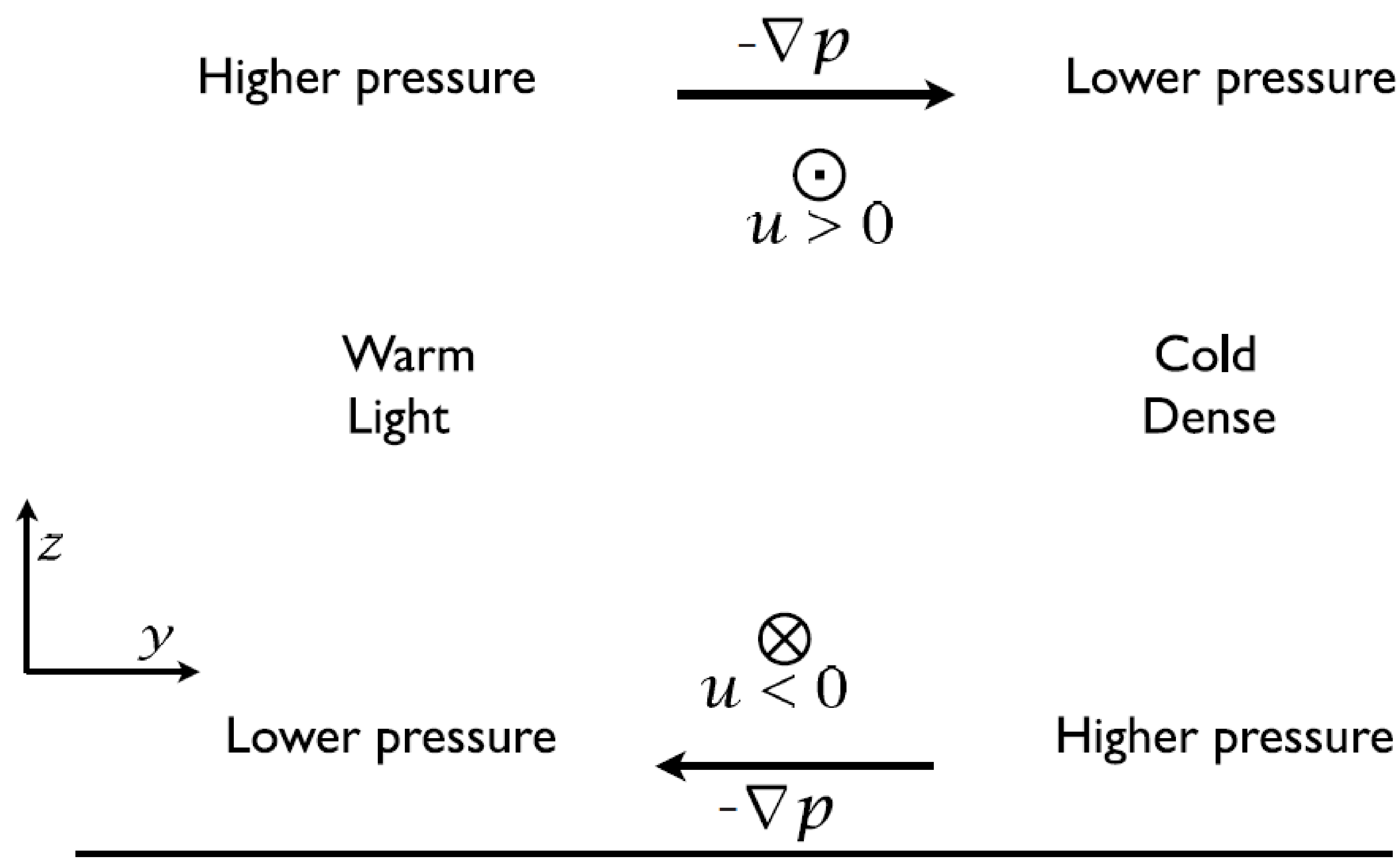
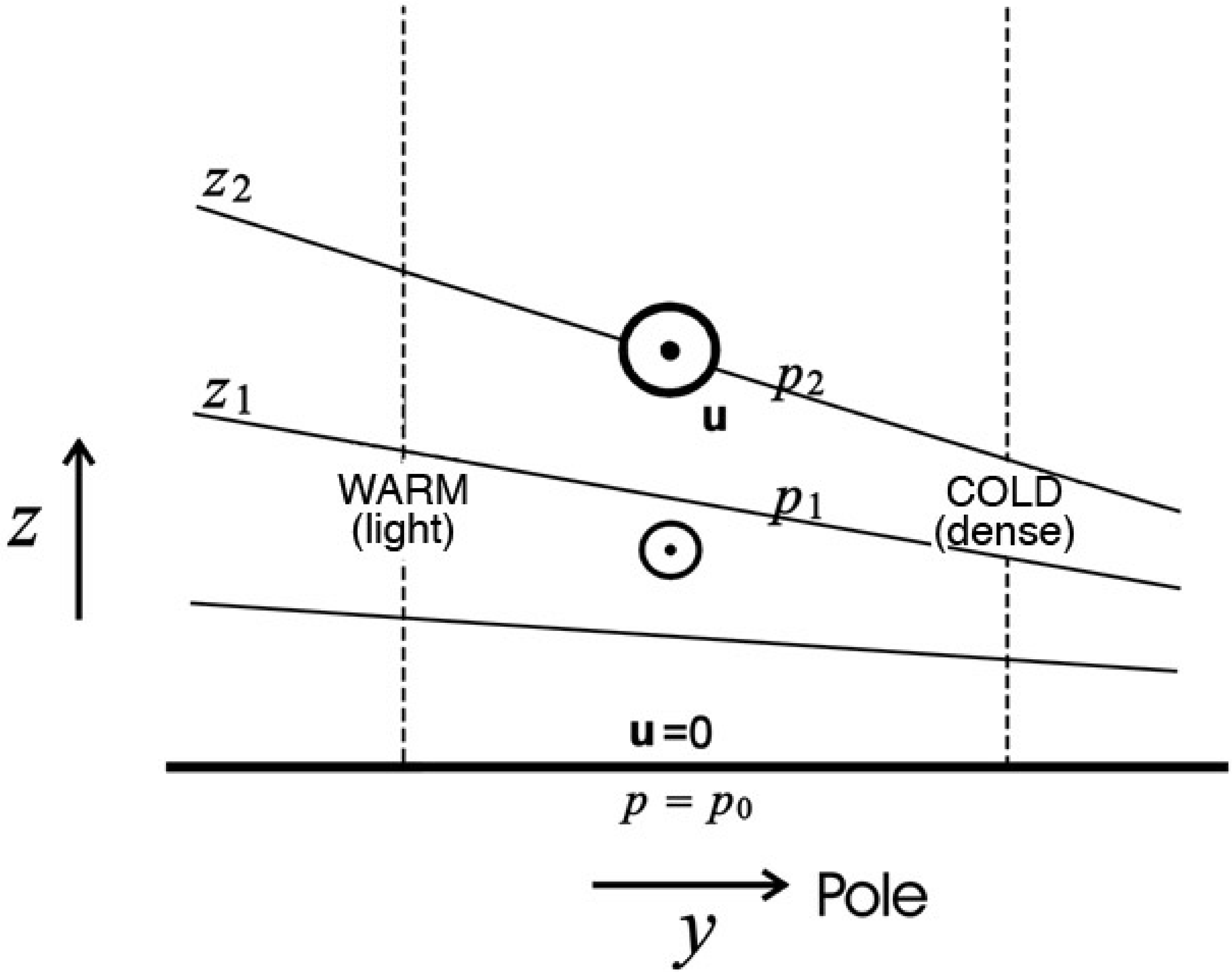
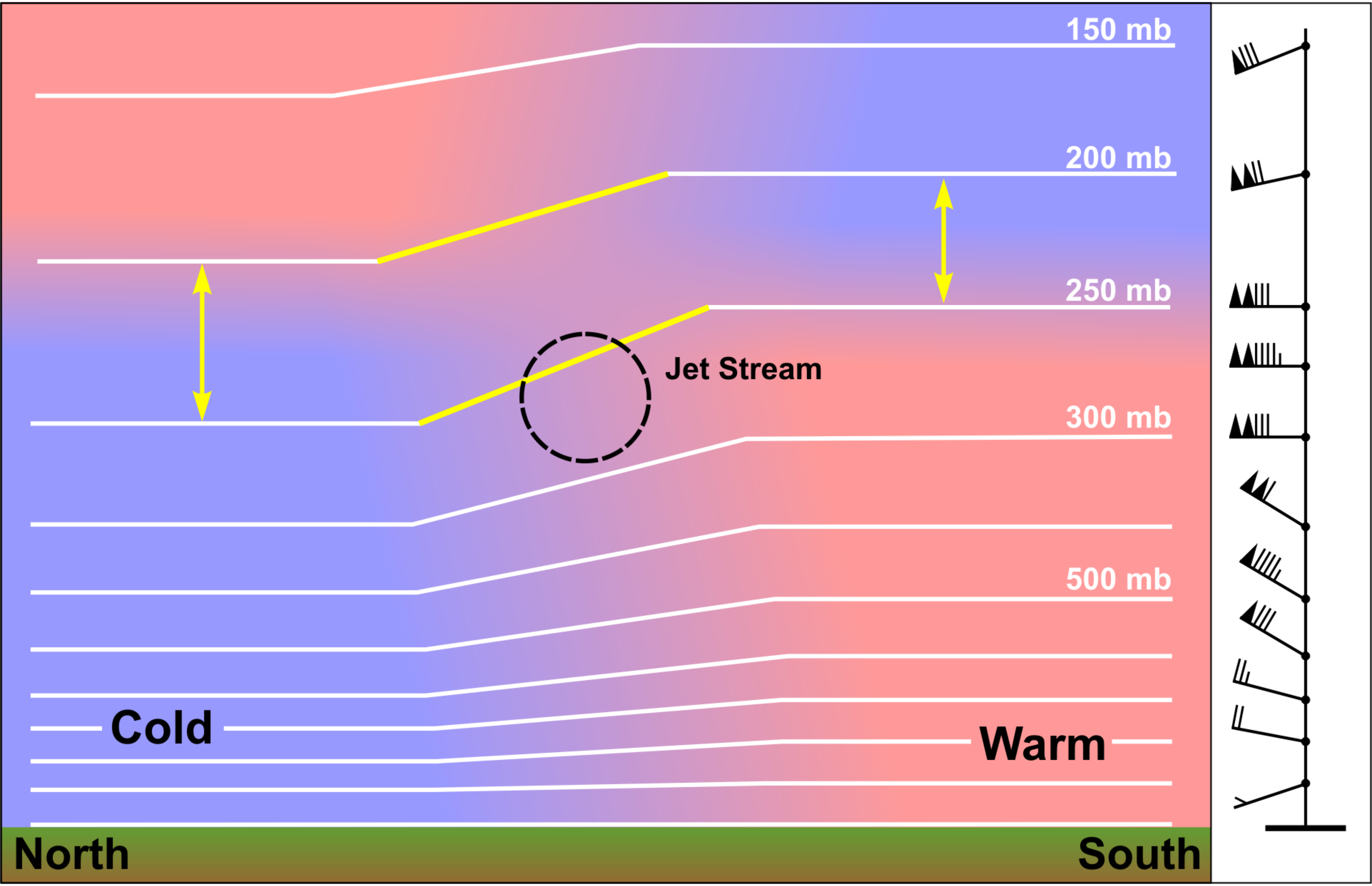


Fig. 2.6 The mechanism of thermal wind. A cold fluid is denser than a warm fluid, so by hydrostasy the vertical pressure gradient is greater where the fluid is cold. Thus, the pressure gradients form as shown, where 'higher' and 'lower' mean relative to the average at that height. The horizontal pressure gradients are balanced by the Coriolis force, producing (for $f > 0$) the horizontal winds shown ($\otimes$ into the paper, and $\odot$ out of the paper). Only the wind *shear* is given by the thermal wind.

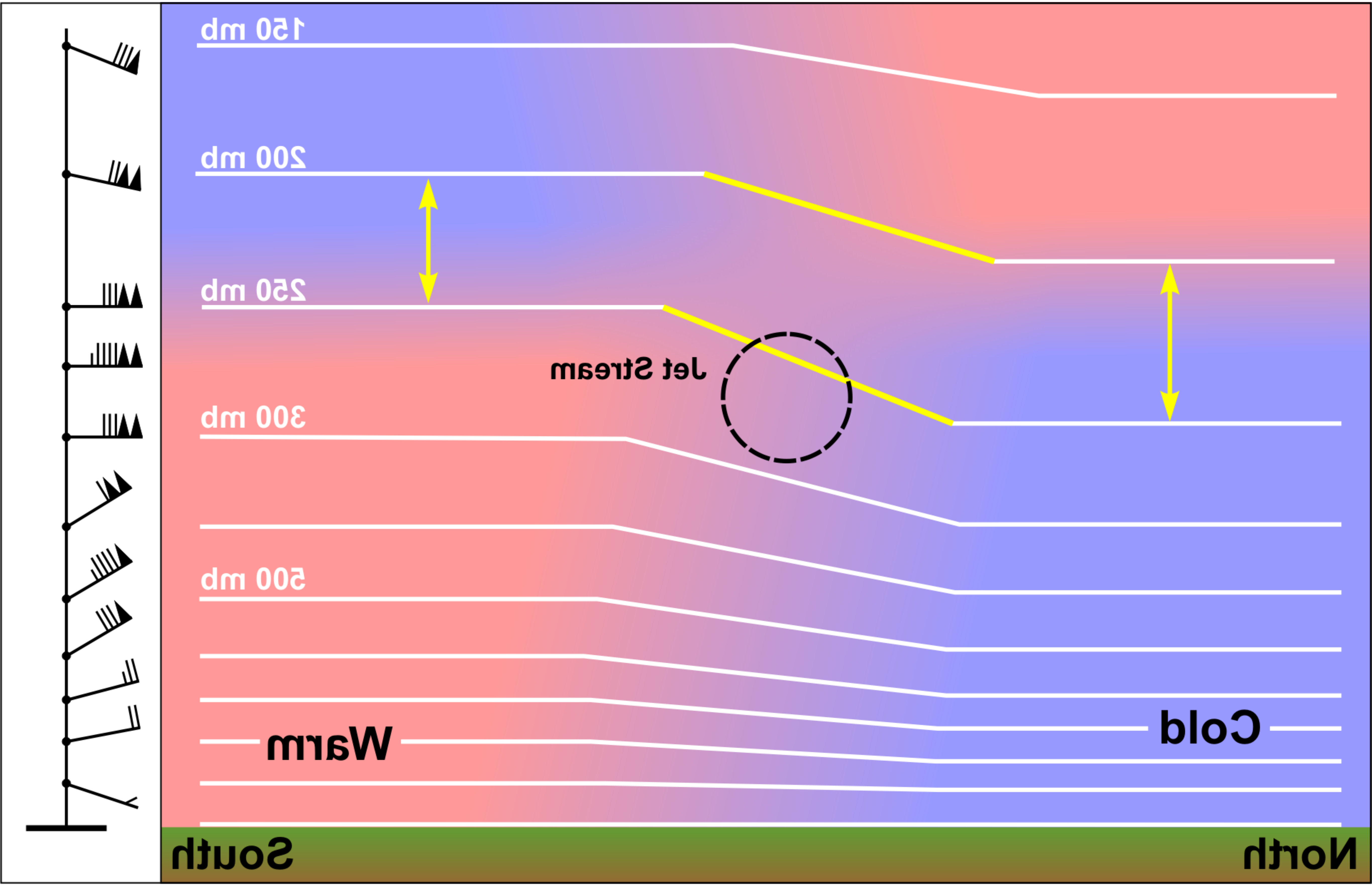
$$\frac{\partial p}{\partial z} = -g\rho$$

Fig. 5.14, Ch. 5 of MIT POAC notes: http://paoc.mit.edu/labweb/notes/chap5.pdf

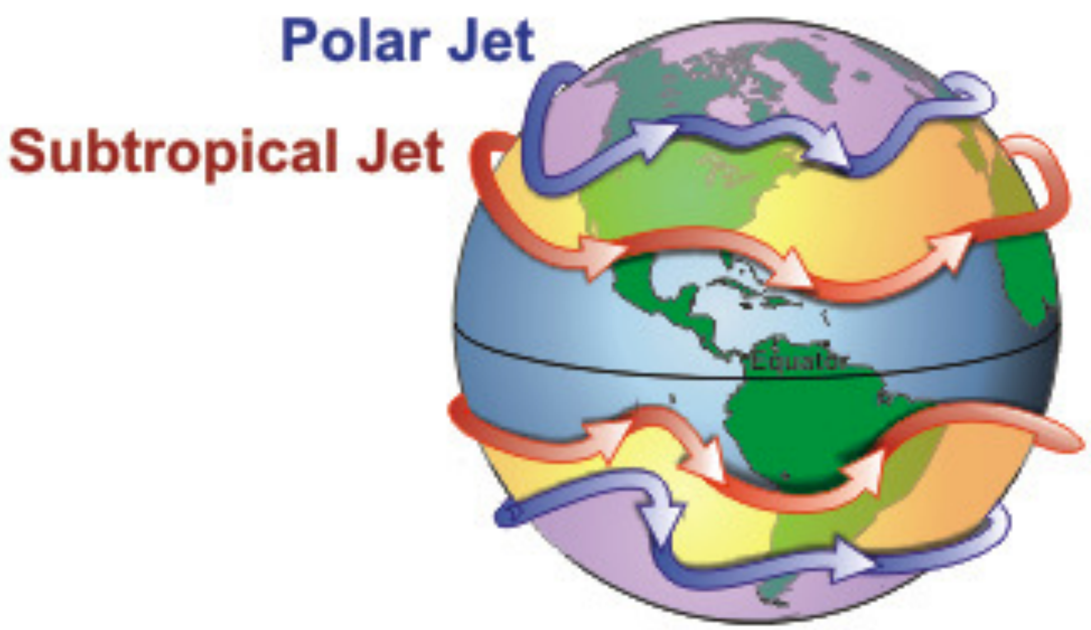


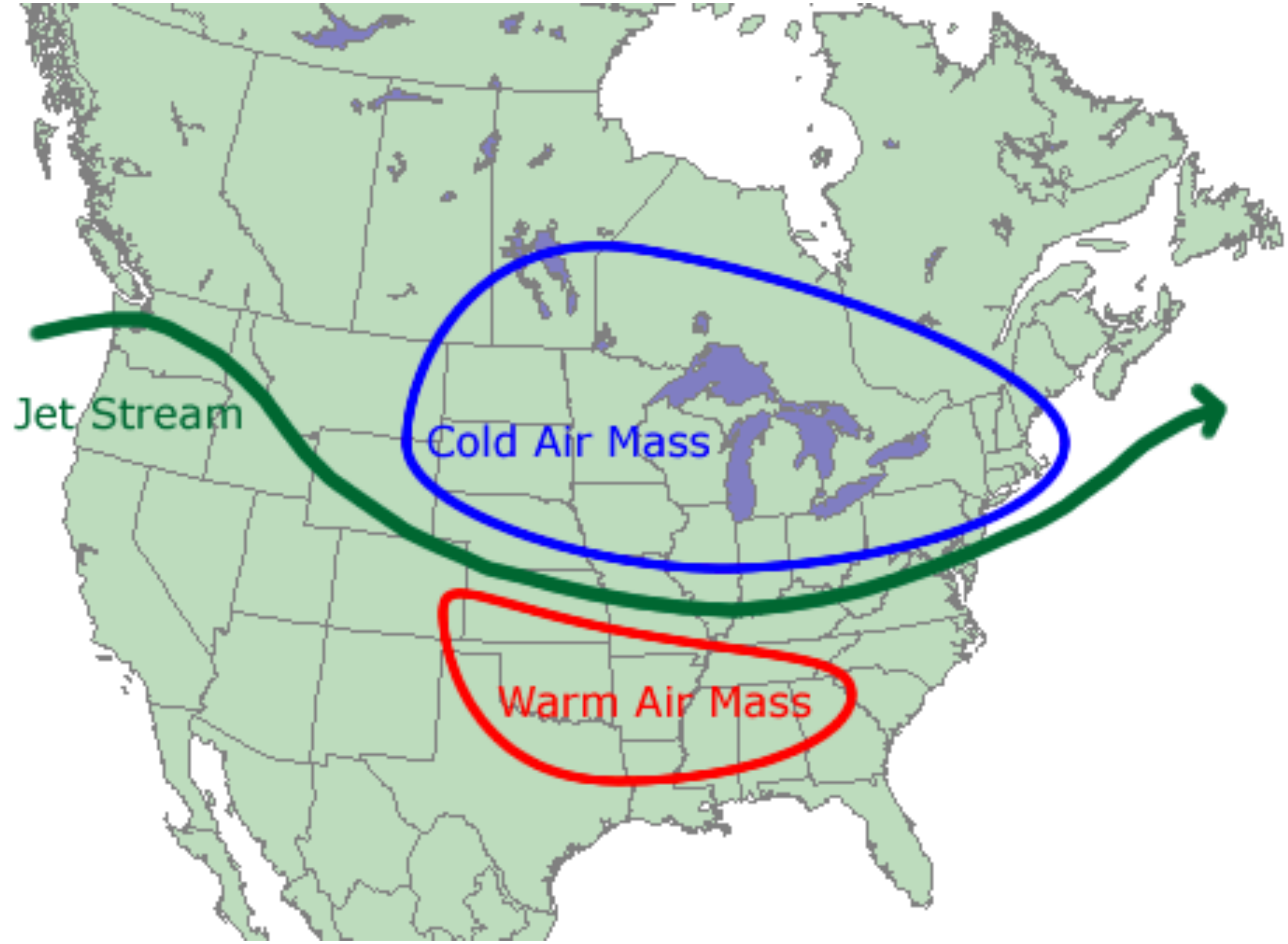


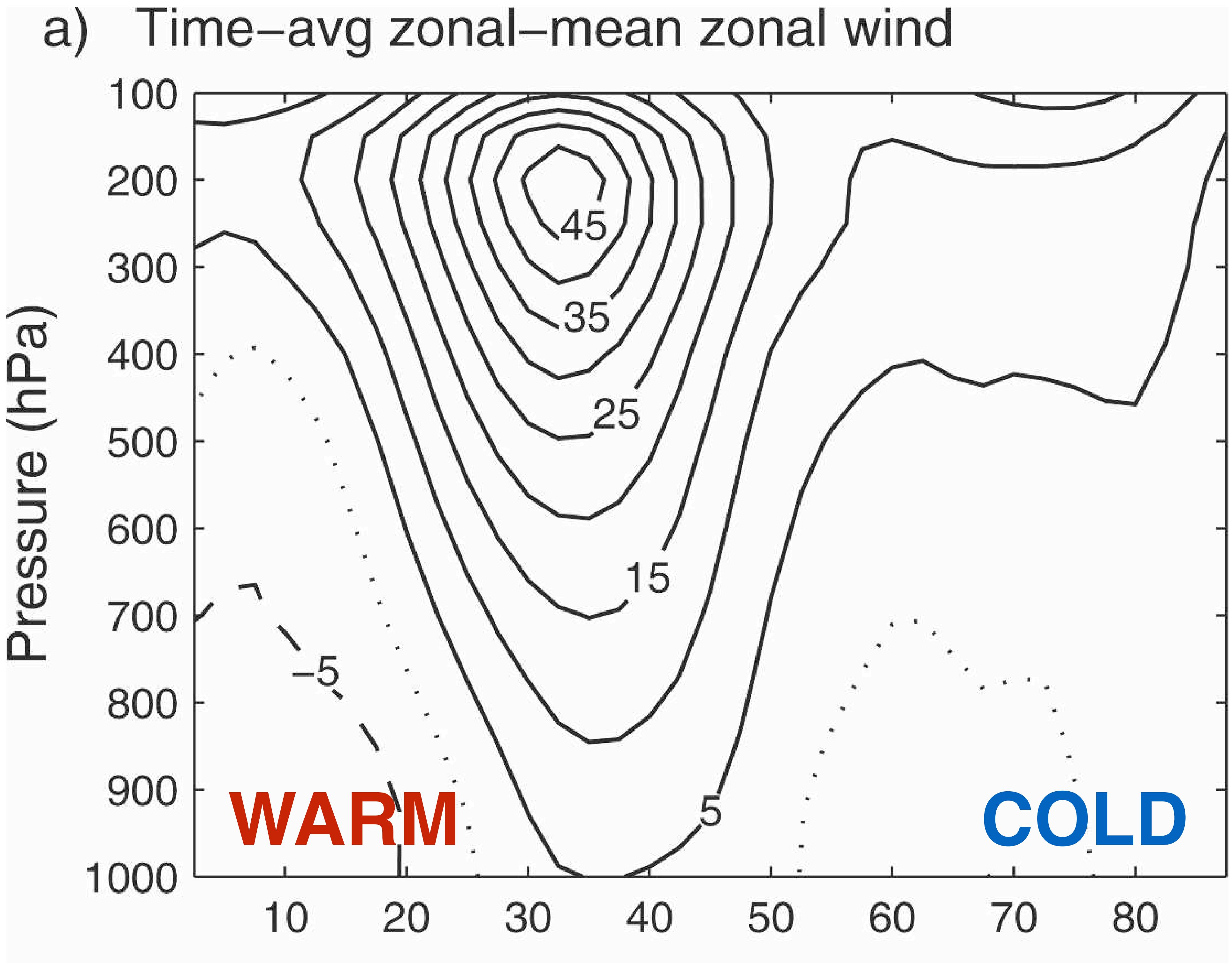
150 mb
200 mb
250 mb
Jet Stream
300 mb
500 mb
Cold
Warm
North
South



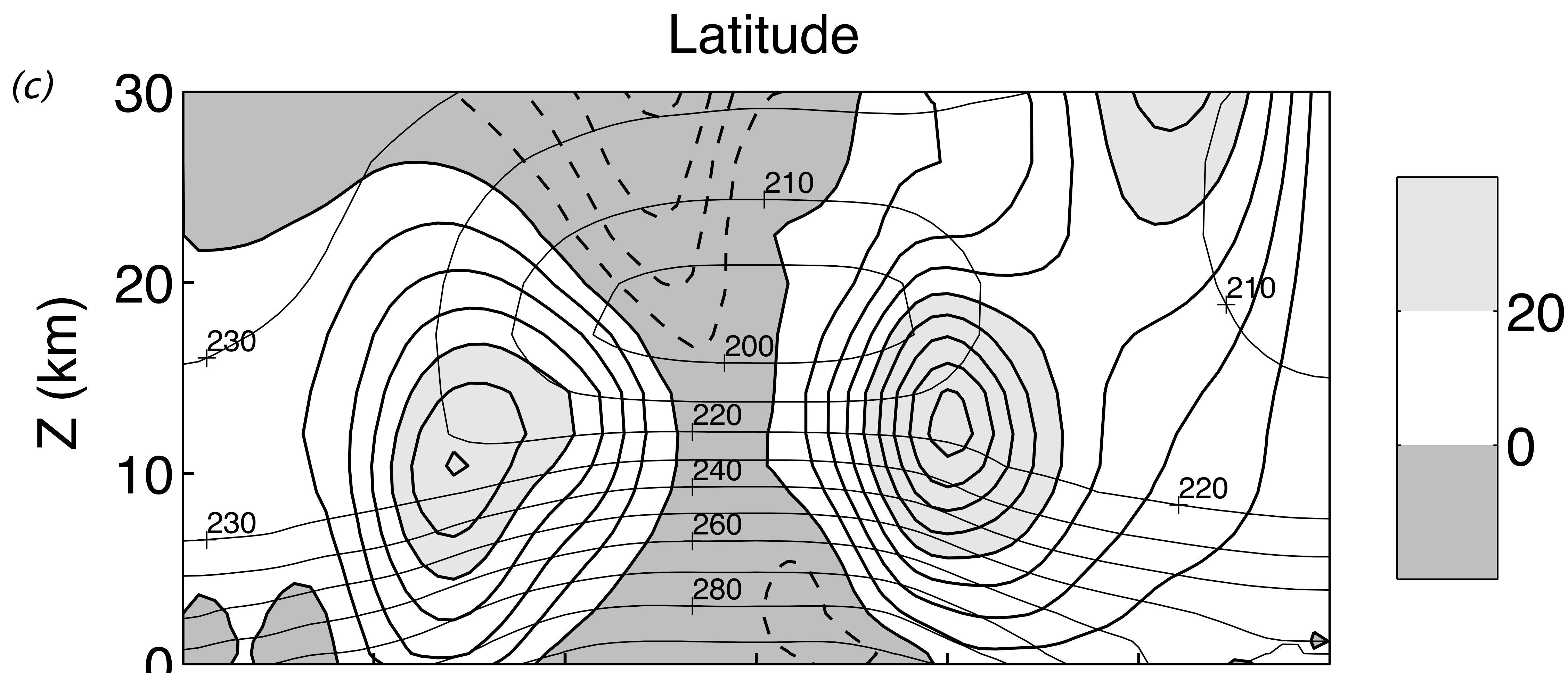
150 mb
200 mb
250 mb
Jet Stream
300 mb
500 mb
Warm
Cold
South
North


Polar Jet
Subtropical Jet
Equator


Jet Stream
Cold Air Mass
Warm Air Mass

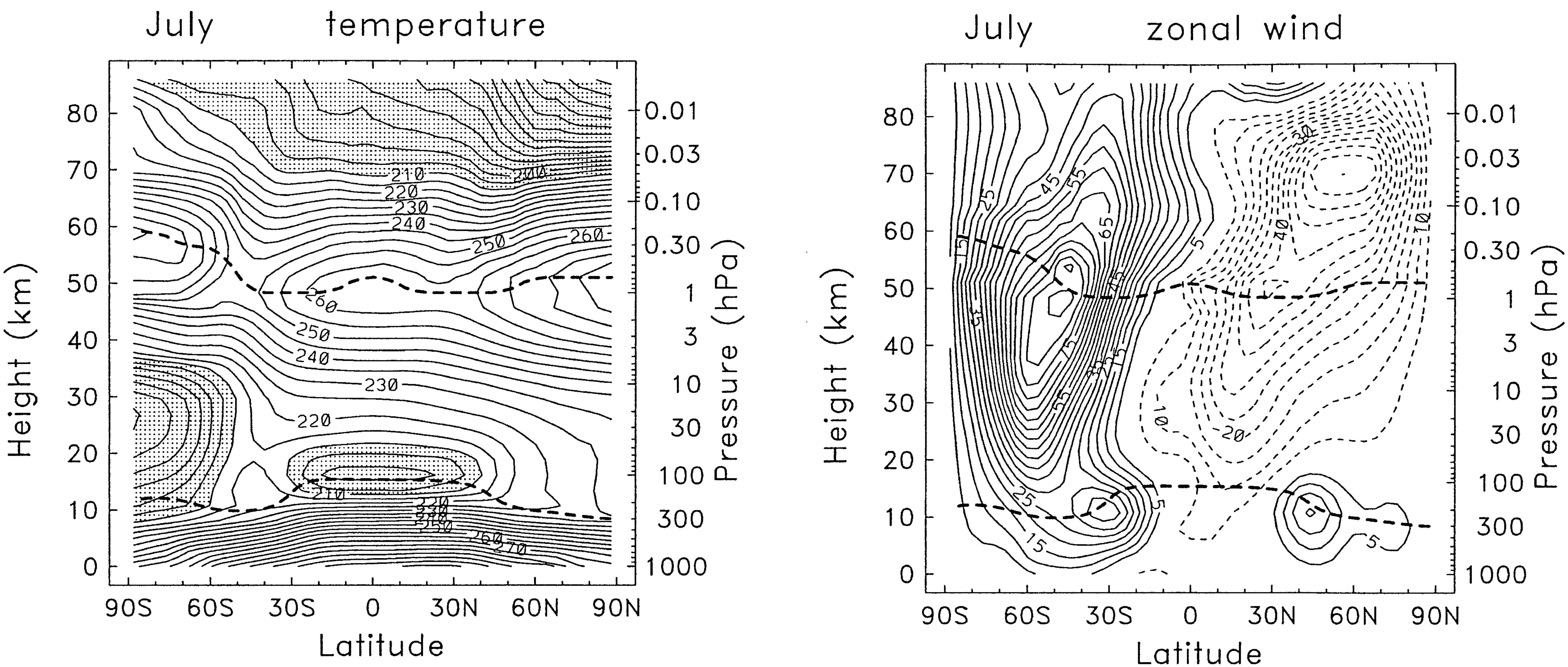


North Pacific zonal-mean zonal winds
(from Eicrhelberger and Hartmann, 2007)



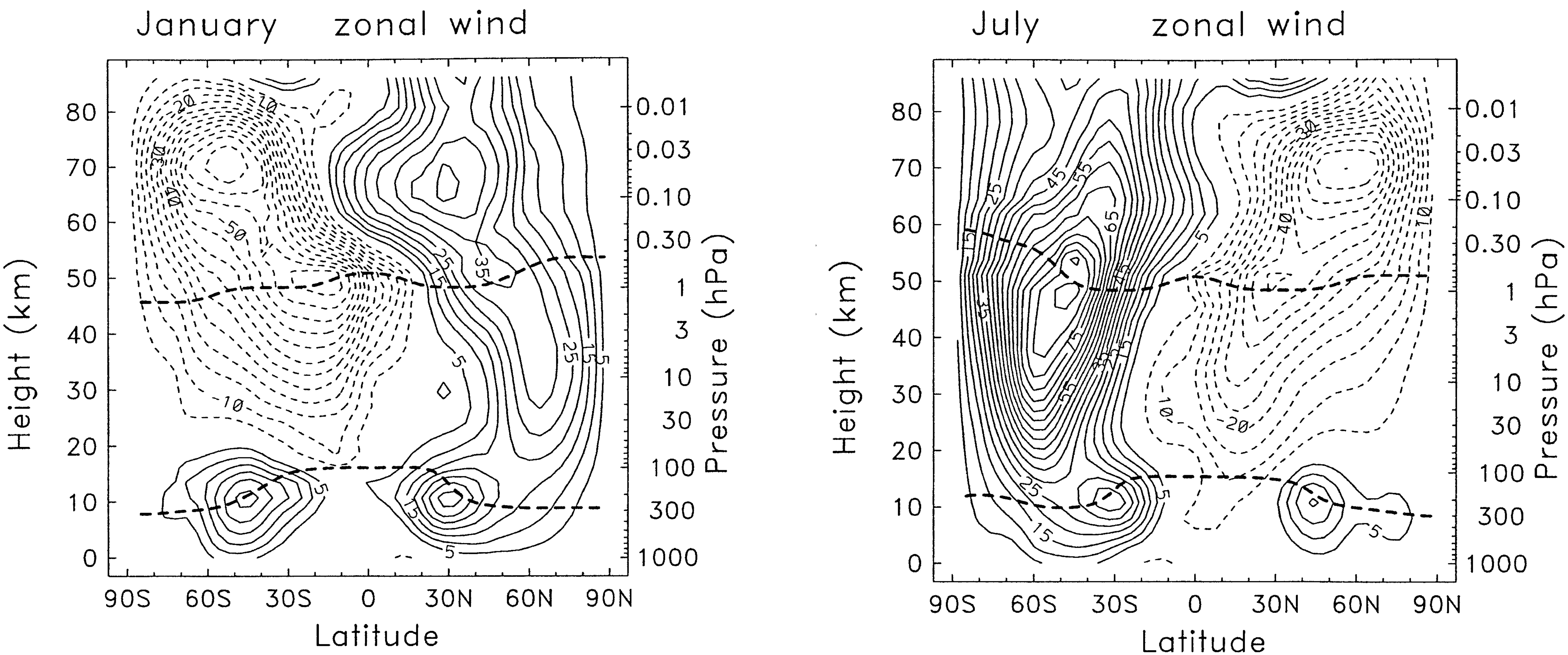
DJF
(winds & temperatures)
Vallis, Figure 11.2

http://www.sparc-climate.org/data-center/data-access/reference-climatologies/randels-climatologies/temperature-wind-climatology/



Randel, Udelhofen et al. (2004)

What differences might you expect in the jet-stream between summer and winter based on thermal wind balance?



Randel, Udelhofen et al. (2004)