Climate of the Ocean – Exercise 4 **07.12.2016**

Task 1:

Calculate the geostrophic wind speed (in m/s) on an isobaric surface for a geopotential height gradient of 100 m per 1000 km, and compare with all possible gradient wind speeds for the same geopotential height gradient and a radius of curvature of ±500 km. Let $f=10^{-4}s^{-1}$.

Task 2:

Determine the maximum possible ratio of the normal anticyclonic gradient wind speed to the geostrophic wind speed for the same pressure gradient.

Task 3:

On a certain occasion the wind at 850 hPa was 15 ms^{-1} from the NE and the average temperature between 850 and 500 hPa was found to increase to the south at a rate of 4 K per 100 km. Estimate the magnitude and direction of the wind at 500 hPa on that occasion. (This temperature gradient has been chosen to be typical of those in frontal regions.)

Task 4:

Explain why in any given season the polar jet stream is stronger in the southern than in the northern hemisphere and why there is less variation in the strength of the jet between winter and summer in the southern hemisphere.