

The Aurora Borealis is surrounded by many Myths and Legends. Legends of dragons originate with the lights of the Aurora Borealis. Sights of the Aurora Borealis were an indication of a royal birth to come. The Auroras were also a sign of our ancestors and spirits coming to guide us. They were also seen as a forewarning of war. Some believed if you whistled at the Aurora Borealis it would take you away into its river of lights or if you clapped your hands at it, you could force it away. It was even believed in earlier times to be a reflection of the sun on our atmosphere. Even though it is caused by the sun, it is NOT a reflection of the Sun, but a chemical reaction that occurs with the Sun and Magnetic Field of a planet; to be discussed later. The Aurora Borealis was a term coined by Galileo after Aurora, the Roman Goddess of the morning. But what is the Aurora?

Shimmering rivers of light shows in the sky in flashy colors of greens, blues, yellows, reds, and purples. The Aurora is a beautiful dancing display of lights that reside closer to the magnetic North and South poles of not only our Earth, but of any planet that has an atmosphere and a magnetic field that can be touched by the supersonic rays of the Sun or other solar star. This light display is the only time you can see visible evidence of a magnetic field's presence on a planet. It happens from the interacts of the Sun's Coronal Mass Ejections catapulting through space traveling toward the Earth or other neighboring planets at supersonic speeds. These powerfully charged electron rays of plasma and the Sun's magnetic field interact with the magnetic field of other planets. Auroras have been photographed on not only on Earth, but from space telescopes it has been seen on Jupiter, Saturn, Uranus and Neptune, just to name a few other planets where this shimmery light show may be displayed and capture your imagination.

The beginnings of the Aurora originate over 90 million miles away from our planet within our very own Sun. You can see the birthing points of these solar flares and Coronal Mass Ejections within the dark spots of the sun that eventually release bubbles of gas, plasma and the Sun's magnet field spewing out into space like a wrecking ball. These solar eruptions send super charged electron particles as well as the Sun's magnetic field streaming toward the Earth at speeds of 350 miles per second and the highest speed traveling at 1900 miles per second!! Solar flares are like the kid brother to the Coronal Mass Ejection. The Solar flare is like a flame gun and the Coronal Mass Ejection is like a cannon ball of magnetized particles on a more direct path. It can take a Coronal Mass Ejection up to three days to reach the Earth. Coronal Mass Ejections are generally what triggers an Aurora to occur, but a Solar flare can trigger it as well if the solar storm is strong enough. Not only do you get the visually stunning light displays, but sometimes you get the backhand of communication loss, navigational interference and power grid failures due to the influx of energy storming through from the Sun's power rays.

These light displays would not be possible without the interaction with the Earth's magnetic field. The magnetic field forms a protective cocoon around our planet, as well as others planets within the Universe. This magnetic field shields us from space debris and radiation. Without our magnetic field, life on Earth would not exist, nor would our atmosphere because nothing would be there to protect and maintain it. The Sun's solar rays would have stripped it away bit by bit. Without the presence of this invisible protective shield we would closely resemble a familiar neighbor, the baron planet, Mars.

As the solar winds spew out of the sun and are catapulted toward Earth, they distort the magnetic field of the Earth deflecting the particles away from our planet. Not all of the Sun's powerful rays are deflected, some penetrate the magnetic field. These supersonic rays (mostly electron particles) become trapped within the magnetic field of the Earth and travel along the magnetic field lines of the planet toward/away from the North (Aurora Borealis) and South (Aurora Australis) poles, striking the atmosphere. The traveling rivers of light are when the magnetic field can be seen with the human eye. Otherwise, this magnetic field, though always present, appears invisible. These light displays are rarely, if ever, seen near the equator. It takes hundreds of thousands of years for the magnetic poles of the Earth to switch. It is at this time that these magnetic field lines will cross the equator and the likelihood of witnessing an Aurora around these parameters of the equator will increase, due to the crossing of magnetic fields and changes in field strength around these areas that would otherwise not normally be so strong. That being said, this happens once every 450,000 years. Under normal circumstances there isn't enough energy generated around the area of the equator to cause a visible display of the Aurora.

The high energy electron particles streaming toward us from the solar ejections that are not deflected interact with the Earth's neutral atoms within the atmosphere. These interactions cause an influx of excitation amongst these neutrally charged atoms and the atoms begin to release the excessive amounts of energy. As they release this energy it turns to photon energy and displays as the mesmerizing light show above our head that is known as the Aurora; in various colors and swirls: yellow, green, purple, blue and red rivers of life.

What makes these colors? The various color displays of the Aurora come from the high energy particles of a Coronal Mass Ejection as it meets the magnetic field and atoms of the Earth. Yellow and green are the most commonly witnessed colors of the Aurora. The green and yellow lights occur when the super charged electrons from the Sun's Coronal Mass Ejections interact with the oxygen in the Earth's atmosphere at or below 150 miles in altitude. Red is also a commonly seen color. Red is created when the super charged electron particles of the Sun's Coronal Mass Ejections interact with atoms in the Earth's atmosphere at or above 150 miles in altitude. Blues and purples variations are harder for the human eye to see. If the highly charged electron particles of the Sun's Coronal Mass Ejections interact with Nitrogen in the Earth's atmosphere at 60 miles or higher, they display as blue Auroras. The Sun's Coronal Mass Ejections can also react with Hydrogen or Helium and cause blue or purple light displays that are very hard for the eyes to pick up on. If you have a well-functioning camera, that can operate under such extreme weather temperatures in which the Auroras can be witnessed, the images can pick up more vibrant color displays than what the eyes alone may capture.

Despite appearing flame like and happening from the interaction of the highly charged particles of the sun, the light display of the Aurora is actually extremely cold; 0 degrees Fahrenheit or colder. Another amazing and not so well-known anomaly of the Aurora is that it not only produces light displays, but it also produces sound!!! Usually, these sounds aren't audible to our ears, but sometimes during high solar activity you may be fortunate enough to hear the Aurora. The sound of the Aurora can be heard as a clapping, popping and crackling or banging and sputtering noises. These sounds are subtle, soft, and faint. They usually take a trained ear

to hear them because they do not occur close to the ground like thunder. The sounds originate within a thermal inversion layer which is where a blanket of warm air meets cold air and gets trapped next to the "ground". This layer exists about 230 feet above the Earth's surface, which is lower than the level where the Aurora occurs, but higher than the surface layer of the Earth. So now that you know... where can you witness the marvels of the Aurora and when?

Some of the best places to view the Aurora are in Sweden, Alaska, Norway, Canada, Greenland, Iceland, Finland, Russia, Tasmania New Zealand, and for the lucky few who get to go there, Antarctica. The best times to witness the Auroras is during the Winter months when darkness falls earlier and longer; on nights without the presence of the moon or minimal moon light without the overcast of clouds.