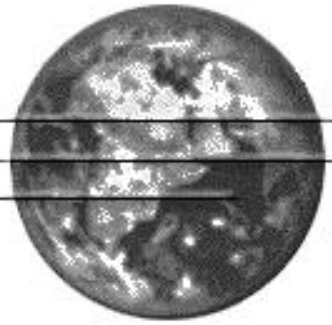
Geoscience 101

The Solid Earth



# Lecture 5

October 18, 20, 23
October 19, 24

## Sediments and Sedimentary Rocks

CHAPTER 7

This is only an outline of the lecture. You will need to go to class to fill in the outline, although much of the relevant information is also in the text.

# SEDIMENTARY ROCKS

## Sediment

Sediment is

Sediment is created by

## Weathering

Mechanical break up of rock may be caused by

Chemical decomposition includes

These changes soften the rock, making mechanical break up easier.

The products of weathering include

1)

2)

3)

4)

## Detrital ("Clastic") Sediment

Clastic sediment consists of

These pieces are divided into:

1)
2)
3)
4)

## Characteristics of Clastic Sediment
## Composition

Some minerals weather faster than others. These more susceptible minerals may oxidize, dissolve or change to clay. Therefore, we don't often find them in the sediment downstream.

We can list the silicate minerals from less resistant (more susceptible) to more resistant:

less resistant

more resistant

As a result, we find that smaller size sediment is made mainly of the more resistant minerals:

## Characteristics of Clastic Sediment
## Size

Sediment is transported by

Sediment transported by landslide or glacier will be of all sizes:

Water

Wind

## Characteristics of Clastic Sediment
## Sorting

Glaciers and landslides

Water sorts sediment moderately well by size.

The size it can carry depends on its velocity and turbulence.

Wind sorts sediment very well.

## Characteristics of Clastic Sediment
## Roundness

Grains become rounded during transport.

Landslides and glaciers do not round

A river rounds gravel very well

Sand grains carried by wind

## Characteristics of Clastic Sediment
## Stratification

Stratification is layering. In water, sediment is deposited horizontal layers, one on top of another.

The layering results from changes in grain size through time, which is caused by

Graded bedding means that the grain size changes within each layer. Usually it changes from large to small (from bottom to top).

Crossbedding means there are beds within beds, and the little beds are not horizontal.  The most common cause of these is sand dunes.

Changes after deposition = Diagenesis

**Lithification: Making Sediment into Rock**
**Compaction**

**Lithification: Making Sediment into Rock**
**Cementation**

## Lithification: Making Sediment into Rock
## Recrystallization

In sedimentary rocks,

Recrystallization is very minor in clastic rocks, but important in formation of limestones (below).

## Chemical and Organic (or "Biochemical") Sediments and Sedimentary Rocks
## Limestone

Limestone mostly is formed by living organisms.

Shells that form limestone are made of calcite or aragonite.

You will see two varieties of limestone in lab:

Limestone reacts with acid, so you can use the acid test to identify it.

Shells become limestone by

**Chemical and Organic (or "Biochemical")**
**Sediments and Sedimentary Rocks**
**Evaporites**

Evaporites precipitate (crystallize) from water as the water evaporates.

The most common evaporite rocks are

Evaporites usually form as hard rocks, originally.  They don't have to be "lithified."

**Chemical and Organic (or "Biochemical")**
**Sediments and Sedimentary Rocks**
**Chert**

Chert is made of

When the shells accumulate in layers on the seafloor, the opal crystallizes to

Chert is harder than glass, like other forms of quartz.

## Chemical and Organic (or "Biochemical") Sediments and Sedimentary Rocks
## Coal

Coal is made from

Instead, it heats and compresses in the absence of oxygen,

Thus, coal is called a hydrocarbon.

## Environments of Deposition
## Wind, Water and Ice

In summary, wind sorts sediment best, then water, then ice.

Ice can carry the largest sediment, then water, then wind.

Sediment is typically stratified, or layered. Sand dunes have cross stratification. Running water often produces graded beds.

You can use these clues to figure out what process deposited the sediment.

**Environments of Deposition**
**Sedimentation in the Ocean**

Sediment in the ocean is more coarse near land, and becomes very fine in the deep ocean.

In the deep ocean, there is no sand or gravel.

Otherwise the deep ocean has mostly organic sediment: