Atmospheric Sciences 101 Midterm 1 Study Guide

These questions should not be interpreted as examples of the questions that might be on the test, but rather used to guide your studying.

Tools

1) Practice isoplething with problems from chapter 1 in the textbook.

Heat Transfer, Radiation and Temperature:

2) Name the three ways that heat can be transferred, define each method, and give an example of each that is important for the atmosphere.

3) Explain why the temperature in the lower atmosphere often decreases with height during the day but can increase with height at night.

4) Define temperature in terms of molecular motions. What changes in molecular motions correspond to increases or decreases in temperature?

5) How does the temperature of an object relate to the wavelength and intensity of radiation emitted?

Global Energy Balance

6) Is the amount of radiation absorbed always the same as the amount emitted for the Earth as a whole?

7) Is the amount of radiation absorbed always the same as the amount emitted at individual locations (e.g. in the tropics)? If not, what processes make up the differences in radiation budgets at different locations?

8) What is albedo, and what is its effect on the temperature of an area?

Temperature

9) What are the most important factors that determine the daily temperature variations at a specfic location?

10) What are the most important factors that determine the seasonal temperature variations at a specfic location?

11) What are the most important factors that determine the climatological temperatures at a location (e.g. Seattle vs. San Diego, Seattle vs. Boston, Seattle vs. Denver)?

12) How can advection change the temperature at a location?

Role of Water

13) What is saturation? What is saturation vapor pressure?

14) What are the two ways that unsaturated air can be brought to saturation?

15) What other ingredients are needed for saturated air to condense to form fog or clouds?

16) What is latent heat? Does condensation have a warming or cooling effect? What about evaporation? Freezing? Melting?

17) What is the difference between relative humidity and dewpoint? What are the strengths and limitations of each as a measure of atmospheric humidity?

18) What factors favor the formation of dew and frost?

19) How are the various types of fog formed? Which involve moistening the air, and which involve cooling it?

Satellite and Radar Imagery

20) What does the brightness in an IR satellite image tell you about the temperature of the object? How is this useful in assessing the elevations of different clouds in satellite images?

21) What do reflectivity and Doppler radar imagery tell you? What are their limitations?