

ESS 5 The Atmosphere (2007S) Midterm study guide

Chapter 1:

- ❖ Thickness of the atmosphere
- ❖ Composition of the atmosphere: permanent gases and variable gases
- ❖ Air pressure, what is the sea level pressure?
- ❖ What is the volcanic outgassing? Why is it important?
- ❖ Vertical structure of the atmosphere: names of layers, properties of every layer, temperature variation in every layer
- ❖ Units of pressure and temperature

Chapter 2:

- ❖ Solar radiation and terrestrial radiation
- ❖ Spectrum of solar radiation
- ❖ Atmospheric window
- ❖ Stefan-Boltzman's law: what does it tell us?
- ❖ Wein's law: what does it tell us?
- ❖ Absolute zero temperature: what does it mean in term of the motion of air molecular?
- ❖ Solar luminosity, solar flux and solar constant

Chapter 3:

- ❖ Definition of greenhouse effect and properties of greenhouse gases
- ❖ Greenhouse effect on Mars, Earth and Venus
- ❖ Selective absorption of atmosphere
- ❖ Rayleigh scattering and Mie scattering: Why sky is blue? Why sky is red?
- ❖ Energy balance on Earth: how much (percentage) solar radiation is absorbed/scattered by the atmosphere, cloud, and the surface?

Chapter 4:

- ❖ Forces that affect wind speed and direction: pressure gradient force, Coriolis force, friction and centrifugal force.
- ❖ Hydrostatic balance: What does it mean? How many forces are involved?
- ❖ geostrophic balance and gradient wind balance
- ❖ Super-geostrophic and sub-geostrophic flow
- ❖ Cyclone and anti-cyclone: Is it high or low pressure system?

Chapter 5:

- ❖ Saturation and unsaturation
- ❖ Water vapor indices: Which changes with temperature changes? Which doesn't?
- ❖ Make sure you understand the differences among these indices.
- ❖ Five kinds of fog