

Outline 17: The Paleozoic World

Shallow marine and terrestrial facies

Shallow marine facies

- Sea level was much higher than today during much of the Paleozoic.
- Shallow epicontinental seas flooded continental interiors.
- Rocks with marine fossils are common in the centers of continents.
- Beach deposits like Seneca Rocks are also common.

Coal Deposits

- Most of the world's coal deposits formed during the Carboniferous. Why?
- Woody plants evolved in the Devonian. These are the plants that form coal.
- Carbon dioxide levels were 10X higher in the early Paleozoic.

Coal Deposits

- Carbon dioxide levels were reduced to modern levels by the end of the Paleozoic.
- What happened to all that CO₂?
- The carbon was converted to wood, then to peat, then to coal. The oxygen was released to the atmosphere.

Chemical Formulas

- Photosynthesis:
$$6\text{H}_2\text{O} + 6\text{CO}_2 = \text{C}_6\text{H}_{12}\text{O}_6 \text{ (sugar)} + 6\text{O}_2$$
- Sugar forms cellulose or wood:
$$\text{C}_6\text{H}_{10}\text{O}_5 + \text{H}_2\text{O}$$
- Wood changes to peat, lignite, bituminous coal, and anthracite under heat and pressure:
$$\text{C}_6 + 5\text{H}_2\text{O}$$
- Anthracite is almost pure carbon

Coal Deposits

- Did extensive coal ever form again?
- CO₂ levels increased again in the Cretaceous, the only other time of significant coal formation.
- Very little coal is forming today.

Cyclothem

- Cyclothem is a cyclic sequence of marine and nonmarine facies. The facies are repeated. Counted by coals.
- Repeated fluctuations of sea level produced the cyclothem.
- Sea level fluctuations associated with fluctuating glaciers on Gondwana.

Cyclothem

- There are about 50 cyclothem in the Illinois Coal Basin. These are tied to worldwide changes in sea level.
- There are about 90 cyclothem in the WV Coal Basin. The extra 40 were caused by delta shifting as rivers changed courses.

U.S. Coal Production

- Wyoming is #1 overall in tonnage. Coal is sub-bituminous.
- West Virginia is #2 overall, but #1 east of the Mississippi River. Coal is bituminous and has 3X more BTUs than Wyoming coal.