

Meteorology 2270 – Homework #9

Sounding Analysis

Due: TBD

Write a program to read an atmospheric sounding produced by GEMPAK. The file will consist of a header containing station information, the date and time of the sounding, and several variables describing critical atmospheric levels. In addition to the file header, the file contains five columns listing the pressure, temperature, dew point, wind direction, and wind speed at several levels of the atmosphere.

The first part of this assignment is to read the data from the file, storing the level information into arrays. Once done, the program should calculate several parameters and stability indices listed below and output the data to a file in a format easily readable by the user. Your output should contain all of the details about the station included in the header.

Lastly, your program should use at least one function and subroutine contained in a module. The instructor will say more about this in class.

The parameters your program should calculate are:

1. Freezing Level (FRZ): The level at which the environmental temperature first reaches 32 °F.
2. Total Totals (TT): $(T850 - T500) + (Td850 - T500)$.
3. K-Index (KI): $(T850 - T500) + Td850 - Tdd700$.
4. SWEAT index (SW): $12(850Td) + 20(TT - 49) + 2(V850) + (V500) + 125(\sin(dd500 - dd850) + 0.2)$.
5. Maximum wind (MW): Pressure level of the maximum wind speed.

The first thing the program should do is successfully read the file. No analysis should be done while reading the file. Next, the data should be searched in a separate loop for the above variables. This second loop should only loop through data successfully read in. You can initialize your arrays to length 100, but there will not be 100 individual lines of data in the file. Solve the problem in a minimum of two loops and be as efficient as possible. You will learn more about the severe weather parameters in class.

Hand in your assignment by emailing your program and module as an attachment to mteor2270@iastate.edu and submitting a hard copy version of your program and module to the instructor on the due date.