≋ RAOB Program - MUCAPE Options

Among RAOB's hundreds of parameter configuration options, the important MUCAPE parameter now has an alternate configuration option. MUCAPE (or Most Unstable CAPE) is identified by the level which produces the highest CAPE value in a specified search layer. Current literature recommends that a surface-based 300 millibar (mb) search layer is best. The RAOB user can edit the depth of this search layer as seen in the below configuration panel image.

All previous RAOB programs always found MUCAPE by lifting the level which had the highest Wet-bulb potential temperature in the search layer. This highest Wet-bulb potential method (and the equally popular equivalent potential temperature method) is used by nearly all sounding programs. This method is most commonly used due to its very fast solution in an otherwise very time-consuming set of mathematical calculations. This is RAOB's default method.

Beginning with the RAOB 6.9 program, there is now another configuration option to find MUCAPE. This option is labeled "Calculate CAPE every 1 mb ..." (see above image). When selected, it will calculate all possible CAPE values within the user defined search layer. For example, using the standard 300 mb search layer, RAOB systematically calculates CAPE at each of the 300 lifting levels. This process requires 300 separate CAPE calculations resulting in hundreds of thousands of extra calculations. The level with the highest CAPE result then defines the MUCAPE value and the associated most unstable lifted parcel level. For a sounding that is relatively stable with little or no CAPE, this process only takes several milliseconds. However, using a modern day desktop PC, with a sounding containing large CAPE values, this process can require an extra 2-3 seconds of processing time. This can be very frustrating for someone wanting to quickly scan a file containing hundreds of soundings. While PC memory is important, RAOB power users will want to maximize PC speed, especially for those users who also need to calculate Effective Storm Relative Helicity (ESRH) values -- and to a lesser extent -- use of the "density-weighted" DCAPE option.

Note 1. Literature recommends MUCAPE be determined using Virtual temperature correction calculations. However, RAOB provides this method as another user-defined configuration option.

Note 2. ESRH is a separate RAOB configuration option, which is found under the Configuration Options' "Algorithm Options" tab. ESRH processing also requires extensive amounts of CAPE calculations. However, unlike the MUCAPE options, there is no ESRH quick processing option.