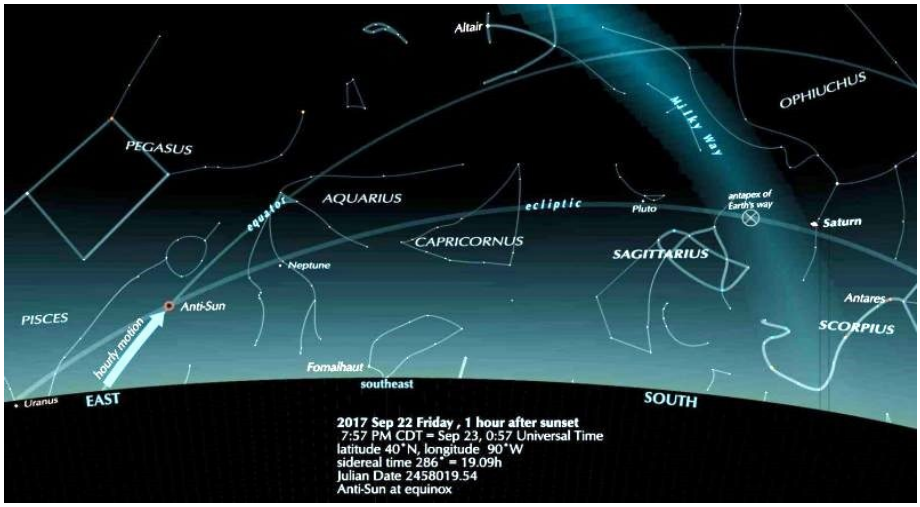
**SUN ON THE SKY'S EQUATOR**

At an equinox, the Sun is at the intersection of the sky's ecliptic and equator. Day and night are of approximately equal duration all over the planet. They are not exactly equal, however, due to the angular size of the sun and atmospheric refraction. The word is derived from the Latin aequinoctium, from aequus (equal) and nox (genitive noctis) (night).

But these two great circles around our sky intersect at two points, and you can see that, at the "anti-sun" – as we can call the point 180 degrees from the Sun – at the second intersection of the sky's ecliptic and equator.



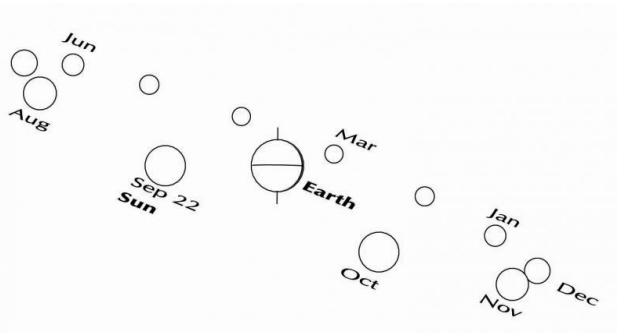

The Anti-sun point on the day of the equinox, September 22. Chart set for an hour after sunset, mid-U.S. At this location, it's about 3 hours after the instant of the equinox.

**The equinox strikes, like a bell, on Friday September 22, 2017. It heralds the Fall in America, Autumn in Europe, and Spring in the Southern Hemisphere. So the impartial and safest term for it is the September Equinox.**

It is the moment at which the Sun, travelling as ever on the ecliptic, crosses southward over that other sky-circling line, the celestial equator. **This moment is 20:02 Universal Time, which is four or more hours earlier by clocks in North America.**

Our sky scene above, for an hour after sunset on equinox day in mid-U.S.A., happens to be about three hours after the instant of the equinox. You can see that the anti-sun, as we can call the point 180 degrees from the sun, appears to be just on the opposite crossroads of ecliptic and equator. Actually it's a little way past, the fraction of a degree that the Sun moves in three hours. The anti-sun point is already a little way into the northern celestial hemisphere, as the Sun is a little way into the southern.

If we want to be exact, and mean by Sun the centre of the half-degree-wide Sun, there is only one instant when it is on the celestial equator. So it follows that there is only one spot on Earth's equator which gets to have the Sun exactly overhead. If the equinox had been at 12 Universal Time, the Sun would have been overhead on the zero or Greenwich meridian, but, being 10h02m later, it's overhead at longitude 150.46° (the hours multiplied by 15) east, which is in the Pacific Ocean, north of the islands that are north of eastern New Guinea.




**Only at this instant, and at a point 90 degrees west from there on the equator, does the Sun's centre rise exactly in the east**.

But not only on the equator: also at the other points on Earth along a circle that you could draw with centre at this Pacific point and radius 90°. On the western half of this circle the Sun is at this moment rising due east and for the other half it is setting due west. At the top of this circle, which is our north pole, the Sun's geometrical centre comes up and touches the horizon (at longitude 150.46° east) for an instant, and goes down.

**We've been convinced by Copernicus that, really, it's the Earth that does the circling, around the Sun. Though it's most conveniently described by saying that the Sun circles around our sky,**

**The two models are geometrically equivalent, but, as we now know (and poor Copernicus didn't) the Sun is 109 times bigger than the Earth and 333,000 times more massive. Comparing it with a fly and a horse, would you say that the fly buzzes around the horse or the horse buzzes around the fly?**

AK, with EarthSky Notes