ATM 211

Force Balance Exercise

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

You have been given two maps. The first map shows 250-mb height from a 132-hr forecast from 1200 UTC 18 February 2010. The second shows sea level pressure from 0000 UTC 7 February 2010.

1. In the 250-mb height map, draw the forces involved in *geostrophic balance* for each location denoted with a star. Then, draw the *geostrophic wind* for each point, and label each vector.

2. In the sea level pressure map, draw the forces involved in *Ekman balance (surface flow)* for each location denoted with a star. Then, draw the *surface wind* for each point, and label each vector.

3. On the 250-mb map, where (geographically) are the strongest winds located? How can you tell?

4. On the 250-mb map, where do you think the **ageostrophic wind** is strongest? **Why**? *Hint: Remember what makes the wind “non-geostrophic,” and look for such regions in the height field. There is no specific correct answer, but be sure to support your answer with a thorough explanation.*

5. On the surface (sea level pressure) map, where are the strongest winds likely located? Why?

6. Where do you think the surface winds are **stronger**, 100 miles southeast of the coast of South Carolina, or over western Nebraska? Why? *(Note: There is no real right answer here, but carefully describe your choice, thinking about all forces involved).*