How to Avoid Hundreds of Bright Satellites

by Clark M. Thomas

Amateur astronomers and nature lovers can't fly out into deep Earth orbit when we are stargazing. What we see with our eyes and telescopes is what we get. The appearance of hundreds of low-orbit, communication satellites delivering fast broadband service around the world to billions more people is inevitable and already underway. What can be done for profit will be done. Therefore, how can we people on the ground avoid the pollution of hundreds of bright spots racing across our evening sky?

Even though there are many fabulous Internet images of our visible universe, mostly taken by the Hubble and other satellite observatories, that is not the point. The point of driving out into rural darkness is to directly experience the glory of our visible firmament, including "faint fuzzies." When we view objects or even the Milky Way with our eyes, with binoculars, or with various amateur telescopes, we can also gather together and experience the same spiritual awe of our ancient ancestors.

There is a simple, though not ideal, way to mostly avoid the moving constellations of fake stars. It involves our Sun and Earth's shadow. After twilight, and before dawn, any satellite orbiting within the umbral shadow is invisible to our eyes and telescopes. Small satellites several hundred miles above are like points, and thus cannot interfere with our eyes or CCD imaging.

There are two key periods after the Sun recedes below the horizon, and shortly before it reappears for a new day. These are receding twilight, and ascending dawn. It is in those semi-dark

periods that satellites above are not yet inside the shadows, and thus can be a nuisance at ground level. Reflecting satellites pop in and out against a partly darkened sky. It should be noted that satellites are fully illuminated during the day, but irrelevant for our astronomy viewing purposes against bright blue skies.

Those of us who have seen the International Space Station (ISS), or Hubble itself, have experienced their instant visibility followed by their instant invisibility. Large, bright satellites are few and far between.

We can adjust for optimum viewing opportunities by setting up our scopes during twilight, and also enjoying with our darkness-adapting eyes the skies in transition. Our brains, but not our CCD imagers, can seemingly filter out the optical noise while there still is light reflecting from the sun. It is also important to note that the most serious and sensitive visual and instrumental viewing typically occurs after full darkness appears.

After the Sun slips below our local horizon twilight starts to appear. However, because of our atmosphere the Sun needs to be a certain number of degrees below to give us truly dark skies. There are three types of twilight (and three types of dawn): civil, nautical, and astronomical.

Most stargazers will simply wait until the sparkling pests vanish before they start CCD activities. Close to the end of twilight there is an east-to-west line of advancing virtual darkness as the Earth rotates.

If we wish to precisely time levels of twilight or dawn, there are sources on the Internet of value. One of the best links is the well known site: Heavens Above.

So, let's get out there and put down our stupid smart phones. There are primal joys to be had for free. Just look up! Citizens of this vast visible universe have an absolute right to gaze up in awe at our cosmic neighborhood.