NATS 101-006 (Spring 2007)
Midterm Examination #3
Study Outline

Chapter 14 – Thunderstorms and Tornadoes

- **Thunderstorms:** What are the main differences between air mass and severe thunderstorms? What are the stages of a typical air mass thunderstorm? What are the various types of severe thunderstorms? What time of day and where do thunderstorms most often form?
- **Downdraft:** How do downdrafts form? Why are they dangerous to aviation?
- **Tornadoes:** What thunderstorm type(s) favor the formation of tornadoes? What conditions are more favorable for the formation of tornadoes? What is the structure of thunderstorms containing tornadoes? The fujita scale is a classification developed by both meteorologists and engineers to determine the strength of a tornado. Know the classifications of F0-F5. **Know how to survive a tornado.**
- **Lightning:** Be able to explain how lightning forms within a thunderstorm and propagates to the ground. There is a specific sequence that is typical followed. Once the sequence is completed, we see lightning instantly but we do not hear thunder until later (sometimes much later). What causes thunder? How can we use thunder to determine the distance of lightning from you and the cause of thunder? How about the odds of lightning striking a student within the classroom? **Know how to decrease these odds of getting struck.**

Chapter 15 - Hurricanes

- **Hurricanes:** What conditions are necessary for hurricane formation (i.e. environmental conditions and triggers)? Where do hurricanes derive their energy? What dictates their motion? How about their development sequence? Where do they tend to form?
- **Hazards:** What causes more damage from a hurricane, winds, rain, flooding, or storm surge? Be able to explain the storm surge, and how a hurricane generates a storm surge. Which sides of a hurricane are strong and weak?

Chapter 16 – Climate Change

- **Climate Change:** What is climate change? What are the causes?
- **Paleoclimate:** What was the climate like in the distant past? What is the effect of plate tectonics (continental drift)? Understand what proxies are used to take measurements for our climate from the distant past (i.e. tree rings, ice cores).
- **CO2 and T:** The influence of Carbon Dioxide on Temperature. Is there a correlation? If so, be able to quantify and explain it.
- **International Agreements:** Understand the agreements, such as the Montreal Protocol. These were primarily explained in lecture.
- **Volcanic Eruptions:** How long can these eruptions affect the climate? Critics have seized onto these eruptions as reasons to not worry about climate change on the long term, be able to reason why this is not necessarily the case.
- **Milankovitch Theory:** Understand and be able to explain all concepts behind this theory and how it relates to ice ages.

Chapter 17 – Global Climate

- **Climate Controls:** There are 5 controls on climate. These are latitude, whether you are landlocked or near an ocean body, whether an ocean current is near you, the general circulation (remember those three cells?), and terrain (or elevation).
- **Climate Classification:** A German Scientist named ***Wladimir Köppen*** classified regions of the world based on their climate. As they are far too numerous to remember (especially when their subscripts are added), just remember the tropical moist (A), dry (D), moist temperate (C), moist cold (D), polar (E) and highland (H) classifications. Know why these tend to occur in certain places on earth and how they relate to the climate controls.

Chapter 18- Air pollution

- **Sources:** What are some of the main sources of pollution? Should people of the United States worry about pollution from China? Why or why not?
- **Smog:** How does it form? What is the difference between London-type smog and L.A. type smog? What type is needed to make each?
- **Ozone:** Why is it important in the upper atmosphere? Why is it hazardous in the lower atmosphere? What are the effects of the ozone hole that is being formed over the Antarctic regions and why is an ozone hole favored there? What substance(s) is causing this hole to form, and at what time(s) does this hole form?
- **Meteorological conditions:** What meteorological conditions favor severe air pollution (i.e. inversions, geographic location, climate, etc.)?
- **Acid Rain:** Explain how this can form and the consequences behind it.
- **Congressional Action:** Congress has taken action under the *Clean Air Act*s of 1970 and 1992 to try to clean up our air in the United States. What was the purpose of each of these acts, and how did each one aid (or in some cases not) in the mandate of regulating air pollution?