Synoptic Meteorology I: Assignment #4

Due: 9 October 2018 (via e-mail by 9:30a CDT)

Learning Objective: Apply your understanding of the physical relationship between the thickness of an atmospheric layer and the mean temperature of that layer to gain insight into synoptic-scale meteorological phenomena, particularly the vertical structure of cyclones and anticyclones.

In our hydrostatic balance, hypsometric equation, and thickness lecture, we stated that thickness is a powerful tool by which the vertical structure of cyclones and anticyclones may be understood. Examples of the vertical structures of cold-core and warm-core cyclones were provided to illustrate this point. We can build on these examples, however, to gain additional insight.

Use the hypsometric equation and thickness concepts to describe why each of the two statements below is true. If a sketch would help to support your answer, please feel free to provide one. You can make any assumptions that you feel are needed to support a given answer, but you must state what these assumptions are with your answer.

- *At the Earth's surface*, high pressure is favored in cold regions and low pressure is favored in warm regions.

- *An anticyclone aloft* will tilt away from the direction of the warmer air as you move down toward the surface.