

A Science Service Feature

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? WHY THE WEATHER ?

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THE CAUSE OF THE SEASONS

Suppose we start with imagining what the situation would be if the plane of the earth's equator coincided with that of the earth's orbit around the sun. Under such conditions the sun would pass through the zenith at the equator every day in the year, and day and night would be virtually equal throughout the year over the entire earth. This is as they now are at the two equinoxes, March and September, when the sun passes through the zenith at the equator. Furthermore, with the slant of the sun's rays remaining the same at midday throughout the year, there would be little variation in the delivery of solar heat to the earth's surface, so there would be a condition of perpetual spring or fall in middle and high latitudes.

Temperatures would, however, be a little higher in January than in July the world over, because in its elliptical course the earth comes about 3 million miles closer to the sun early in January than it does early in July. The difference in the intensity of solar heat on account of this is 7 per cent., which is less than a tenth of the seasonal changes in our latitudes. There would be also much smaller, more or less irregular changes owing to changes in the sun itself or in the clearness of the space between sun and earth.

This shows at once that what we call the progress of the seasons is almost wholly the result simply of the varied presentation of the earth to the sun as the earth makes its annual revolution. The axis of the earth, and, in consequence, the place of the earth's equator, slants about $23\frac{1}{2}$ degrees from the plane of the earth's orbit about the sun. Since this slant continues, with but very slow change, in the same direction in space, e.g. the axis pointing at the pole-star, first the northern hemisphere and then the southern are presented to the more or less direct rays of the sun, and made warmer (spring and summer), or allowed to become cooler (autumn and winter).

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