

Northern lights - the most beautiful color display of the nature



The origin of Northern Lights

The active Northern Lights, also known as aurora, are nature's most beautiful color display. In Finland normally just before midnight, when it is dark enough, a green glow appears in the sky, normally in the form of an arc across the whole sky, directed from east to west. Later during the night, this light might get structured, so bright as to make shadows on ground - and what is most fascinating, start moving fast, covering sometimes the whole sky! Today we know what the lights are. Electrically charged particles come down from space and hit the atmosphere. The air particles in turn, in fact oxygen atoms and ionized nitrogen molecules, get energy in the collisions with the incoming electric particles. Then the air glows the excess energy away, in the form of light emission. This light emission we know as the Northern Lights. We can detect those electric particles, which originally cause the Northern Lights, of course, by using satellite instruments. But more than 100 years ago - nobody knew what the lights were!

Quiet Northern Lights

In the North, in Finnish Lapland, we have those Majestic Lights in the sky for 200 nights per year. Lights are high up above our heads, at the altitudes of 100 km and more. And that is why we need a dark, clear night without any clouds, if we want to see the Northern Lights. Most often we see the so called quiet Northern Lights, a diffuse green light, without any structure at all, in the form of an arc from the eastern horizon, across the whole sky, to the western horizon. There are no rays, and no fast movement in the quiet Northern Light. But the arc can gradually rise on the sky, coming from the North, slowly to above your head or even to the southern horizon. The normal altitude of Northern lights is from 100 to 170 km. The brightest light comes from altitude 110 km. The lower edge of the light is sharper and can get a bit below 100 km altitude. The upper edge is unclear, but can extend up to the altitudes of 200-300 km, sometimes even as high as 1000 km.

Active Northern Lights

But sometimes we see the active lights, the storm of the Northern Lights, for a couple of minutes. Then there might be several arcs simultaneously in the sky. And they move fast. Clear rays, small folds and bends, curls and spirals, appear in the arcs. The whole sky looks like as being in fire. The normal duration of the storm is only 2 minutes. In good conditions, the active phase could last as long as from 5 to 10 minutes. But only very rarely you will see a storm of 20 minutes, the absolute maximum is 30 minutes. Occasionally there are nights when the storm can repeat itself several times, for example 3-5 times per night with some hour intervals. During such nights of the Northern Lights, the quiet light can then stay in the sky for the whole night. The scientists actually call the storm of Northern Lights as a substorm, since it is part of a larger disturbed time in the near-Earth space environment, the magnetic storm. The occurrence of the active Northern lights follows roughly the 11-year sunspot cycle, which currently during the year 2000 is again at the maximum. During the maximum time and a couple of years after that, we expect frequent active displays to occur.

The Fox Fire

Here in Finland we call the lights as Fox Fire (in Finnish it's "revontulet"). There is a Finnish folk story, that a fox in the north is running on the snow, and it's sweeping its tail so that sparks fly off into the sky. This story is very common in different versions in whole Finland. In addition we do have about 20 different folk stories about the origin of the northern lights in Finland. One claims that there is so much fish in the Arctic Sea that the sun light is reflected back into the air from the backs of the fishes. Well in fact, in the old Finnish language there exists a word, resembling to the word fox, but really meaning something like making magic. So actually our ancestors really meant the magic lights - and not the fox running on the snow - when they spoke about the fox fire.

Forms of Northern Lights

There are various forms of the Northern Lights. One classification counts more than 30 different forms. The shape of the arc usually resembles a band. A band can be diffuse or rayed. Sometimes, when the rays are clear, you would imagine a curtain in the sky, the lower part might be green and the upper part beautifully red. Sometimes you see a bluish red especially in the lower edge of the shapes and rays. And what are the rays, that we see so often? They are just the tracks of the particles from space, made visible to us by the Northern Lights. The electrically charged particles follow the direction of Earth's magnetic field. The magnetic field guides particles from space around the pole areas. Around the magnetic North Pole there is continuously a ring of light, we call it the auroral oval. Above the South Pole, there is a similar ring of light. In fact, the Southern Lights are a mirror image of the Northern Lights.

Time to see the Aurora

If you want to see what really happens on sky, the best position is to lie on your back on the snow and just enjoy. The most probable time to see the Northern Lights is the so called magnetic midnight. Here it occurs a bit before the normal midnight. The normal time window for seeing the lights could be from 10 to 11.30 pm. But it might be better to stay awake between 9 pm and 1 am. A real enthusiast would stay awake the whole night, starting at 6 pm and ending at 6 am. During active nights beautiful forms, such as e.g. the pulsating aurora, could be seen also during the early morning hours. But normally we see just a glow in the North, around the magnetic midnight, the quiet Northern Light. If there is no activation of the light, we can then go back to our beds and take a peaceful sleep. But if you see any brightening in the light, be aware. The lights might get active, and you would be lucky enough to witness the most beautiful color display of the nature, the active aurora.

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More information from <http://www.arcticacademy.fi>

Let's hope for some cold night with clear skies!

The Raid Laponie Organisation