

Name: _____ Section: _____

Atmospheric Sciences 101, Spring 2008

Homework 2 (Due at the beginning of your section, Thursday April 17 or Friday April 18)

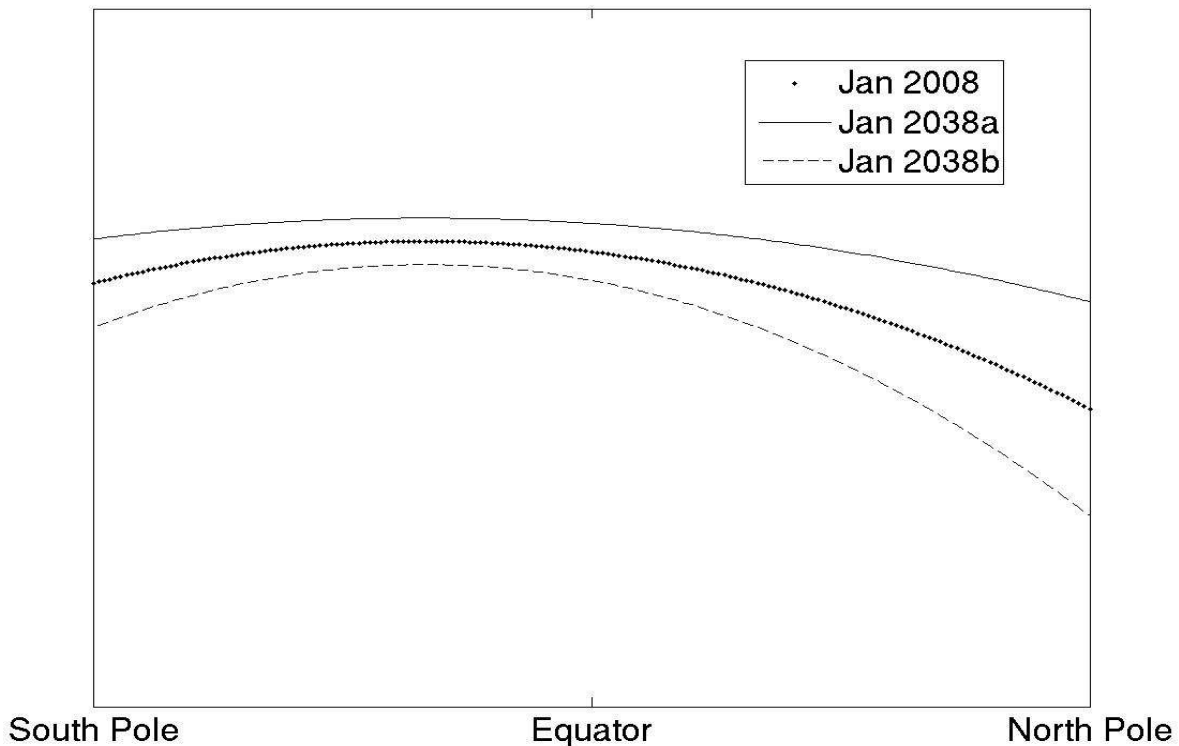
Turn in by 4:30 PM on the due date to receive 75% of possible credit

No assignments accepted after 4:30 PM on the due date

1. Heat Balance and Atmospheric Work

The year is 2038. You are examining the heat ledger for Earth for the past winter. Temperatures in the northern hemisphere were very mild this January, much warmer than 30 years ago back in January of 2008.

A. The following charts show outgoing infrared radiation in January. Which of the two 2038 charts is qualitatively correct for a warmer northern hemisphere, 2038 a. or 2038 b.?



B. Circle one: did the atmosphere have to do [more / less / the same] work to even out the pole-to-equator temperature gradient in 2038 as it did in 2008? Assume the incoming solar radiation was the same in both 2008 and 2038.

2. Seasonal cycle and Earth's tilt

The tilt of the Earth's axis got bumped by a big asteroid, and now instead of 23.5 degrees, the tilt is 25 degrees.

A. Is the length of daylight hours in Seattle in December longer or shorter?

B. Is the length of daylight hours in Seattle in June longer or shorter?

C. Would you expect a change in the seasonal variation in the climate of Seattle? If so, describe briefly.

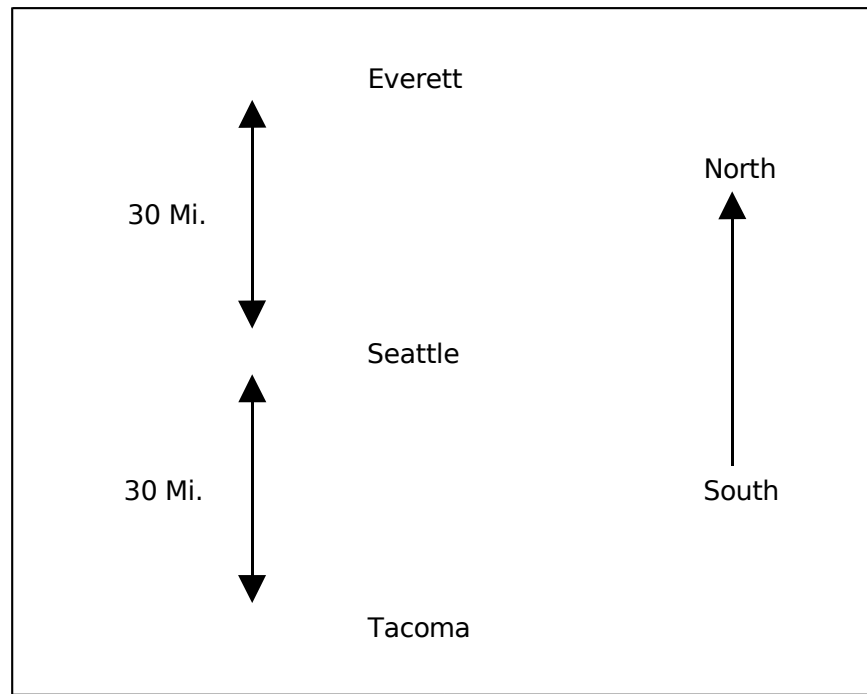
3. Advection

The wind is blowing from south to north at 30 miles per hour. The temperature in Tacoma is 20° C, in Seattle is 15° C, and in Everett 10° C. Assume that the distances between cities is as shown schematically below.

What would be a reasonable estimate for the temperature one hour later in the following cities:

A. Seattle?

B. Everett?



4. Moisture and Latent Heat

A. A raindrop in a box of air evaporates. Does the temperature of the air in the box increase, decrease or stay the same?

B. A cloud forms by condensation of water vapor into liquid droplets. What effect does the condensation have on the temperature of the air in and around the new cloud?

5. Climatological temperatures

Fill in the following table with the cities Seattle WA, Minneapolis MN, Dallas TX, and Miami FL. Match each city to its data. This follows Exercise 2 from Chapter 3 in the text.

City	Average January Temperature (° F)	Average July Temperature (° F)
	44.1	85.0
	13.1	73.2
	40.9	65.3
	68.1	83.7