

Auroras



Essential Standard 2.1

Understand the structure of and processes within our atmosphere.

Learning Objective 2.5.1

Summarize the structure and composition of our atmosphere, along with its interaction with radiant energy and the protection it provides.

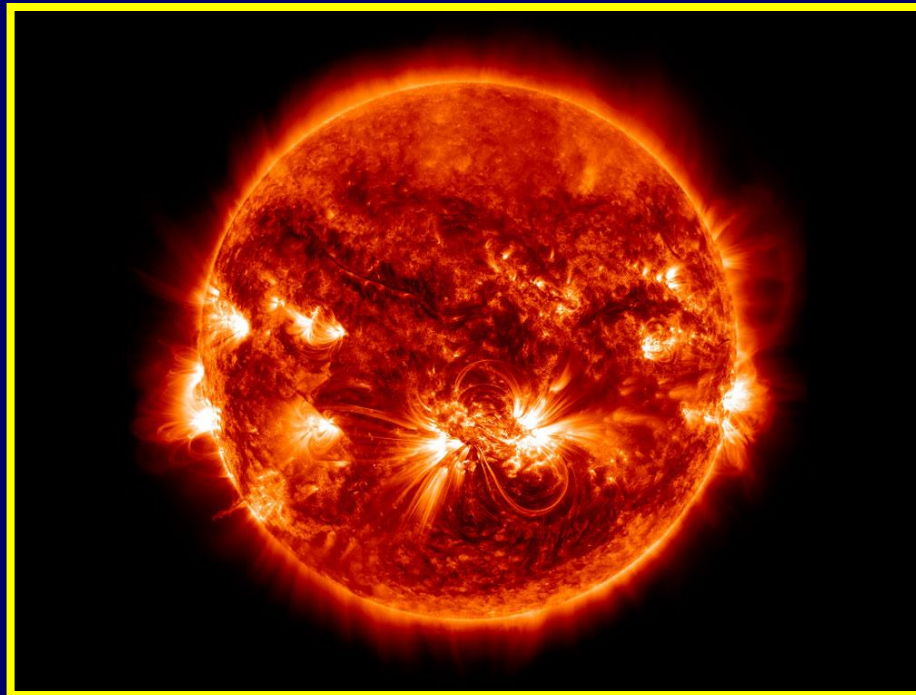
I Can Statements

At the end of this lesson, you should be able to say, with confidence:

- I can explain how radiant energy from the Sun interacts with molecules in Earth's atmosphere.
- I can explain how Earth's magnetosphere protects the Earth from charged particles emitted from the Sun.
- I can explain what causes auroras and describe where they can be found.

Sun's Corona

The outer surface of the Sun, known as the Sun's Corona, is so hot that hydrogen and helium atoms constantly shed positively charged protons and negatively charged electrons.



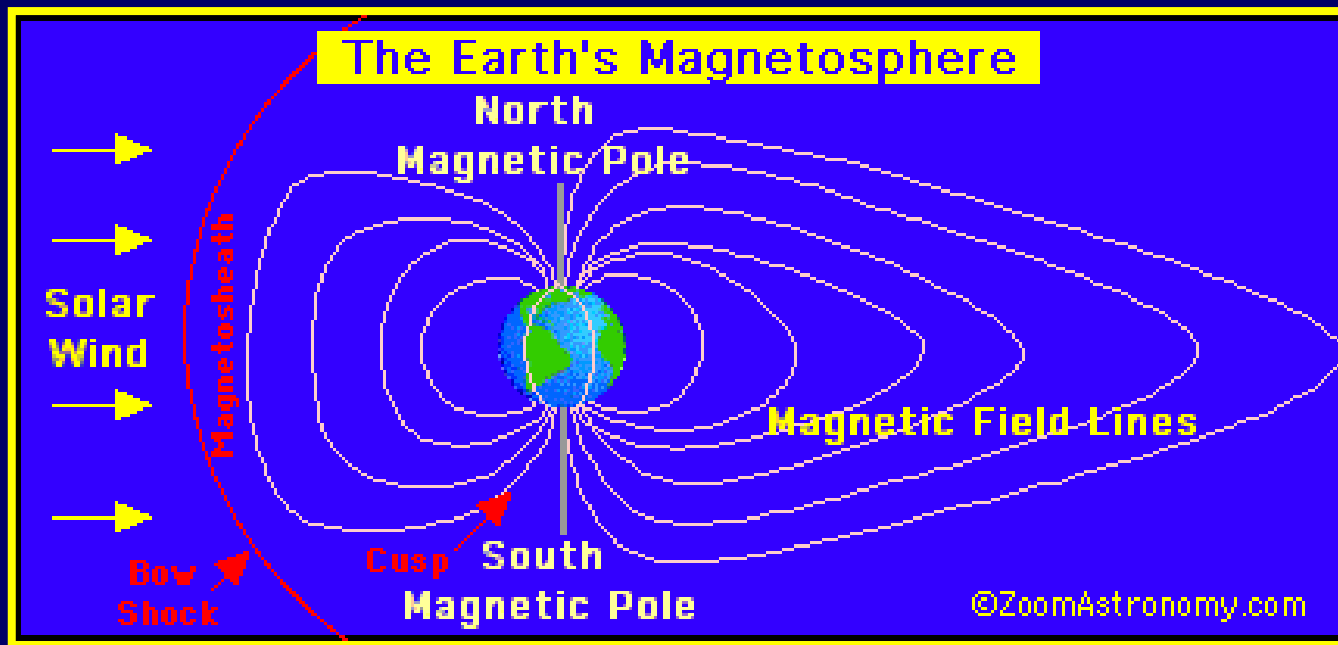
Solar Winds

These charged particles collect into a gas, called plasma, and head towards Earth as a Solar Wind.



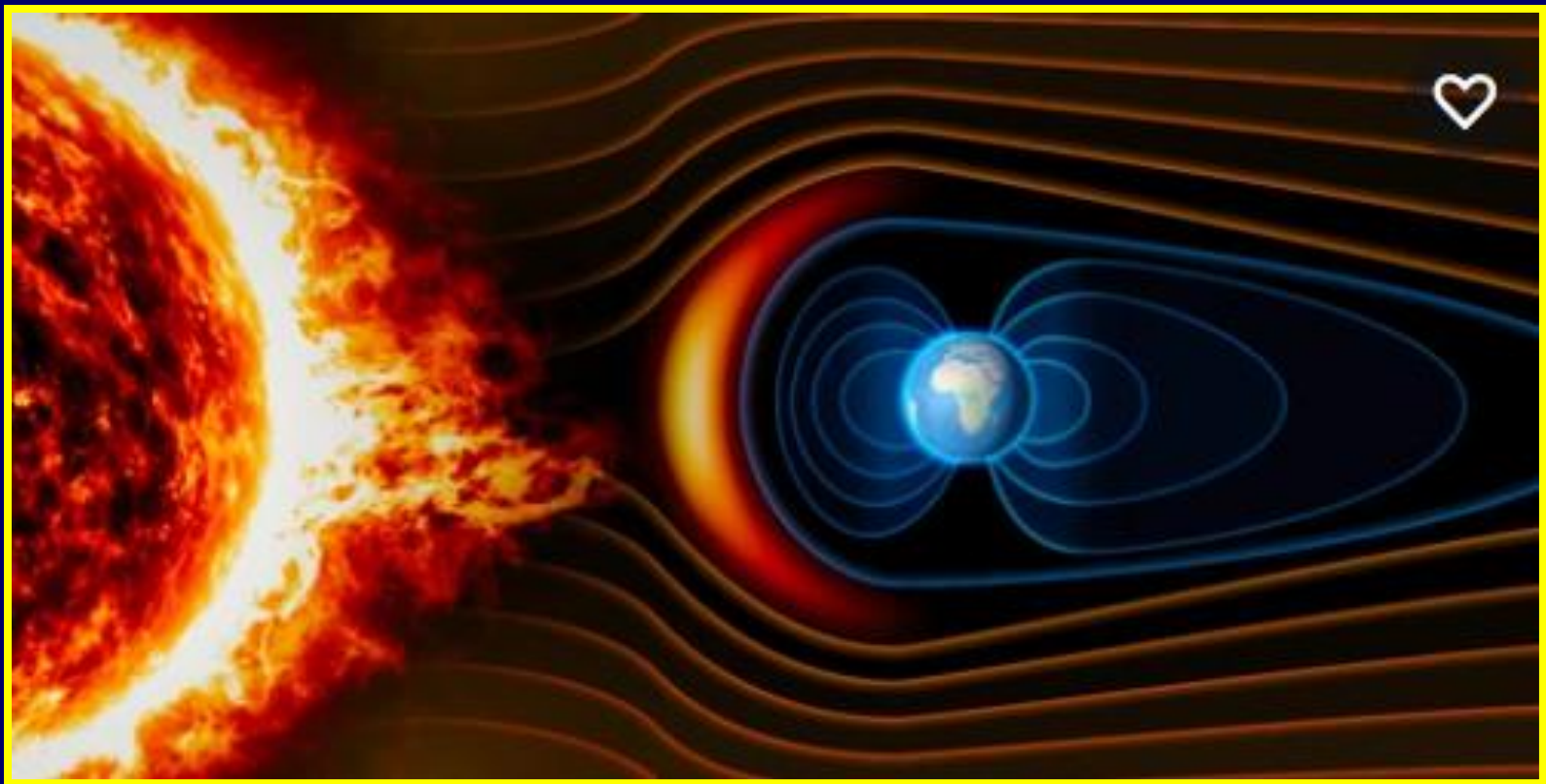
Earth's Magnetosphere

Fortunately, the Earth's rotating iron core results in the Earth being just one big magnet with a magnetic field that extends far into space and is called the Earth's Magnetosphere.



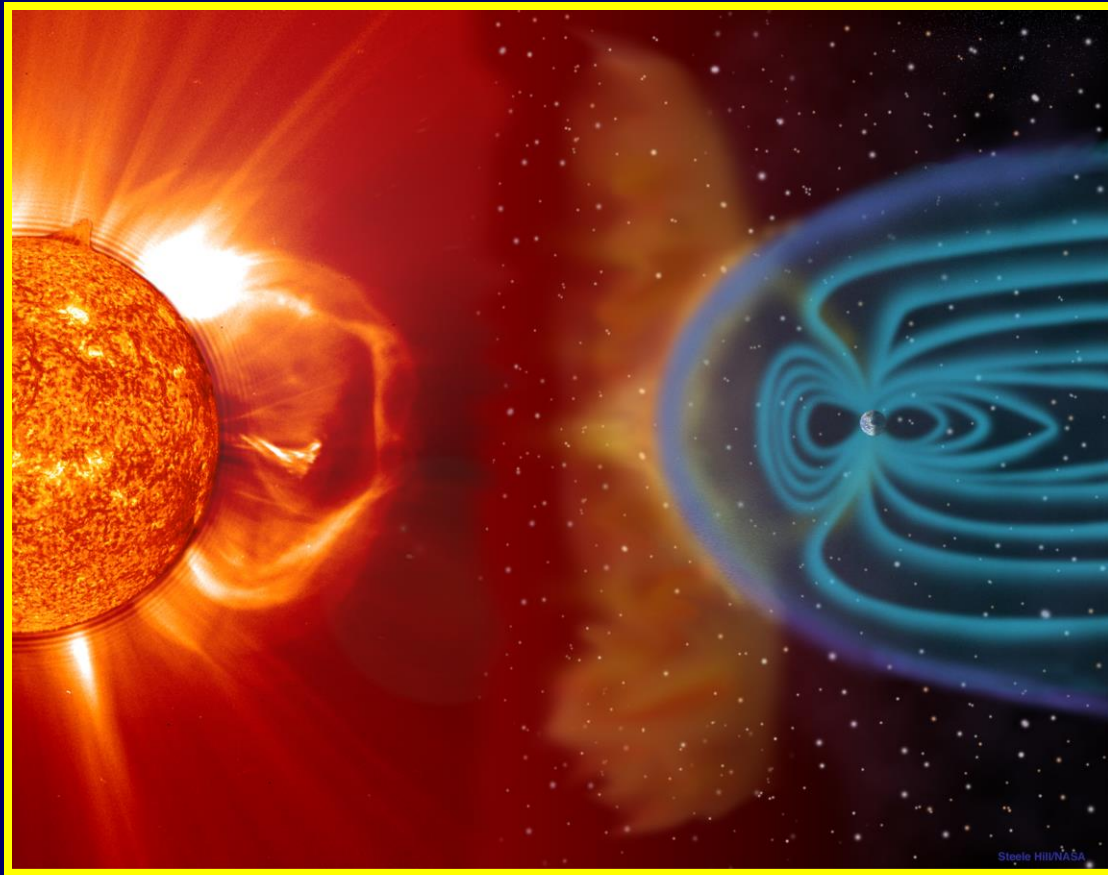
Earth's Magnetosphere

The Earth's magnetosphere protects the Earth from these charged particles by directing them around and past the Earth.



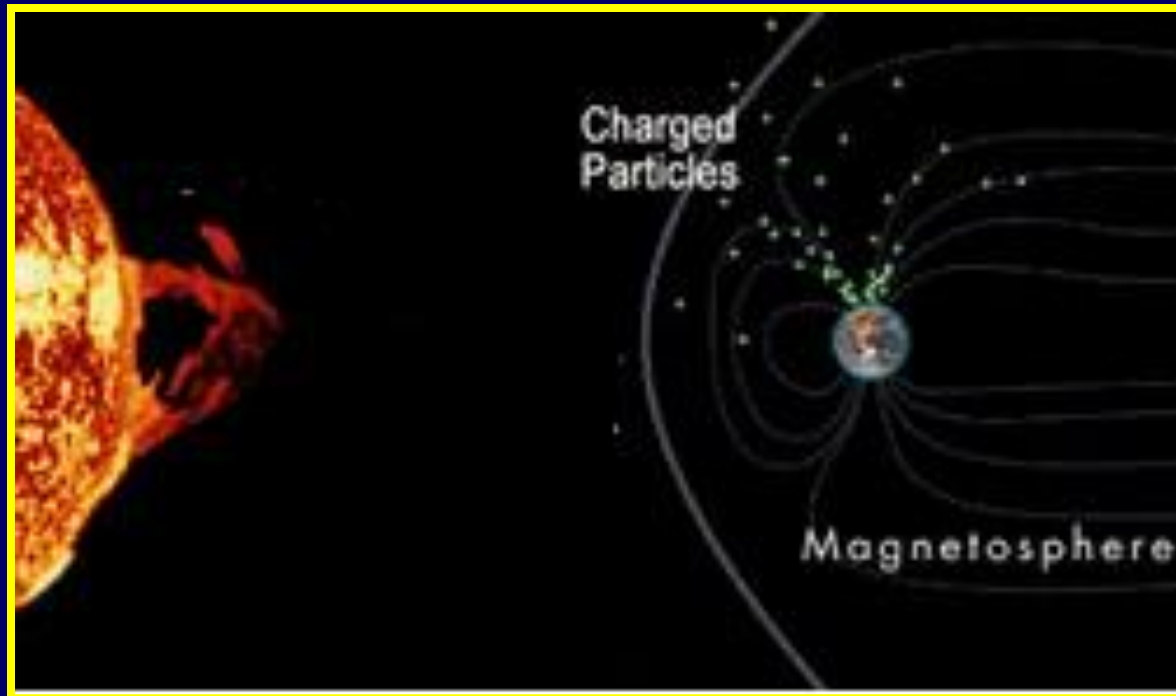
Coronal Mass Ejections

Occasionally, the Sun ejects a large mass of plasma, called Coronal Mass Ejections, into the Solar Wind .



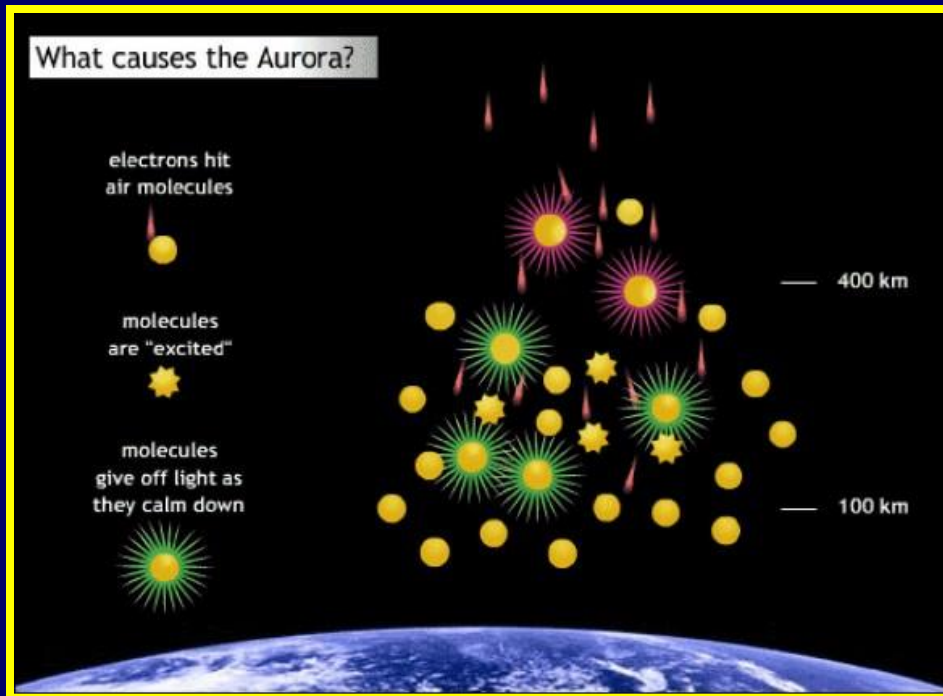
Earth's Poles

During these coronal mass ejections, the Earth's magnetosphere becomes overwhelmed and some of the charged particles are directed, along the magnetic field lines, towards both of Earth's poles.



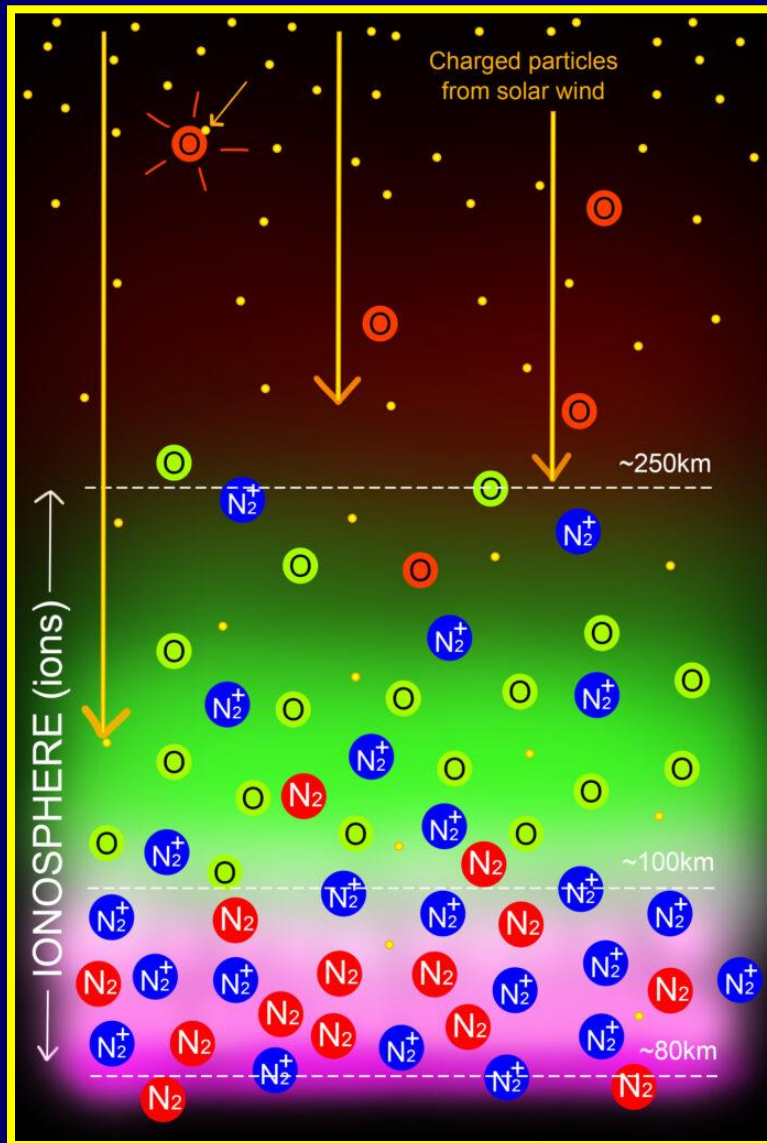
Thermosphere

As these charged particles enter Earth's thermosphere, they collide with nitrogen and oxygen atoms, causing them to become excited.



The excited oxygen and nitrogen atoms give off small bursts of energy in the form of colored lights.

Colored Lights



Oxygen atoms
release green and
bright red lights.

Nitrogen atoms
release blue and
deep red lights.

Dancing Lights



Aurora Borealis

Near the north pole, the dancing lights are officially called the Aurora Borealis, but are commonly called the Northern Lights.



Aurora Australis

Near the south pole, the dancing lights are officially called the Aurora Australis, but are commonly called the Southern Lights.



The southern lights occur mainly over Antarctica but can sometimes be seen over New Zealand and Australia.

Aurora Australis

Fewer people see the southern lights so they aren't as well known, but they can produce a larger variety of colors such as pink, orange, and gold.



The End

