Changes in climate and CO2

http://www.clearlight.com/~mhieb/WVFossils/Carboniferous_climate.html

Effects of Continental Drift on Climate

[At least] Two possible mechanisms for major global climate change
1. amount of land mass at poles to support ice caps
3. ocean circulation
   • transfer heat from equator to pole
   • effects on aridity

Cooling of Antarctica

http://www.scotese.com/paleocli.htm
Movement of Plates Through Time

Transition to Quaternary: Shocks to biota

Biological tools for assessing past climate

Palynology
Biological tools for assessing past climate

Packrat middens

up to 40,000 years ago

Why?
• crystallized urine slows the decay of the material
• dry climate of the American Southwest
• middens protected under rock overhangs or in cave

Biological tools for assessing past climate

Tree rings

up to ~10,000 years ago

Biological tools for assessing past climate

Coral bands

hundreds of years
Global mean temperature was 4-5 deg C lower than today.

Regional Effects during Glacial Periods

Overall, the world was drier as well.
Utah during the LGM - definitely not drier

Lomolino et al., 2006

Eustatic sea level change

Lomolino et al., 2006

Eustatic sea level change

Lomolino et al., 2006
Differences in vegetation types

Vegetation cover changes from LGM to present in Europe

Equatorial Mountain Changes

Lomolino et al., 2006
Differential species responses: rates, direction

North America refugia

Different refugia, different dispersal patterns of species that coexist today