Monday, February 25

CLIMATE CHANGE (CONTINUED)

Most Recent (2008-2009) Information

- Sea level almost certain to rise 1 meter in less than 100 years.
- It could rise several meters if the ice caps in Greenland and Antarctica continue melting at the current rate.
- Take home message: Feedback loops can rapidly switch between positive and negative.

Projections of Future Changes in Climate

- Some years we will get more precipitation and in some years we will see more drought. We'll go back and forth. This will be difficult. The Amazon rain forest will continue to be drier overall, however.

Effects on Extreme Temperatures

- A change in just a few degrees in the mean (average) means that the extremes are much greater.

A World of Drought

- Many dry areas are getting drier as soils dry out.
- Some wet areas will get wetter, too.
- Observed sea surface temperature (SST) and potential links to rainfall patterns in Africa
- SSTS and Sahelian rainfall have co-varied in the past.
- Some studies suggest links now to the widespread ocean SST trends and global warming.

Dust Storms

- The major dust storms, which have many negative implications, come from a small part of Mali.
- Overgrazing by goats is increasing dust storms in Africa.
  - To keep people from moving, villages put in wells. However, this meant that more goats were staying in one place as more people did not move around. Then, overgrazing continued, resulting in more dust in the air.
  - When dust clouds interact with low pressure systems, they sap the moisture out and dissipate a lot of dust all over the world.

What Influences Atlantic Basin Hurricanes?

- 2009 season: Dry air from African dust storms reduced energy content of storms. Wind shear disrupted development of hurricane structure.

- 2010 season: Very active, 10-11 named storms. Few made landfall in mid-Atlantic region because clockwise winds from stable high pressure systems caused storms to move north. If high pressure system had been 100-200 miles closer to mainland, then major hurricanes would have hit the Atlantic coast.

Hurricane Katrina

- It doesn't take much change in sea surface temperature to cause massive storms to develop.
- The change in the massive strengthening was also created by crossing the warm, deep Loop Current.

Conclusion

- Global climate change, mostly warming, is occurring.
- When there are changes in distribution of species or flowering time, they are occurring in the way that the climate is changing.
- Henry Thoreau took detailed notes about Walden Pond. Scientists have gone back and observed exactly what Thoreau did. They found that flowers today were blooming three weeks earlier than they did when Thoreau was around.

Southeastern U.S. Climate Change Projections

- In the southeastern U.S., temperatures will become warmer, following the global pattern.
- However, precipitation trends are more uncertain. General consensus is that the region will become drier on annual average.
- Growing season rainfall may especially diminish that there will be less rain when plants need them. Extreme storms will occur more frequently.
- Some tropical diseases will occur more frequently in the U.S.

However…

- There are many things we can do to reduce the impact of global warming.
- And, if we are smart, these can lead to a healthier world and a strong economy.

CLIMATE CHANGE PART 2

Problems

- There are two growing problems in the southeast that interact with climate change and increase our vulnerability. We have the fastest growing population. The problems are:
  - using the most energy
  - using the most water and we have recurrent droughts

Cities

- Cities are "heat islands" and modify local weather.

Climate Change in the South

- The southeast in general is vulnerable to:
  - recurrent droughts
  - more really hot days
    - rising sea level
    - extreme storm events

Climate Change and River Flow

- During the drought of 2000, creeks became very full of clay and sediment. It looked like a dark organic soup with little oxygen. Creeks became segmented into little isolated pools.
- In 2006, there was another really bad drought.

More Really Hot Days

- In southeast, half the year above 90 degrees, according to predictions.
- More evaporation (drought)
- More severe storms

Sea Level Rise

- Shallow coastal plain increases vulnerability as does Georgia's large tidal change.
- One third to a half a meter in 40 to 100 years.
  - However, the rates are increasing and this could mean a rise of 1 meter in 40+ yeras. This is virtually certain.
- We already have the largest tidal flux (amplitude) in the world, with one exception.
- We absolutely must set aside undeveloped land to accommodate new salt marsh locations.

Georgia Bight

- Most hurricanes miss Georgia.
- Large barrier islands protect it.
- But, it's not protected by the bight. Tidal amplitude is high and the shallow broad shelf enhances the rise of sea level.

Hurricanes

- When the Bermuda high is north (left side), the hurricane tracks are carried out to sea. When the Bermuda high is south, closer to land and larger (such as in 2004-2005), hurricanes are tracked into the Gulf of Mexico and storms can be tracked into Georgia.