ATM 418 Homework # 5
Due Tuesday 14 November

In this homework assignment you will be using Convective Storm Matrix inside the COMET modules (http://www.meted.ucar.edu/convectn/csmatrix) to understand how variations in shear and CAPE lead to different convective evolutions. If you do not already have a Meted username and password, you can register for one (its free!). Once you are on this page you will click Click to Begin. A window will pop up and you will click The Convective Storm Matrix. Once you are on this page, you can observe the evolution of convection, which vary depending on the initial time shear, CAPE and moisture. Prior to starting this assignment, please read the “Overview” section as this will explain the different types of parameters that can be set and the different views you can employ.

Along the left side of the page, there is an option to view the summary of the case. Although this summary exists, your answers CANNOT be a condensed version of this summary. Any answers that merely regurgitate the summary will be given a grade of zero; therefore, it would be wise to avoid reading these.

All of your answers should relate to concepts that were discussed in class. Your answers do not have to be long, but they must include all major points.

1. First, we will explore convection in an environment that is characterized by no shear and moderate CAPE (A2 simulation). Using the concepts from class, describe what is occurring under these conditions and the type of convection.

2. Now, we will look at a case with the same amount of CAPE as in question one, but with a linear shear profile (C2 simulation). Describe what is occurring in this case and compare it to the previous case. What is difference? Increase the amount of CAPE in the profile (C4) and compare it to the previous one. Why might this happen?

3. Increase the shear by 10 m/s, but keep the CAPE the same (D2). How has the evolution of the storm changed from question two? What does this indicate about the importance of shear on convection?

4. Now we will begin to investigate the effect of curved hodographs on convection. Describe the K2 simulation. How does the convection evolve relative to the first three cases?

5. Keeping the vertical shear the same, lets investigate in the importance of moisture on convection. For this question, observe the evolution of the K3 and K4 simulations and describe the difference between the two. How does this differ from the low CAPE
environments?

6. Simulation P3 develops into a strong supercell eventually evolving into a bow echo. Using what you have learned from the previous questions, describe why this is a favorable environment for these types of storms. What happens when the initial sounding is drier (P4)?