

Aurorae

Aurora Borealis (Northern Lights)



Aurora Borealis (Northern Lights) above Bear Lake, Eielson AFB, AK

Source: https://en.wikipedia.org/wiki/Aurora#/media/File:Polarlicht_2.jpg

Aurora Australis (Southern Lights)



Aurora Australis (Southern Lights) as viewed from Space Shuttle Discovery in May 1991

Source: <https://upload.wikimedia.org/wikipedia/commons/thumb/6/61/Aurora-SpaceShuttle-EO.jpg/600px-Aurora-SpaceShuttle-EO.jpg>

Aurorae (Polar Lights)

An **aurora** (plural: auroras or aurorae), also commonly known as the **polar lights**, is a natural light display in Earth's sky, predominantly seen in high-latitude regions (around the Arctic and Antarctic). Auroras display dynamic patterns of brilliant lights that appear as curtains, rays, spirals, or dynamic flickers covering the entire sky.

Auroras are the result of disturbances in the **magnetosphere** caused by the **solar wind**. Major disturbances result from enhancements in the speed of the solar wind from coronal holes and coronal mass ejections. These disturbances alter the trajectories of charged particles in the magnetospheric plasma. These particles, mainly electrons and protons, enter the upper atmosphere (thermosphere/exosphere). The resulting ionization and excitation of atmospheric constituents emit light of varying color and complexity. The form of an aurora, occurring within bands around both polar regions, is largely dependent on the amount of acceleration imparted by the particles.

Magnetosphere

In astronomy and planetary science, a magnetosphere is a region of space surrounding an astronomical object in which charged particles are affected by that object's magnetic field. It is created by a celestial body with an active interior dynamo.



Magnetosphere



Magnetosphere

In the space environment close to a planetary body, the magnetic field resembles a magnetic dipole. Farther out, field lines can be significantly distorted by the flow of electrically conducting plasma like that emitted by the Sun (i.e., the solar wind).

The Earth's magnetosphere largely mitigates or blocks the effects of solar and cosmic radiation, and it also protects living organisms from potentially detrimental and dangerous consequences.

Coronal Mass Ejection (CME)

A coronal mass ejection (CME) is a significant release of plasma and accompanying magnetic field from the Sun's corona into the heliosphere. CMEs are stronger than solar wind.



Source: https://spaceweather.com/images2022/17aug22/cme_anim_crop_opt.gif



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“Big Picture”



Source: <https://site.uit.no/spaceweather/aurora-borealis/>

Color Chemistry

Different elements emit different colors

- Nitrogen atoms emit violets and blues
- Oxygen atoms emit greens, pinks, and reds





Reykjavik – Iceland

Source : <https://pickyourtrail.com/blog/5-best-places-to-view-the-northern-lights/>



Svalbard, Norway

Source: <https://pyt-blogs.imgix.net/2015/10/svalbard.jpg?auto=format&iplib=php-3.3.0>



Cherry Springs State Park, Pennsylvania

Source: <https://pyt-blogs.imgix.net/2015/10/maxresdefault.jpg?auto=format&ixlib=php-3.3.0>



New Zealand

Source: <https://pyt-blogs.imgix.net/2015/10/maxresdefault.jpg?auto=format&ixlib=php-3.3.0>



United Kingdom

Source: <https://www.ibtimes.com.au/3-shades-blue-purple-green-colour-britains-skies-courtesy-aurora-borealis-1507631>

spaceweather.com

