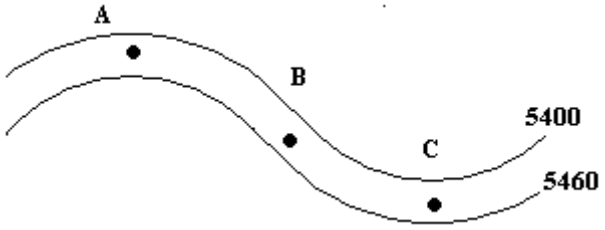
ESCI 241 – Meteorology
Answers to Selected Exercises for Lesson 12

1. a. For the 500 mb isohypse pattern below calculate the magnitude of the geostrophic wind at point B. Assume a horizontal distance between isobars of 150 km, and $f = 10^{-4}\ s^{-1}$. The contour heights are given in meters.



Answer: 39.2 m/s

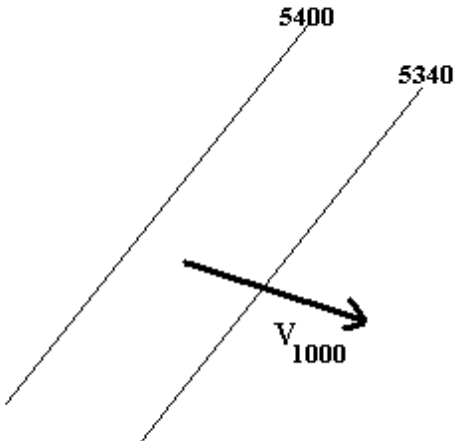
b. For points A, B, and C tell whether you would expect the actual wind to be greater than, less than, or equal to the geostrophic wind.

Answer: A greater; B same; C less

2. Find the thickness of the 1000 mb to 500 mb layer for a layer average temperature of –7°C.

Answer: 5400 m

3. The diagram below shows the 1000 – 500 mb thickness contours and the 1000 mb wind.

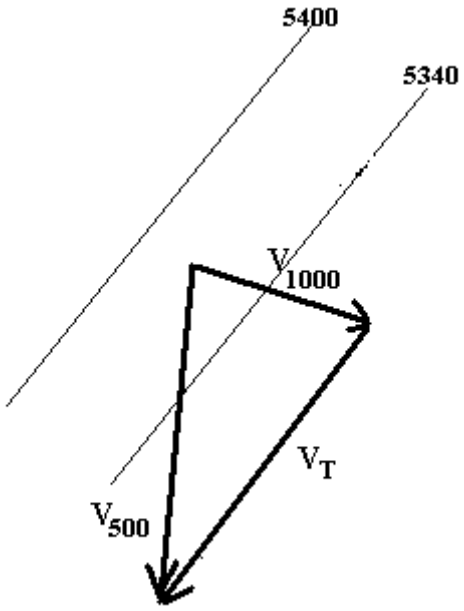


a. Calculate the magnitude of the thermal wind. Use a horizontal distance between the thickness contours of 200 km and $f = 10^{-4}\text{s}^{-1}$.

Answer: 29 m/s

b. Assuming that the 1000 mb wind is 15 m/s, draw the thermal wind on the diagram. Also draw the 500 mb wind and estimate its magnitude.

Answer: 28 m/s



c. Will the 1000 – 500 mb layer be warming or cooling in this case?

Answer: warming