Introduction to Programming: FORTRAN Short Course
September 1, 2009
Homework Assignment 2

1. Write a new program called ClimateModel1LayerTime.f90 that uses the 1 layer climate model with a variable albedo and solar input.
   a. Put your model inside of a do-loop and change the solar input at the rate of 1 W/ m^2/year. Output the surface temperature over 25 years and chart it in Excel.
   b. Change the albedo to start at 0.3 and *increase* with increasing surface temperature (as if the planet were getting more cloudy). Chart 25 years of surface temperatures in Excel.
   c. Change the albedo to start at 0.3 and *decrease* with increasing surface temperature (as if the ice on the planet were melting rapidly). Chart 25 years of surface temperatures in Excel.

2. Download the files FTCTempsLong.txt and FTCRainrates.txt from the website. These files contains 41 years (1968 through 1998) of monthly average temperatures and rainrates in the Fort Collins area. Write a program that calculates the average value of temperature per decile of rainrate. In other words, calculate the values of rainrates in the lowest 10% (first decile), the 10-20% region (second decile), the 20-30% region (3rd decile), etc. Bin the average monthly temperatures together based on the decile of the average monthly rainrate. Average the values in each bin and print it out.

Plot it in Excel, it should look something like the the plot below, only temperature should be on the y-axis and your relationship will, of course, be different than the one shown below (which is outgoing long-wave radiation).