SKYWATCH

Overcoming astronomy's disadvantages

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Every hobby seems to have disadvantages that impact how much enjoyment one can receive from it, and amateur astronomy is no exception.

One disadvantage is the weather. For some reason, it seems that almost every special astronomical event brings cloudy, rainy or snowy weather with it.

Another disadvantage deals with light. This may seem odd, since astronomy's focus is on light. But the problem arises from too much light.

Generally, astronomers are observing light from the sun, moon, stars, galaxies and other celestial objects. The telescopes used to observe these objects are often referred to as "light buckets". The larger the front of the scope, the bigger the bucket, and the more light that can be collected. Collecting more light means smaller and more distant objects may be viewed.

Unfortunately, the presence of light at the wrong time, in the wrong place or in the wrong quantities often makes observations impossible. Light from the moon can be either good or bad, depending on what is to be observed.

If the goal is observing the moon, light from the moon can be good. However, light from a full moon can be so bright that a filter may be needed to safely view it.

If the goal is to observe stars, star clusters and galaxies, the bright light from the full moon makes viewing difficult. Fortunately, astronomers can decide what can be successfully observed according to what phase the Moon is in.

However, human-caused light pollution can't be handled so easily. Astronomers often have to drive many miles to reach darker skies. Individuals and public officials could help solve this problem by making more effective and less expensive use of lighting. The International Dark Sky Association offers many ways to solve this problem. The simple solution is: "Light the ground, not the sky!"

The natural environment also contributes to the light problem. Depending on the latitude and season of the year, the amount of darkness can vary from zero to 24 hours in a day. For the Quad Cities, on the winter solstice — the shortest day of the year, which occurs on or near Dec. 21 — there are about 15 hours of darkness. Around this time, you can observe from 5:30 p.m. for four hours and be home in time to watch the late news.

At the summer solstice, which occurs on or around June 21, there are only about nine hours of darkness. You're then lucky start observing by 9:30 pm and need to stay out well past midnight to get four hours in.

While it appears that winter would be the ideal time to observe, it is also the coldest time of the year. Why? The length of daylight begins increasing from the winter solstice until the summer solstice. Longer periods of daylight should bring warmer temperatures. Not necessarily: From the winter solstice until the spring (vernal) equinox, nights are still longer than the hours of daylight. Our coldest temperatures seem to occur in January and February.

The Earth is actually closest to the sun on or around Jan. 4 (91.5 million miles away), and farthest from the Sun around the Fourth of July (94.5 million miles). Therefore, shouldn't winter temperatures be warmer, and how can the distance between the Sun and Earth change?

The distance changes because Earth's orbit is an ellipse (a slightly flattened circle) and is not perfectly round, and the Earth itself is tilted on its axis.

In the Northern Hemisphere's winter, the North Pole is tilted away from the sun and the sun's rays are spread over larger area. During the Northern Hemisphere's summer, the North Pole is tilted toward the sun and the sun's rays are more concentrated into a smaller area.

Johannes Kepler's 2nd Law of Planetary Motion can be summarized as, "Planets move fastest when they are closest to the Sun and slowest when they are farthest away." Therefore, the elliptical orbit of Earth makes the length of the seasons uneven.

In the Quad Cities, winter is about 89 days long and summer is about 93 days long. One should not complain about long winters.

Meteorologists classify seasons differently than astronomers. Meteorologists classify seasons by months. Spring is March through May; summer is June through August; fall is September through November; and winter is December through February. The advantage of the meteorological system is the starting and ending dates are consistent.

The astronomical system is based on the relation of the Earth to the sun, with small changes in times and dates. Spring arrives with the vernal equinox, summer starts with the summer solstice, fall starts with the autumnal equinox, and winter begins with the winter solstice.

I suggest you brave a clear, cold and relatively long night of darkness in February and study Orion the Hunter, a key constellation in the winter sky.

The diagram (facing south so east is on left and west is on right) shows Orion as it appeared on Feb. 15 at about 8 p.m.

Orion can be used as a signpost to find other objects nearby. Orion's line of three stars make his belt, which can be used to locate key stars in other constellations.

Draw a line from the lower (eastern side) of the belt up to the west and find Aldebaran, a bright star that is the "eye" of the constellation Taurus the bull. Continue the line on to the west and you come to the Pleiades, a beautiful star cluster visible to the naked eye.

Follow the belt downward from the eastern end and you arrive at Sirius in Canis Major. Sirius is the brightest star in the sky, and Canis Major is Orion's hunting dog. You have just experienced one of the more important observing techniques known as "Star Hopping."

More can be learned about Orion by going to the article "Hunting the Hunter: Observing Orion" in the January 2022 Popular Astronomy Club's newsletter "Reflections," found at our website: popularastronomyclub.org

Weather permitting, PAC will hold its first free observing session in the Niabi Zoo parking lot after sundown on March 19, the first Saturday after daylight saving time begins. We hope to see you there.