ESS11: CLIMATE CHANGE AND POLICY

Homework # 3

(due Tuesday - 10 February)

1. In the early morning, steam (hot air) from power-plant exhaust stacks does not rise much beyond the top of the stack, but merely fans out horizontally with the wind.
   (a) What type of atmospheric stability condition is this?
   (b) In the late afternoon, this steam will rise almost straight up to 1 km altitude or more before disappearing, what changed?

2. Rising motion is the primary atmospheric motion that leads to cloud formation.
   (a) Explain why?
   (b) List the four major ways to produce rising motion in the atmosphere
   (c) During the rising motion (before the cloud forms), is it the relative humidity or the specific humidity that remains constant?
   (d) What are the units of specific humidity and relative humidity?

3. (a) What are the four basic cloud types based on cloud property?
   (b) What are the four basic cloud types based on cloud height?
   (c) Most of the clouds are formed within which part of the atmosphere?
   (d) Explain why high clouds tend to produce a heating effect on Earth's surface, while low clouds tend to produce a cooling effect.

4. Santa Ana Wind events tend to happen in the Southern California during the winter time.
   (a) What is Santa Ana Wind? Describe its wind speed and direction, humidity, and temperature.
   (b) Why the events happen in the winter time?
   (c) Do you expect the events to be stronger in the day time or the night time? Why?