

Offered Title: Lightshow in the Sky

Have you experienced an aurora? If you have you know, they can be better than the best lightshow ever! Let me give a brief description from one 2002 experience in Alaska.

It's around 2 am in a parking lot just outside Fairbanks and there's a spot near the horizon. Nothing else going on, sky is clear, and oh, it's cold. I turn away to chat with another aurora hopeful and she exclaims, oh look! I turn back and see the spot has morphed into a short, thick rope. It is moving slowly but moving and soon the rope becomes a greenish S-shaped nebula, now extending about a quarter of the sky. The nebula expands into a fat, glowing, meandering greenish river in the sky, with a curtain of waterfall off one side. I hear exclamations of amazement...coming from me!

When our Sun is in an active mode, especially during solar maximum, the likelihood of witnessing a spectacular aurora is very good. Our Sun has an activity cycle that ranges approximately 11 years from peak to peak. Some of the attributes of a solar peak (maximum) are frequent sunspots, flares, and coronal mass ejections (CME). 2002 was a good year near the peak, during solar cycle 23. We are in solar cycle 24, and unfortunately it has been a bit of a flop. In fact, cycle 24 looks like it might be on its way to having the fewest sunspots since 1750.

There is concern that the Sun might be stuck in an extended solar minimum. If this is true, we will still see aurora, but with lower intensity. Another affect might be on Earth's climate. Two previous solar minimums, Maunder (1645-1715) and Dalton (1790-1820) coincided with lower planetary temperatures, but there is no conclusive evidence they caused this phenomenon.

Aurorae are caused by the interaction of free electrons and protons in the Solar wind and magnetospheric plasma, with atmospheric oxygen and nitrogen. The interactions cause excitation of atmospheric elements, then as they return to their ground state a photon (light) is emitted. This activity is focused along Earth's magnetic field lines and is most intense in a belt between 10 and 20 degrees from each magnetic pole. In the north, it's called Aurora Borealis, in the south it is called Aurora Australis. During intense solar activity such as a CME, aurorae can sometimes be seen in southern states.

The prevalent color is green (our eyes are most sensitive to green), with red, blue, pink, even yellow. The colors are caused by atomic vs molecular forms of oxygen, molecular nitrogen, and varying types of interactions at different altitudes.

Interesting fact: The northern and southern aurora are virtually identical and changes in one are mirrored in the other.

What's in the Sky?

The Southern Delta Aquariid Meteor shower is happening through August 1st: 3 am+; south near the horizon. About 20 per hour. Jupiter and Saturn are still up there.