

15 Jan 2016

Problems from today's class (finish at home and hand in on Monday 18th Jan):

1. Neglecting the latitudinal variation in the radius of Earth, calculate the angle between the gravitational force (\mathbf{g}^*) and gravity (\mathbf{g} , defined as $\mathbf{g} = \mathbf{g}^* + \Omega^2 \mathbf{R}$) vectors at the surface of Earth as a function of latitude. What is the maximum value of this angle?
2. Show that a homogeneous atmosphere (density independent of height) has a finite height that depends only on the temperature at the lower boundary. Compute the height of a homogeneous atmosphere with surface temperature $T_0 = 273$ K and surface pressure 1000 hPa. (Use the ideal gas law and hydrostatic balance.)
3. Isolines of 1000–500 hPa thickness are drawn on a weather map using a contour interval of 60 m. What is the corresponding layer mean temperature interval?