ATS 421 Homework 3 due Wednesday, April 24th 2013

1. Copy the two netcdf data files ERBE_mean.cdf and ncep.mean.nc containing ERBE satellite data of top-of-the-atmosphere radiative fluxes and surface temperatures, respectively, from /home/server/scratch/ATS421-521/data to your directory. Open the data in FERRET. Calculate and plot the zonally averaged values of temperature T, fluxes F_{SW}, F_{LW}, F_m, and planetary albedo a. (2)
2. Define a new y-axis from 85°S to 85°N, with 10° grid spacing. Define a new grid consisting only of your new y-axis. Calculate and plot T, F_{SW}, F_{LW}, and a averaged on your new grid. Now save these averaged variables and the corresponding latitudes in ascii files using the "list/form=(...)" command. (dots need to be replaced with FORTRAN format, e.g. i3,x,f6.1 or 2f8.3) (2)
3. Define yet another grid consisting of a y-axis from 90°S to 90°N with 10° grid spacing and plot and save as an ascii file the zonally averaged values of F_m interpolated on your new grid as in 2. (1)
4. Copy the FORTRAN code of the 1D-EBM from /home/server/scratch/ATS421-521/models/1D_EBM/. Initialize the model with T=293 K everywhere. Compile the code and run it to equilibrium. Plot T, F_{SW}, F_{LW}, F_m, a and compare the model results to the observed data you created in 1-3. (2)
5. Perform a CO_2 doubling experiment by modifying the outgoing longwave radiation appropriately. Plot the temperature anomaly with respect to the control simulation as a function of latitude. Discuss the pattern. (2)