

Consider Perihelion

Despite our attention to science and the earth's temperature few are aware that the sun is 7% stronger in January than July.

Perihelion, on January 4, 2004, is when the elliptical orbit of earth brings us 3-1/2% closer to the sun than in July.

Our calendar balances on the solstices, but perihelion is not connected to the solstices. Perihelion slowly moves to later dates; 25 minutes later each year, one day later in 57 years, a complete cycle in 21,000 years. The solstices, equinoxes and eclipses are easy to see. Perihelion can be identified only with exact instruments. Though the climate in which we live is a consequence of perihelion, we have only known about it since Johannes Kepler discovered the earth's elliptical orbit in the seventeenth century AD.

Perihelion moves through our calendar like a giant century hand. It moves fast enough; one day in a lifetime for us to recognize its movements, yet so slowly it makes us giddy to consider the vast momentum of its drowsy progress. In "perihelion time" the atom bomb was invented a day ago, the steam engine a week ago, and fire a year or two ago. We might remember that perihelion coinciding with winter in the Northern Hemisphere is a big favor we enjoy that will pass.

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In fact, Earth's elliptical orbit has nothing to do with seasons. The reason for seasons was explained in last month's column, and it has to do with the tilt of Earth's axis. But our non-circular orbit does have an observable effect. It produces, in concert with our tilted axis, the analemma.

If you plot the noontime position of the Sun in the sky over a one-year period, it produces a figure-eight shape on the sky (Figure A). This is the analemma. You may have seen it drawn on a globe of Earth. The shape results from the combination of two things: the 23.5° tilt of Earth on its spin axis, and the elliptical shape of Earth's orbit around the Sun.

