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A Science Service Feature

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? WHY THE WEATHER ?

Dr. Charles F. Brooks,
of Clark University,
discusses:

SNOW AND TEMPERATURE

Suppose that on a clear cold morning when the ground is covered with snow you should be ambitious enough to take a thermometer out for exercise before breakfast. To observe the air temperature keep the thermometer swinging or moving briskly. On a flat area of some extent where there is no breeze you will find that the air temperature at 3 feet above the snow surface is somewhat lower than that obtained when the thermometer is swung above your head. And if you lean over and wave the thermometer back and forth just above the snow surface you are likely to find a temperature several degrees lower than those previously observed. Then lay the thermometer directly on the snow surface. If the sun is not yet shining on it, the instrument will show a still lower temperature. Finally, stick it down a few inches into the snow, and watch the mercury rise, probably to several degrees above the highest air temperature observed.

One observation of this sort late one evening showed that while the air at 6 feet above the snow surface was 2 degrees below zero Fahrenheit and at 6 inches above the surface was 8 degrees below zero, the temperature of the snow surface was 14 degrees below zero, while the temperature of the snow only 6.5 inches below the surface was 18.5 degrees above zero Fahrenheit. The 6.5 inches of snow between the surface and the interior of the snow covering thus caused a difference of 32.5 degrees. Snow with its included air is an efficient insulator and keeps the heat in, while the snow surface on losing much of its small store of heat by radiation and evaporation becomes extremely cold on clear nights. This coldness of the snow surface is largely responsible for the very low air temperatures of clear nights when snow is on the ground. Even on sunny days the snow results in lower air temperatures than if the ground were bare, for the snow surface temperature can never rise above 32 degrees Fahrenheit, and, therefore, the snow cannot warm the air to higher temperatures. The bright sunlight, however, both direct and reflected, may raise the air temperature to 40 degrees. Day as well as night, therefore, snow favors low air temperatures.

(Tomorrow: The Cold Wave)

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