

Homework 3

1. An airplane pilot crossing the ocean at 43°N latitude has both a pressure altimeter and a radar altimeter, the latter measuring his absolute height above the sea. Flying at an airspeed of 100 m/s he maintains altitude by referring to his pressure altimeter set for a sea level pressure of 1013 hPa. He holds an indicated 6000 m altitude. At the beginning of a 1-h period he notes that his radar altimeter reads 5700 m, and at the end of the hour he notes that it reads 5950 m. In what direction and approximately how far has he drifted from his heading? Assume that the heading is eastwards.
2. Show that geostrophic balance in isothermal coordinates may be written

$$f\mathbf{U}_g = \mathbf{k} \times \nabla_T(TR\ln p + \Phi)$$