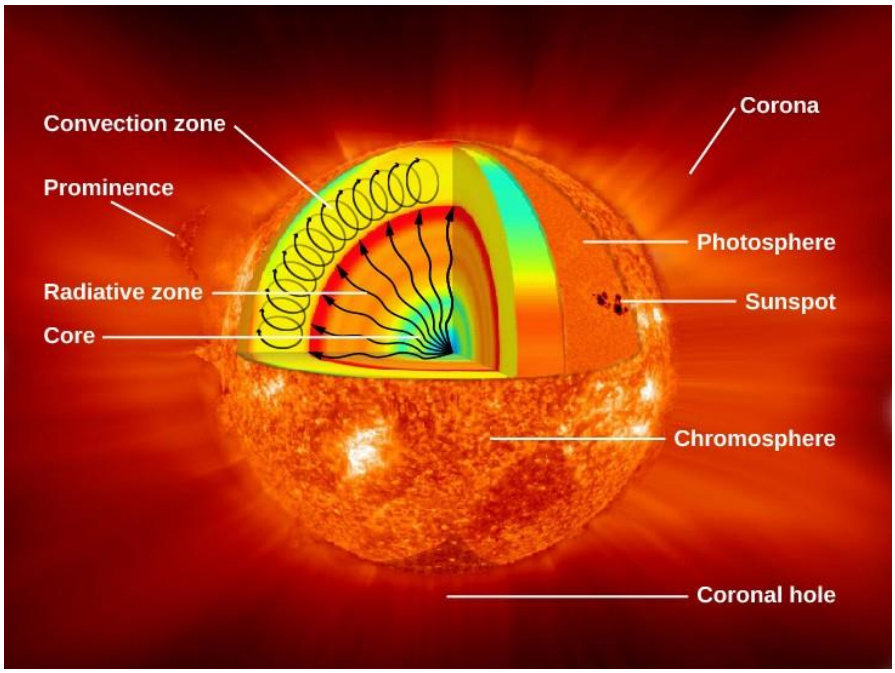
# The Sun – an average size star

Our Sun is low mass, average size star. A hot ball of gas and plasma – 92% of which is hydrogen.

It has six layers. Its inner layers are its **core**, **radiative zone** and **convection zone.** Its outer layers are its atmosphere – its **photosphere**, **chromosphere** and **corona.**




*Credit: NASA/Goddard*

## Inner layers:

In its **core**, the temperature is 27 million degrees F. In this intense heat and pressure, hydrogen atoms are fused together into helium. This process is called nuclear **fusion** and creates photons (the stuff we call "light"). Atoms are broken apart here creating what is called a **plasma** – a soup of electrically charged particles. Together, the photons and the particles work their way up through the **radiative** and **convection zones** into the Sun's atmosphere.

## Outer layers – The Atmosphere of the Sun:

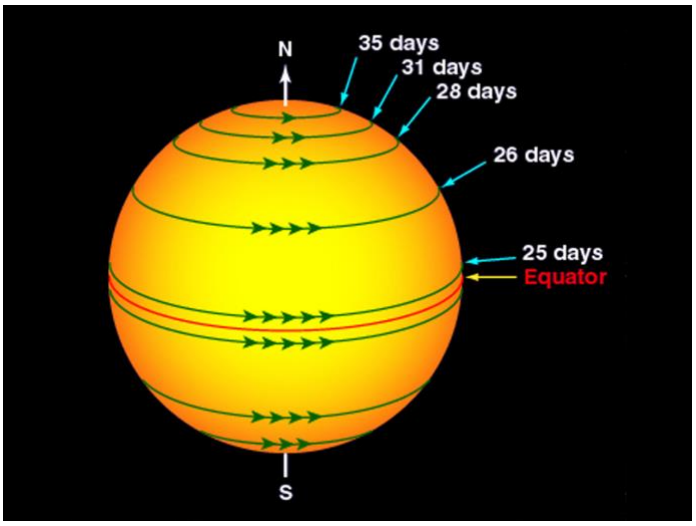
The **photosphere** – the visible surface of the Sun, where light and particles are emitted and solar flares and sunspots appear. Its temperature is 10,000 degrees F.

The **chromosphere** – Its temperature is 7,800 degrees F. Light here is usually too weak to be seen.

The **corona** – the outer layer of the Sun. Its temperature is more than a million degrees F. (No one knows why it is so much hotter in the corona than in the photosphere and the chromosphere!) As its gases, now in the form of plasma, flow outward and cool, they become the solar wind.

## Rotation:

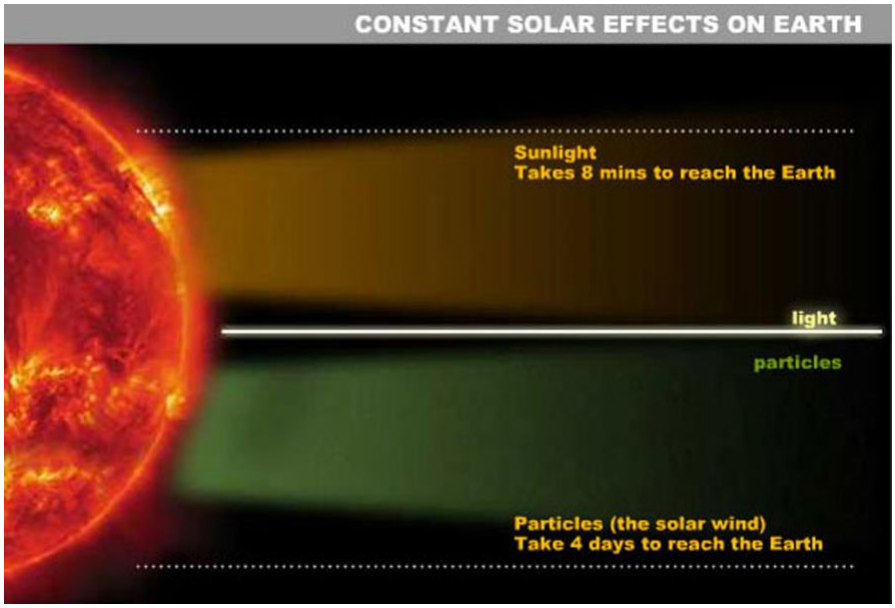
The Sun rotates. Because it is a gas/plasma and not a solid, the Sun rotates at different speeds from its equator to its poles. This is called **differential rotation.**




*Credit: NASA*

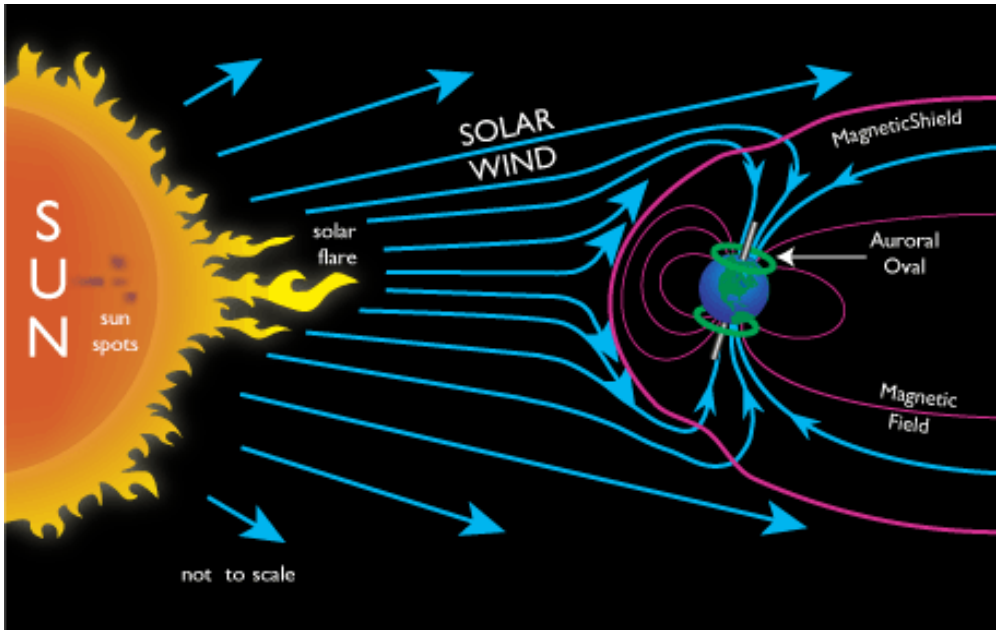
## The Solar Wind:

We are all familiar with photons -- the stuff that comes from the Sun that we call "light". But the Sun also emits particles which affect us here on Earth in various ways. Note that while photons of light take only eight minutes to reach Earth, the solar wind can take up to four days.




*Credit: UC Regents*

The diagram below shows the solar wind interacting with the Earth's magnetic field.




*Credit: NASA*

As you can see in the above diagram, the Earth's magnetic field protects us from the harmful radiation contained in the solar wind.

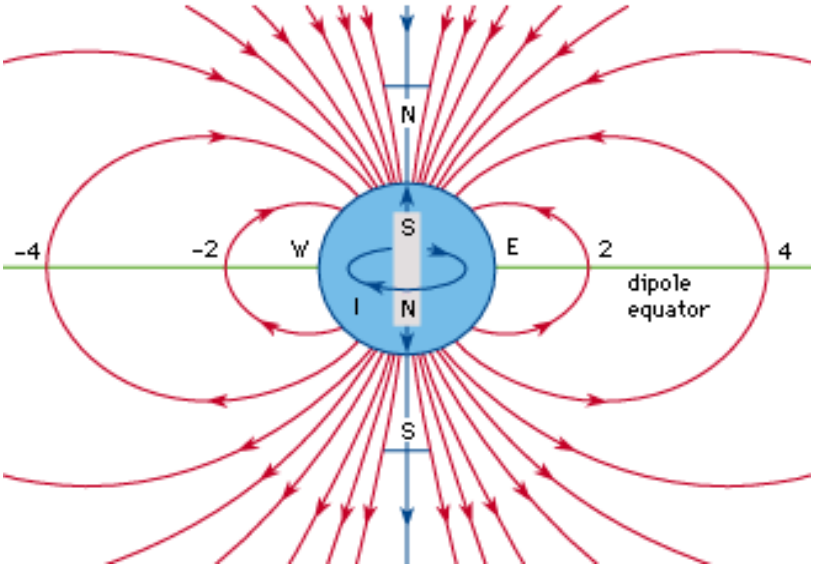
## Auroras:

When some of these particles in the solar wind do interact with the atoms and molecules in Earth’s atmosphere, they produce auroras at the Earth’s poles.

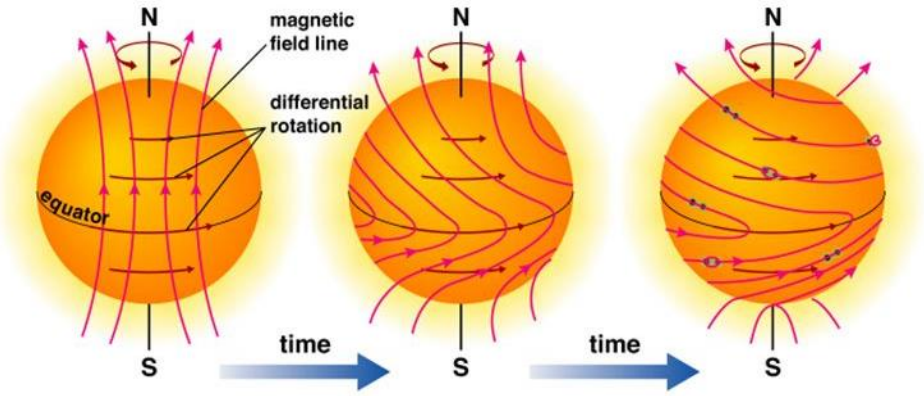
*Credit: The Aurora, A NASA/IMAGE Resource*

# The Magnetic Field of the Sun:

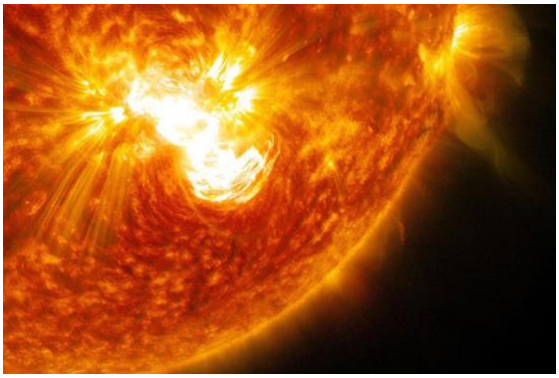
Like the Earth, the Sun has a magnetic field:



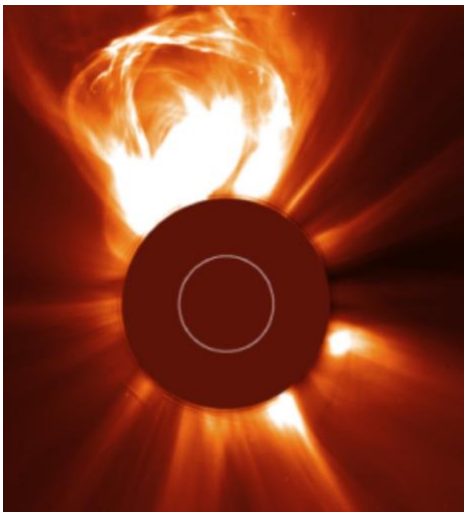

As the Sun rotates, this magnetic field becomes twisted:



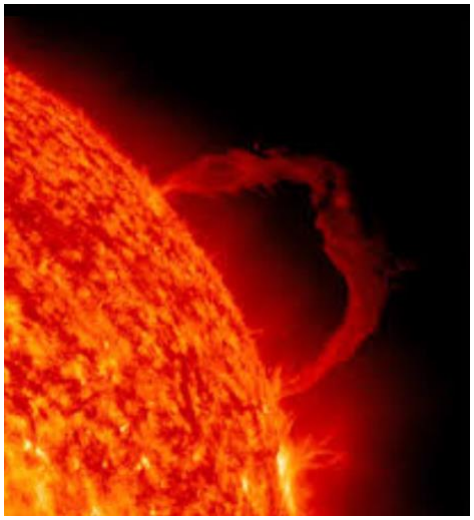
This twisting of the Sun's magnetic field causes massive, explosive eruptions from the surface of the Sun:



Solar Flare



Coronal Mass Ejection



Solar Prominence

These eruptions on the Sun increase the intensity of the radiation coming from it and can and do cause interference with our satellites and electrical systems here on Earth.

## Sunspots:

Slightly cooler regions on the photosphere -- the visible surface of the Sun -- appear to us as sunspots. Their number increases and decreases in an eleven-year cycle.