstone-shale-limestone-shale-sandstone
 - Sequence base is an unconformity



Sequence of sediments deposited by transgression and regression of shallow sea

Sequence Stratigraphy

- Sedimentary rock formations classified by rock type
- Sequences of formations may be grouped together
 - Sequences separated by unconformity
 - Relate global scale events
 - e.g., Change in sea level



Sedimentary Systems

- Plate tectonics plays a major role
 - Sediment deposition & geographic distribution
 - Sediment source areas
 - Formation of sequences

Continental Environments

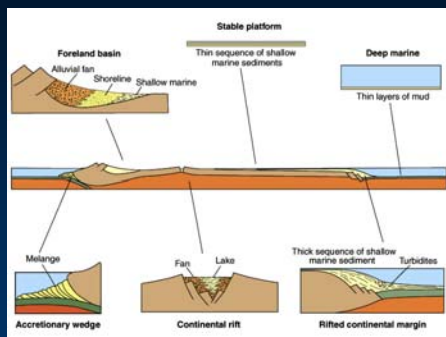
- Sediment produced by weathering & erosion
- Transported by streams, wind or glaciers
- Thin deposits formed
- Most sediment carried to the sea

Continental Rift Valleys

- Sequences of conglomerates & sandstones
 - Proximity to source area
 - Wedge shaped deposits
- Lake or evaporite deposits may form
 - Dependent on climate

Convergent Plate Boundaries

- Subsiding basins associated with folded mountains accumulate clastic sediments
- Shallow seas may form in basins
 - Marine limestones, shales or evaporites
- Turbidites associated with trenches
- Sediment from ocean floor is scraped off to form a melange



Tectonic settings and their associated sedimentary sequences