

Physics 311, Fall 2008

Review IV

8. Global Change (Lecture Notes 8, Chap 9-7)

- b. Must understand the energy balance equation (see Review III 7.4); know what factors may contribute to variations in Earth's surface temperature.
- c. Know of the history of Earth's climate and the issue of global warming.
- d. Must know what is the solar constant. Know roughly how much variation has been observed in the solar constant, and whether this alone can account for global warming in the past century.
- e. In general, understand arguments on global change within the scope of this course.
- f. Know what is earthshine, in general what we measure from the ratio of earthshine intensity to the crescent intensity, and how earthshine measurements may be useful to address the Earth's climate change.

9. Jovian Planets and Rings (Lecture Notes 9; Chap 12, 14)

9.1-2 Introduction, Motion

- a. Carefully study the data for the Jovian planets. Must know the general properties of the Jovian planets: orbit, rotation, size, mass, density, composition, atmosphere, and magnetic fields, in comparison with the terrestrial planets.
- b. Must know what is a differential rotation, and what it tells us about the interior of a planet.
- c. Know the history of discoveries of the Jovian planets.

9.3-4 Atmosphere & Internal Structure

- a. Must know the atmosphere circulation patterns on the Jovian planets and how they form, in comparison with the terrestrial planets.
- b. Must know cloud patterns on Jupiter and Saturn: zones, belts, spots (e.g. Great Red Spot), ovals, and what kind of motions is found in these features.
- c. Must know how Jupiter's surface appears in visible and infrared observations, and what's the meaning of these observations.
- d. Must know the source of energy that drives the atmosphere activities on the Jovian planets. Understand why some atmospheres are more dynamic than others.
- e. Must know the composition, structure, and temperature profiles of the Jovian atmospheres, in comparison with atmospheres of the terrestrial planets.
- f. Know the internal structure of the Jovian planets, in comparison with the terrestrial planets.
- g. Must know methods to deduce the interior structure of a planet.

9.5 Magnetic fields

- a. Must know mechanisms to generate global magnetic fields in the terrestrial and the Jovian planets: what is common, what is different.
- b. Must know what are plasmas and how plasmas behave in magnetic fields.

- c. Must know how the magnetosphere of a planet is observed. Must know what causes auroras on planets, where they are observed, and why.
- d. Must understand why Jupiter has strong magnetic fields and magnetosphere.
- e. Know properties of Uranus and Neptune's magnetic fields.

9.6 Rings

- a. Know general properties of the Jovian planets' (esp. Saturn's) rings: ring systems, divisions (gaps), ring particles, brightness, colors, and arrangement.
- b. Must know how rings formed around the Jovian planets.
- c. Must know what is tidal force, and what effects tidal forces have on planets and satellites. Must know what is the Roche limit. Must understand why rings of the the Jovian planets are within the Roche limit.

General: must understand the critical role of gravity in many important properties of the Jovian planets (see the summary in Lecture 9).

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