NATS 101, Section 13, Fall 2010
Remaining topics for Final Exam
Study Outline

NOTE: REFER TO PREVIOUS STUDY OUTLINES FOR MATERIAL PRIOR TO THIRD MIDTERM.

Chapter 18- Air pollution

Sources: What are some of the main sources of pollution? How are primary pollutants different from secondary pollutants?
Smog: What is the difference between London-type smog and L.A. type smog? What ingredients and environmental conditions needed to make each? (e.g. for photochemical smog NOx, VOCs, presence of sunlight).
Acid Rain: Explain how this can form and the consequences behind it. Where are favored areas for this type of pollution to occur?
Ozone hole: Why is ozone important in the stratosphere? Why is it hazardous in the lower atmosphere but good there? 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 pollutants and atmospheric conditions unique to the Antarctic cause this hole to form? What time of year is the hole worst and why? Is this problem the same as global warming? Why or why not?
Meteorological and geographic conditions: What meteorological conditions and geographic favor severe air pollution (i.e. inversions, geographic location, climate, etc.)? Specifically, what unique geographic and meteorological conditions exist in the western U.S. that strongly favor for the production of photochemical smog?

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) and how far back these proxies can be used to estimate climate. What are some significant events in the paleoclimate record (e.g. Younger Dryas)?
CO2 and T: The influence of Carbon Dioxide on Temperature. Is there a correlation? If so, be able to quantify and explain it.
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 how the changes in Earth's orbital parameters cause ice ages. What is the timescale at which these changes occur?

Global Warming

- **The Data:** What is being suggested by the data alone concerning climate change? When is the period of greatest warming occurring? Is the warming globally uniform? If not, what regions are most adversely affected? What are some of the observed changes with respect to other variables of climate (i.e. not temperature related)? What greenhouse gas seems to be most correlated with the warming (if any)? What is the meaning of positive and negative feedbacks? Give some examples of key feedbacks in the climate system.
- **Attribution:** How are global climate models used to attribute global warming to human activity?
- **Future climate projections:** Global Climate Models have been employed to try to project the future change that global climate change may cause. What do these models tell us? Give some examples of the IPCC model scenarios. What are some projected consequences of global climate change (i.e. sea level change)? What about specific impacts in Arizona and the Southwest? What are some of the caveats and uncertainties in the IPCC climate projections?
- **What do you think?** What is your position on the global warming question and what do you think we should do? **Be able to substantiate your position with facts.**

I strongly suggest utilize the supplementary materials posted on the course website for studying this topic, in addition to the lectures and textbook.