

NATS 101-006 (Spring 2007)

Midterm Examination #1

Study Outline

Chapter 1 – The Earth and It's Atmosphere

Composition of the Atmosphere: The most abundant gasses (Nitrogen, Oxygen, Argon, Neon), the importance of greenhouse gasses, the concern of changing concentrations of Carbon Dioxide.

Vertical profiles: Temperature and Pressure

Layers of the atmosphere: The order and importance each layer plays in the earth's atmosphere (troposphere, tropopause, stratosphere, stratopause, etc.) Does temperature or pressure determine each layer?

Mass, weight, density, pressure: gravity pulls downward on a mass producing weight. Pressure is a measure of the weight of the air above. Mercury barometer. Typical sea level pressure reading and units. Air pressure and air density (mass/volume) both decrease with increasing altitude.

Knowing how to calculate pressure at certain altitudes.

GMT: Knowing how to translate this time to a certain time zone (namely Tucson's).

Station model notation: Knowing how to translate weather information given to you into a station model, with all the parameters about the station in their proper positions on the model.

Chapter 2 – Energy: Warming the Earth and the Atmosphere

Energy and temperature: temperature is a measure of average kinetic energy. *Know how to convert between all three temperature scales.*

Energy transport: conduction, convection, radiation, latent heat (names of various phase changes, is energy absorbed or given off). Vertical forces on air parcels, free convection.

Electromagnetic radiation: static electricity and electric fields, wavelength, frequency, and energy.

Electromagnetic spectrum - UV, visible, and IR light.

Laws governing the emission (kind and amount) of radiation and how to calculate them.

Radiative equilibrium: on earth with and without an atmosphere. What is so important about selective absorption of radiation by earth's atmosphere? How about greenhouse gases and the greenhouse effect?

Chapter 3 – Seasonal and Daily Temperatures

Seasons: dates and orientation of earth on the solstices and equinoxes. What are the factors affecting the arrival of sunlight energy at the ground?

Controls of temperature: effects of latitude, land/ocean, altitude on annual mean and range. What is so important about the effects of clouds and wind on daytime and nighttime temperatures, as well as the effect wind and temperature on your body?

Chapter 4 – Atmospheric Moisture (Lecture 8)

Humidity: saturation, humidity variables - mixing ratio, saturation mixing ratio, relative humidity and dew point temperature. Understand the concepts behind them, and **how to calculate them.**

Chapter 5 – Condensation: Dew, Fog, and Clouds

CCN's and Fog: Dew and frost. The importance of cloud condensation nuclei and how *all 4 types of fog form.*

Cloud identification and classification: *ten cloud types, key words.*

Chapter 6 – Stability and Cloud Development

Determining Stability: Stable vs. Unstable, Conditionally Unstable Air. How do you determine when an air parcel is stable or unstable? Know the importance and usage of environmental, dry and moist adiabatic lapse rates.

Cloud Development and Stability: How clouds form over topography versus when clouds form as a result of convection. What is the process that allows a drop to grow 2 orders of magnitude in terms of hours, rather than days or weeks?

Chapter 7 – Precipitation

Precipitation Processes: Know the collision, coalescence and ice-crystal processes.

Precipitation types: Know the temperature profile differences between rain, snow, sleet, freezing rain, snow grains, snow pellets and hail.

Notes: There will be 25 short answer/calculation questions, with no multiple choice questions. The questions for review, thought, problems and exercises are all extremely helpful items to prepare you for this exam. If you have found that past lecture material did confuse you, or some questions for review were rather difficult to answer, see either of us during office hours or be prepared to ask them during the review session (but remember that time is limited to 50 minutes and you are competing with 125 students asking questions).

The exam will consist of material from lectures 1-13, and Chapters 1-7. It will be 50 minutes long, and no more. Good luck with your studies!

-Professor Castro and Mr. Bieda