

A Science Service Feature

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? WHY THE WEATHER ?

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THE TWO SHELLS OF THE ATMOSPHERE

Since the year 1902 it has been known that the earth's atmosphere is divided into at least two layers, or shells, having quite different characteristics. At the bottom is a layer called the "troposphere," which enjoys a monopoly of storms, clouds, rain, snow and most other things that are generally classified as weather. This layer has an average depth of between six and seven miles. Above it lies the "stratosphere," extending to an unknown height. In the troposphere the temperature of the air decreases rapidly with increase in height; so that, for example, aeronauts always encounter frigid weather a few miles above the earth. This fall in temperature goes on until, at the top of the troposphere, the thermometer reads 60 to 70 degrees below zero Fahrenheit, in middle latitudes, and much lower over the equatorial regions. A temperature of 133 degrees below zero was once registered with a sounding-balloon about 10 miles over Java. (A sounding-balloon carries self-registering instruments, but no human passenger.) In the stratosphere there is no such vertical variation in temperature; at least as far up as measurements have been made. From the bottom of the stratosphere upward a thermometer generally shows but slight changes in its readings.

Air is a mixture of gases, some of which are much heavier than others. In the stratosphere there is supposed to be no general mixing of these gases by winds. Hence, in this lofty region, the heavier gases tend to settle to the bottom and the light gases to float above them, so that there is a progressive change in the composition of the atmosphere with height. Just which gas predominates at the highest levels is, however, a matter of controversy.

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