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A Science Service Feature

? WHY THE WEATHER ?

Dr. Charles F. Brooks,
Secretary, American Meteorological Society,
describes:

AIR COOLED BY ASCENDING

When air rises it is cooled in the process of expansion, which results from decreased atmospheric pressure. Conversely descending air is warmed by compression, which follows increased pressure. When air expands it does work, so to speak, and in so doing loses its heat. When air is compressed work is done on it, which adds to its heat. A familiar illustration of this is in the bicycle pump which becomes quite hot when used vigorously in causing compression.

Under ordinary conditions the cooling of uniformly ascending air proceeds at a regular rate. Technically this is known as the adiabatic rate of change in temperature. For each 1,000 feet increase of height the temperature drops a little over 5 degrees Fahrenheit. Thus on a hot morning the air at a temperature of say 80 degrees at the ground, impelled aloft in ascending currents, would fall about 16 degrees, to 64 degrees, at an elevation of 3,000 feet. If the dewpoint of the air were as high as 64 degrees on reaching the 3,000 feet level, condensation would begin and clouds would form. In fact, it is chiefly because of this process of cooling by expansion that clouds form to give us rain or snow.

(Tomorrow: Artificial Thunderstorms)

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