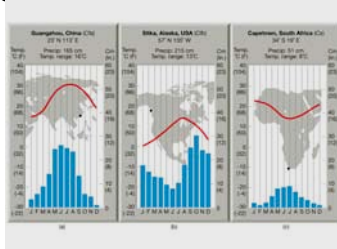


Climate

- Weather at some location averaged over the last 30 years. Also includes weather extremes
- Can vary in space and time

Climagraph:



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Climate Controls

- **Latitude**
- **Distribution of land and water**
- **Ocean Currents**
- **Prevailing Winds**
- **Position of high and low pressures**
- **Mountains**
- **Altitude**

Determining Past Climates

- **Direct Observations**
 - Last 125 years
- **Proxy Data - obs. of other variables that substitute for climate data**
 - Tree rings (100's of years)
 - Pollen (15,000 years)
 - Sediment (10,000-100,000 yrs)
 - Deep Sea sediments (100,000's yrs)
 - Ice Cores (100,000's yrs)

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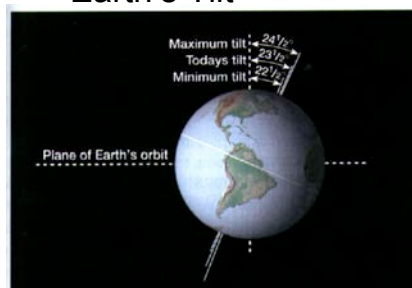
Earth's Past Climate

- Earth has been a warm planet (compared to today) punctuated by 7 Major Glacials.
- Interglacials have lasted 100's of million yrs. to billions of yrs.
- We are currently in the 7th glacial
- Last Glacials began:
 - 700 mya
 - 300 mya
 - 2 mya

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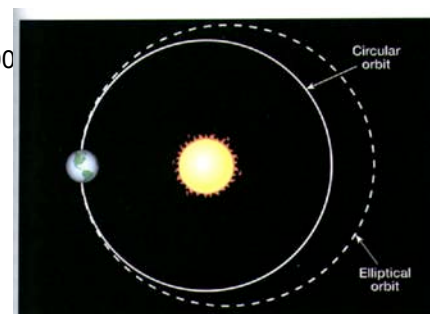
Earth's Tilt

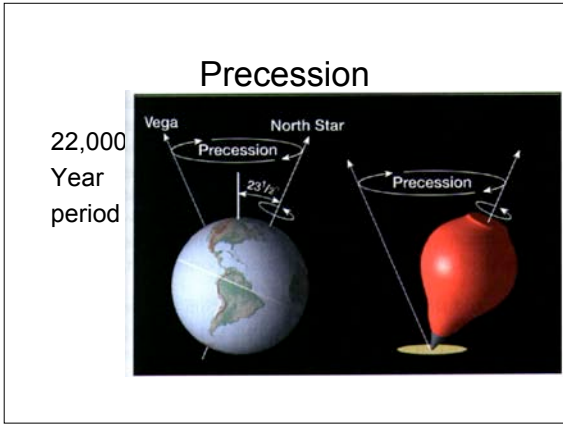
41,000
Year
period



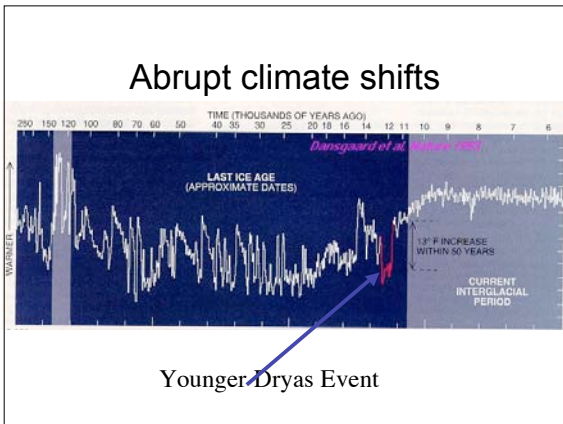
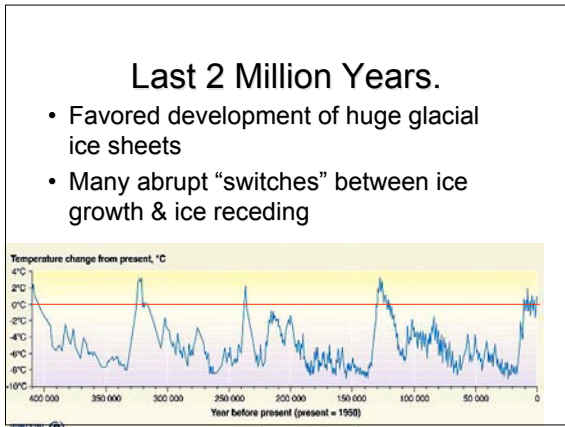
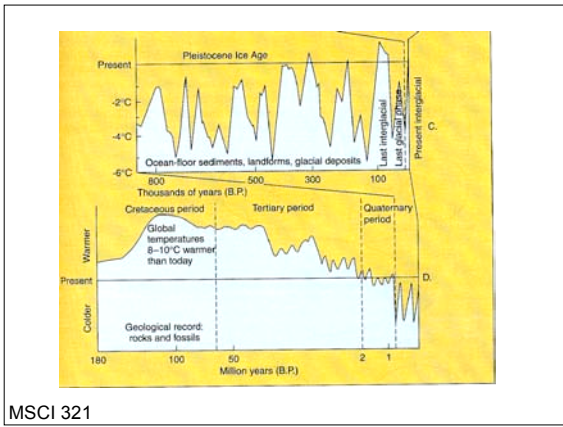
Eccentricity

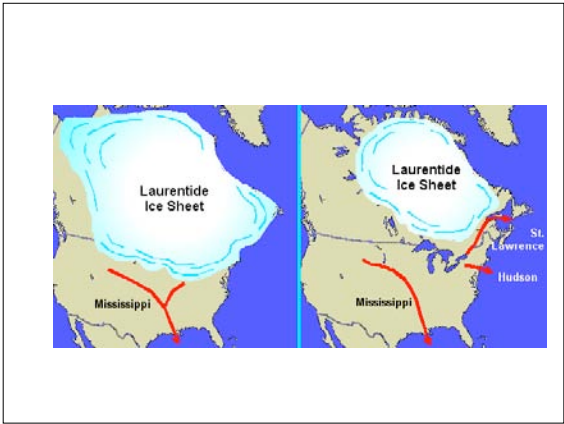
100,000
Year
period





- These 3 (Milankovitch) cycles explain the long lasting glacial/interglacial periods on Earth.
- Last Ice Age peaked 18,000-20,000 y.a. Earth has been melting ever since.
- According to these cycles, Earth should begin cooling and ice should begin growing in the next several 1,000 years.





- Large input of fresh water into the North Atlantic
- Freshwater >> Lower surface density
- If the density of the North Atlantic becomes too low >> Shutdown of NADW
- If NADW does not flow out of high latitudes, warm Gulf Stream water can not flow up to high latitudes

