

ATOC 5050: Atmospheric dynamics

Exercise 2

(due in class Tuesday 8 September)

1. (Holton 1.1) Calculate the maximum angle between the gravitational force and gravity vectors as a function of latitude.

Hint 1: Derive an expression for this as a function of latitude, then look for the maximum

Hint 2: g and g^ can be written as vectors, and they are related by the cosine rule.*

2. (Holton 1.8) What is the horizontal displacement of a car dropped from a hot air balloon at height $h = 5$ km?

(Hint: make an approximation for fall velocity)

3. (Holton 1.13) “Thickness” is distance (in z) between 1000 and 500 hPa pressure surfaces. Contours in the a map of this quantity are considered a measure of mean temperature. If the contour interval is 60 m, what temperature interval does this represent?