The Earth's Climate Constantly Changes

The main source of energy for the Earth comes from the sun.

- Conservation of energy requires that the incoming energy from the sun is balanced by "heat" radiated to space
- Some of the energy radiating to space is depended upon the amount of energy absorbed, reflected, and emitted by the Earth and the amount trapped by the greenhouse effect of the atmosphere (gasses and clouds)
- Carbon molecules (as well as clouds and water) provide a greenhouse effect

A cycling of energy connects climate to carbon and water cycles

- A change in one cycle (energy, water, or carbon) will impact the other two as the system moves to a new equilibrium

There are many components involved in water cycling, the oceans hold most of the Earth's water

- To fully understand the role of the ocean in climate, scientists create models to test hypotheses of ocean circulation and oceanic changes
- Ocean circulation drives global weather patterns
- Biological activity, freshwater input, and changes in sea surface temperatures all influence oceanic expansion/contraction, salinity, density, and carbon levels

Molecules with carbon move between surface ocean, deep ocean, soil, animals, plants, fossil fuels, and atmosphere

- The Earth possesses reservoirs of carbon including the ocean which acts as a long-term reservoir
- Carbon dioxide dissolved in cooler water but is released from warmer water

Climate change is a change in the balance of the cycles

- Paleoclimatic evidence indicates the Earth's climate has constantly changed
- Some changes have more long-standing impacts than others

Changes in the Earths orbit and axial tilt influence climate for thousands of years

Solar output and disruption of oceanic currents influence climate for hundreds to thousands of years

Human activity and large volcanic eruptions influence climate for tens to hundreds of years

- Amplifiers in the climate system, such as ice and greenhouse gasses, disrupt balance and provide feedback for climate change
- Evidence from the past as well as current climate models predict an increase in global temperatures