12.815

**Atmospheric Radiation and Convection**

Problem Set 7

(Note: Please re-download and unzip the sounding plot package from the course Stellar site as there have been some modifications to the routines. Also note that you will need an internet connection to do this assignment.)

1. Run the MATLAB script *entrain* using station identifier 72357 (Norman, Oklahoma, USA) for the date [2011 5 10 0]. Lift parcels from 1000 hPa.
   1. Qualitatively describe the stability of the atmosphere represented by this profile to upward displacements of air from near the surface.
   2. By entering ‘0’ followed by <return> at the MATLAB prompt you will see vertical profiles of parcel buoyancy for reversible, pseudo-adiabatic and entraining plume displacements, and a table of CAPE values associated with these processes will be listed in the command window. Describe how these three buoyancy profiles and CAPE values differ from one another and why.
   3. State whether you think deep convection was present when this sounding was taken, explaining your reasoning.
2. Repeat problem 1 but use station number 06011 (Tórshavn, Faroe Islands, north of Scotland) at time [2015 1 10 12], lifting a test sample from 975 hPa.
3. Repeat problem 1 using station 91376 (Majuro, in the Marshall Islands of the tropical western North Pacific) at time [2015 10 27 0], lifting a test ample from 1000 hPa.
4. Compare and contrast the soundings from the three locations in problems 1-3. What geographical factors (location, season) do you think makes them different? It might help to locate the three places on a map if you are not already familiar with their locations.