



Important Dates and Events

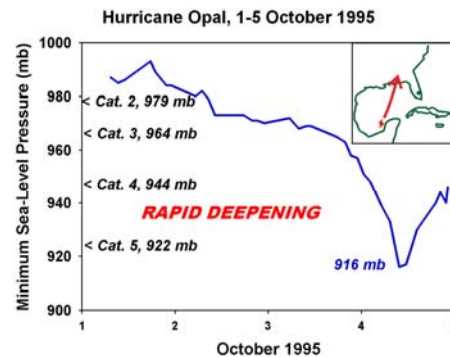
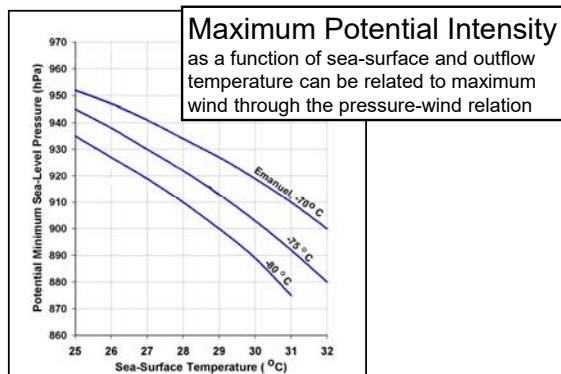
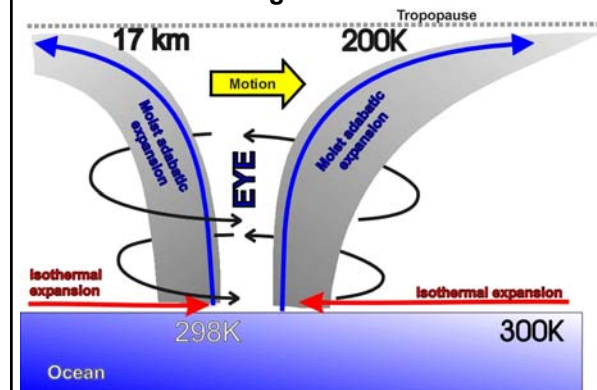
- Paper assignment
 - Length 1500-2000 words, at least 5 references
 - See written assignment for details
 - Preliminary draft to Turnitin 08 November
 - Final hard-copy Wednesday 15 November 2017
- Paper topics due **Monday 19SEP16**
- **Monday 27 September, Lecture 17, EXAM REVIEW. Lectures 1-16**
- **Wednesday 2 October, Lecture 18, EXAM # 1**

Saffir-Simpson Scale

Cat	Winds	Effects
One	74-95 mph	No real damage to building structures.
Two	96-110 mph	Some roofing material, door, and window damage to buildings. Considerable damage to vegetation, mobile homes, and piers.
Three	111-130 mph	Some structural damage to small residences and utility buildings with a minor amount of curtainwall failures. Mobile homes are destroyed.
Four	131-155 mph	More extensive curtainwall failures with some complete roof structure failure on small residences. Major erosion of beach. Major damage to lower floors of structures near the shore.
Five	> 155 mph	Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away.

• Major hurricanes, CAT 3-5, cause 80% of US damage

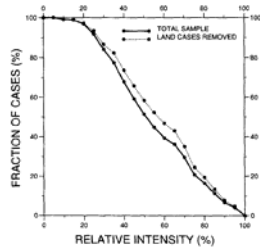
Hurricane Heat Engines



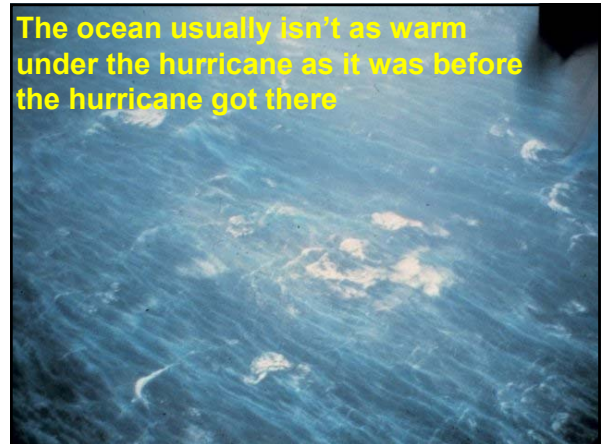
- Rapid deepening causes most major hurricanes
- Time-scale is too short for adequate warnings

Relative Intensity

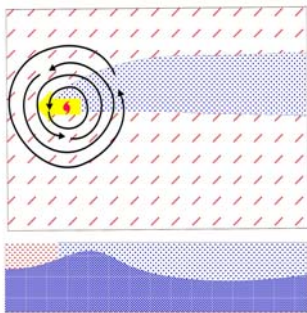
- Plots percent of TCs as a function of Relative Intensity
- Or, $100 \times V_{max}/MPI$
- All values from ~20% to 100% are equally likely.
- Not what you would expect
- Why?
 - Storm-induced cooling
 - Eye-wall replacement
 - Shear
 - Life cycle duration



The ocean usually isn't as warm under the hurricane as it was before the hurricane got there



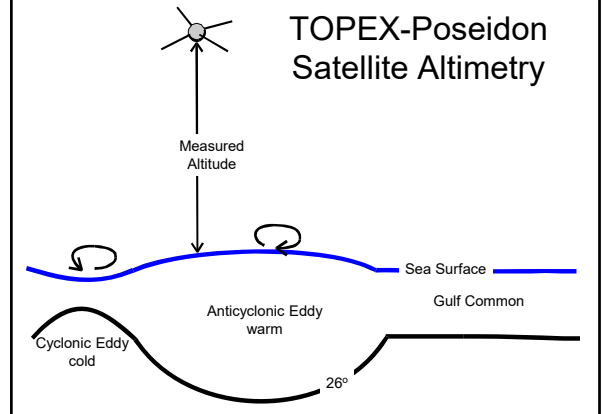
Effect on Ocean Thermal Stratification



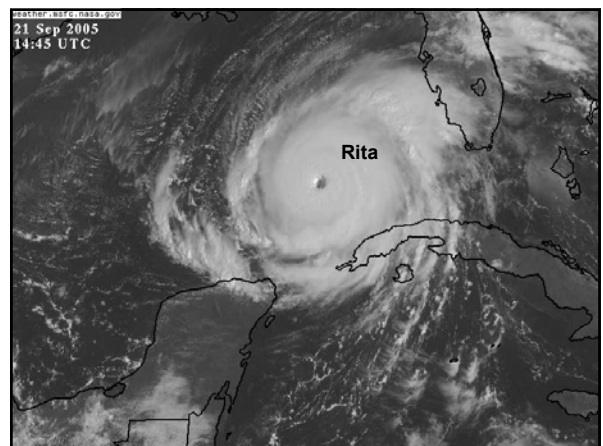
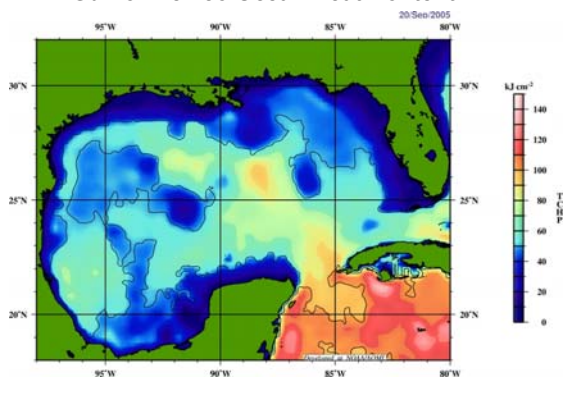
- Momentum transport causes upwelling.
- Wind-induced turbulence mixes cool water upward.

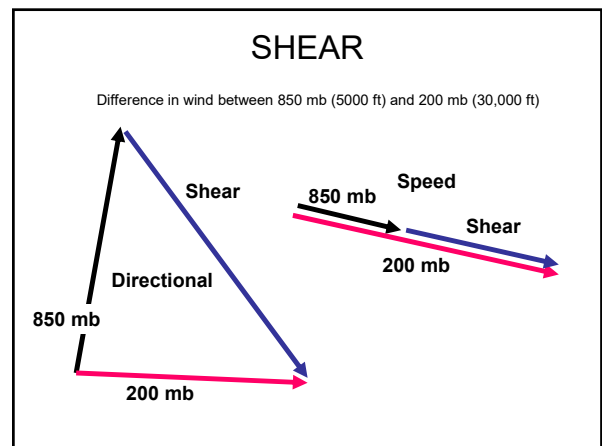
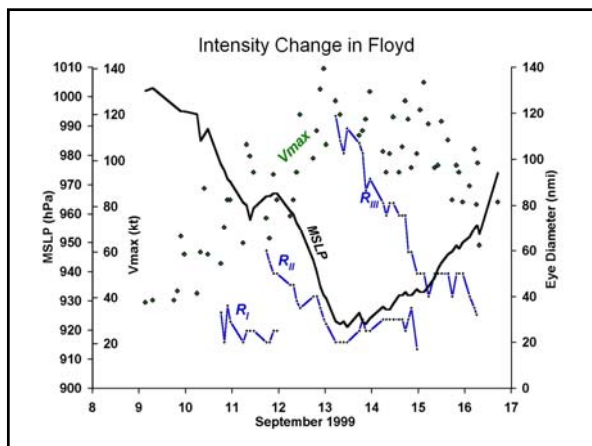
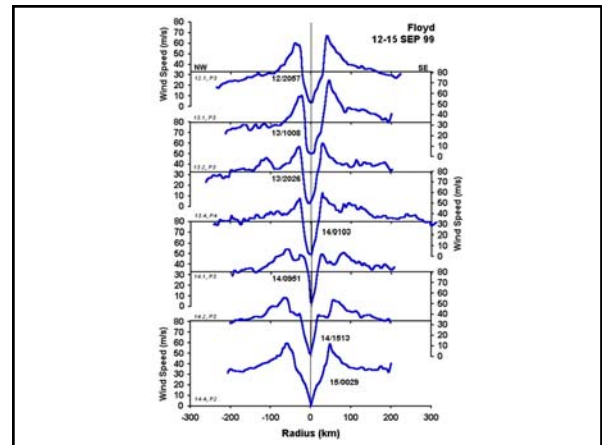
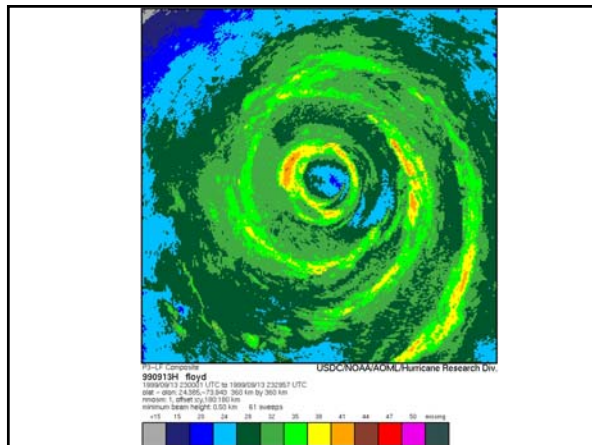
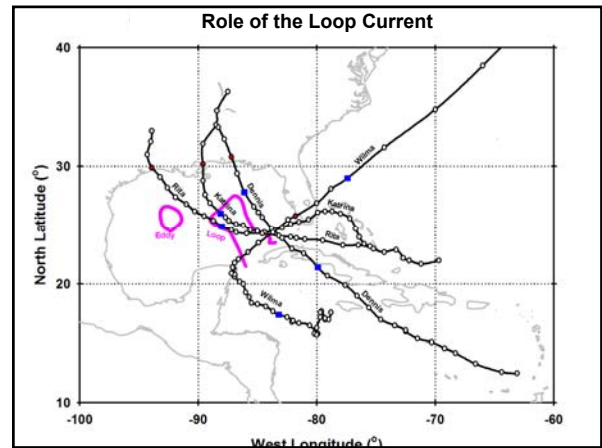
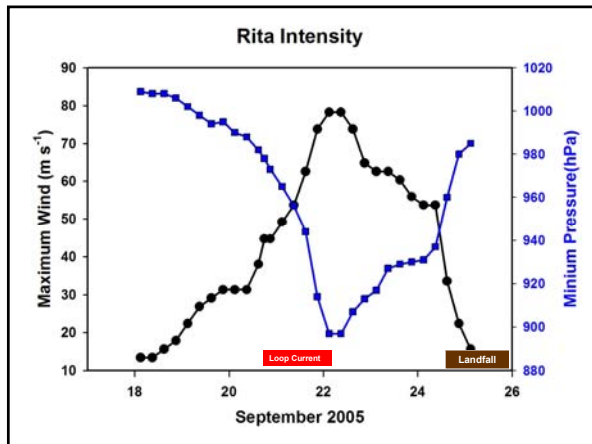
Hurricane Research Division
ACOM/NOAA

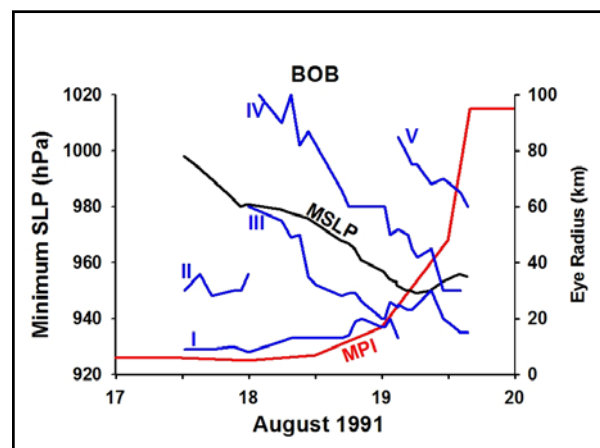
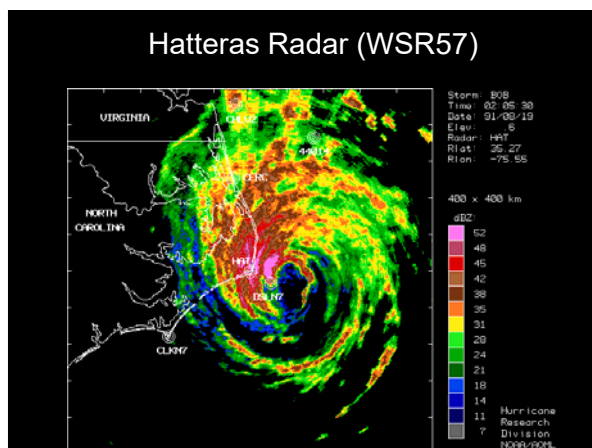
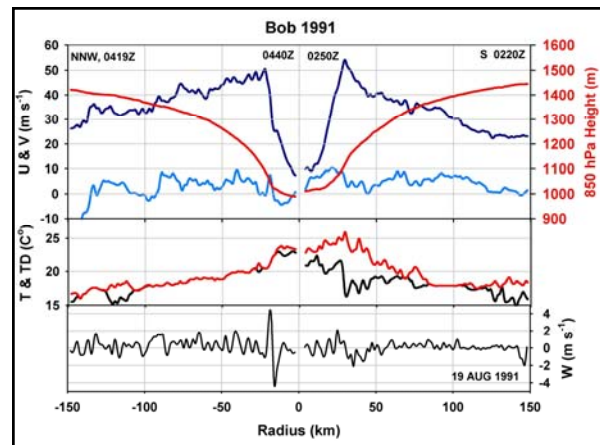
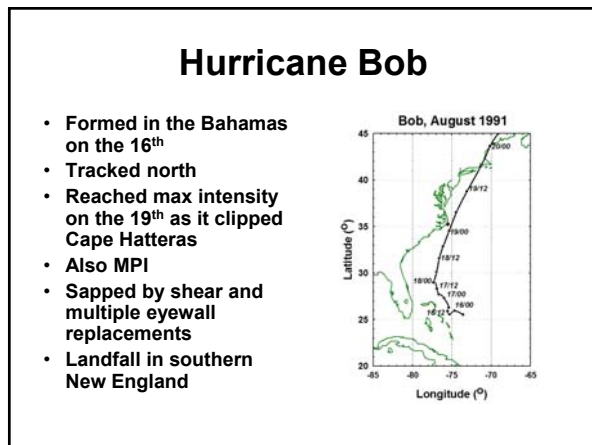
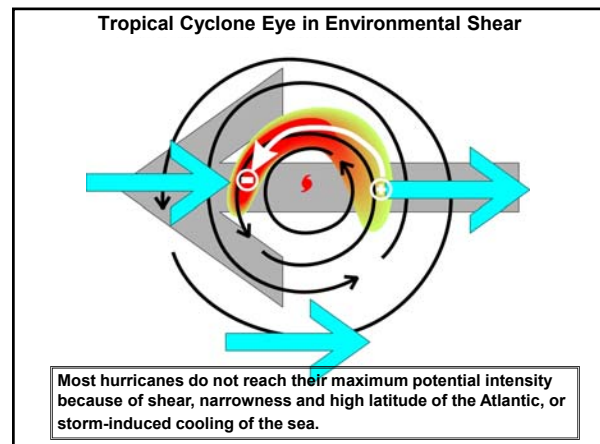
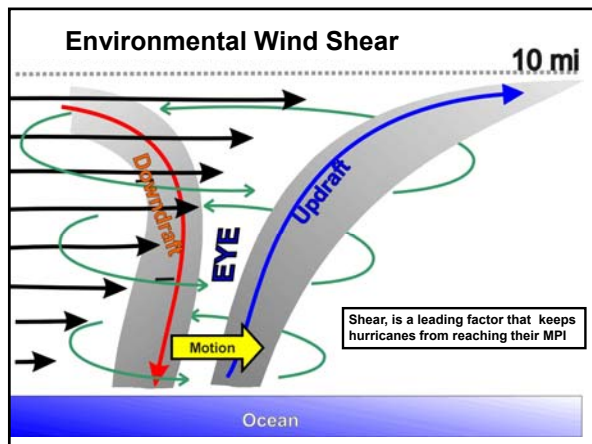
TOPEX-Poseidon Satellite Altimetry



Gulf of Mexico Ocean Heat Content







SUMMARY

- Saffir-Simpson Scale
 - CATS 1-5, from barely a hurricane to worst imaginable
 - CATS 3-5: Major hurricanes, $V > 100$ kt, cause 80% of damage
- Rapid deepening: CAT 1 to CAT 4 or 5 in less than a day
- Most hurricanes are weaker than MPI **because of**
 - Storm-induced cooling of the sea by upwelling and mixing
 - Shear---vertical change of surrounding wind---brings cooler, drier air into the storm
 - Concentric-eyewall replacements: New eye forms around old and strangles it
 - Life cycle duration: Not enough time or open warm ocean to reach MPI
- **Next Lecture:**
 - Galveston and Early 20th Century. E 83-90, S&W 61-95