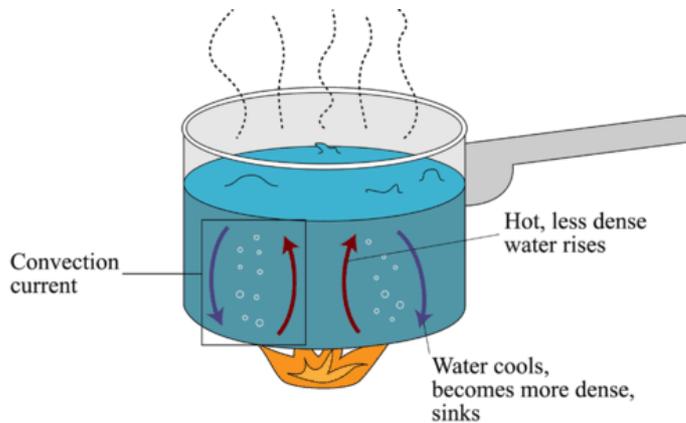


Convection

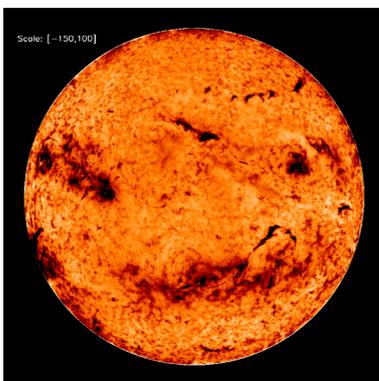


Heat rises, while cooler gas falls. Have you ever noticed that your basement is always much cooler than upstairs. The same laws of physics apply within stars. Because heat rises while cooler gases fall, the gas within a star is constantly rising and falling. This creates massive streams of circular motion

within the star. This is called convection.

As the gases near the core of the Sun are heated, they begin to rise towards the surface. As they do so, they cool somewhat. Eventually they become cool enough that they begin to sink back down towards the core. It can take an atom millions of years to complete one complete cycle around a convection stream. As a result of this process, the temperature on the surface of the Sun is around 5,500 degrees Celcius, which is much cooler than its **superheated core**.

Sun Spots



We don't often think of the Sun as having cooler areas on its surface. The Sun is far too hot for an astronaut to ever visit, but there are areas which are slightly cooler than others. These areas are known as sun spots. Sun spots are still very hot. However, because they are slightly cooler than the rest of the surface of the Sun, they appear slightly darker in color. The gravitational forces in Sun spots are also stronger than the other hotter areas. Of course, you cannot look directly at the Sun to see these spots because you would damage your eyes. Astronomers have to use special telescopes with filters and other instruments to be able to see the cooler spots on the surface of the Sun.



Sun spots come and go on a regular basis. At times, there are very few, if any sun spots. At other times there are far more. They generally increase in intensity and then decrease over a period of 11 years. This 11 year cycle is known as the **Saros Cycle**.

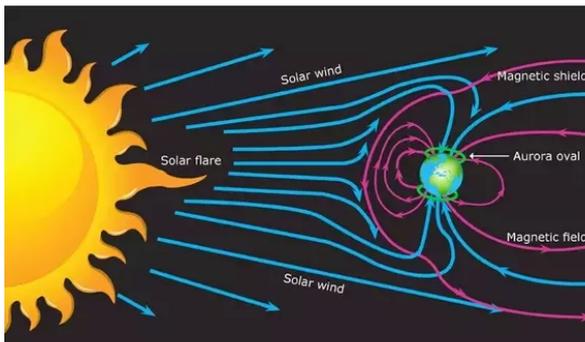
Solar Flares



During periods of high solar activity, the Sun commonly releases massive amounts of gas and plasma into its atmosphere. These ejections are known as solar flares. Some solar flares can be truly massive, and contain impressive power. On occasion, these more powerful flares can even cause satellites orbiting the Earth to malfunction. They can also interact with Earth's magnetic field to create impressive and beautiful light shows known as the [Northern and Southern lights](#). In the

northern hemisphere, these lights are commonly known as the Aurora Borealis.

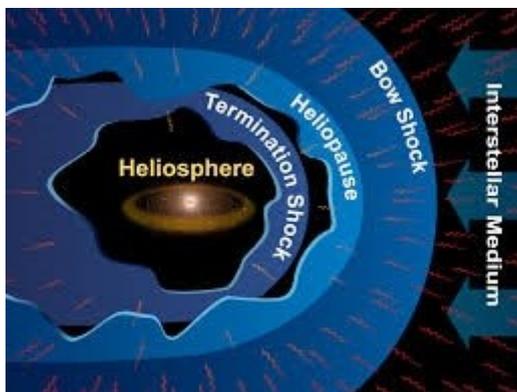
Solar Winds



Charged particles are blown towards the earth by the solar wind. They're largely deflected by the earth's magnetic field.

As the Sun burns hydrogen at its core, it releases vast amounts of atomic particles, or pieces of atoms, into outer space. These atomic particles along with the Sun's radiation create a sort of wind, known as the solar wind.

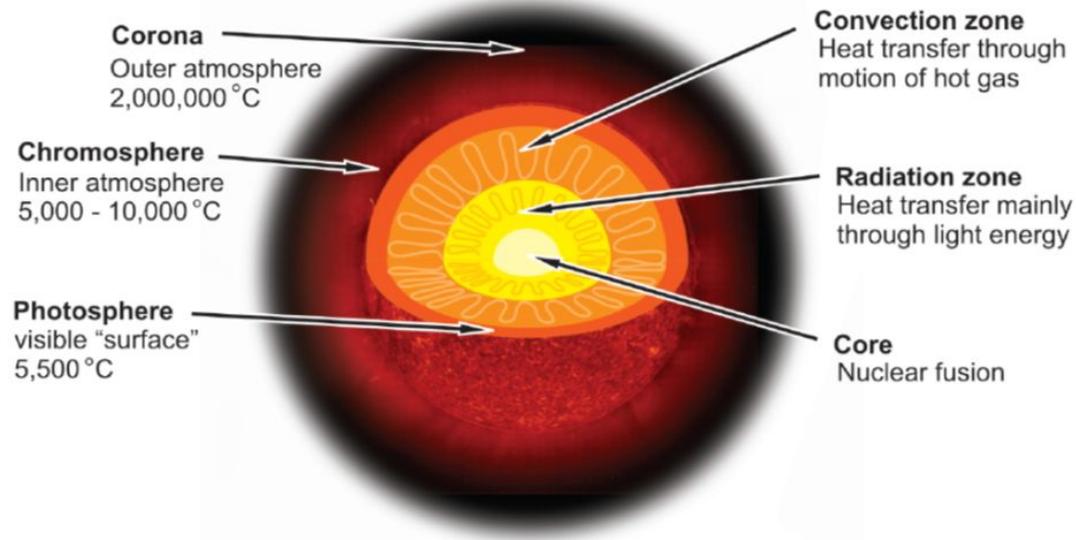
This wind blows particles outward in all directions from the Sun. Even as you read this, there are atomic particles which are traveling from the Sun towards you. Often, particles pass right through your body without you ever realizing it.



Eventually this wind reaches out beyond the Solar System and begins to mix with the winds from other stars. **The bubble around the Sun** where the solar winds are still strong enough to blow outward is known as **the heliosphere** (note the Greek name Helios). The area of space where the winds are too weak to

continue pushing outward and instead begin to mix with the winds of other stars is known as the **interstellar medium**.

Sun Anatomy



The Sun's Family

The Sun is by far the largest object in the Solar System. 98% of all matter within the Solar System is found within the Sun. This means that all the planets, moons, asteroids, minor planets, comets, gas, and dust would all combine to make up only 2% of all the matter in the Solar System. The Sun is so large that the Earth could easily fit inside the Sun a million times.

Because the Sun is so large compared to everything else, it is easily able to hold on to the rest of the matter, causing everything else to orbit around it.

Light from the Sun can reach the Earth in only 8 minutes! This is called **the speed of light** (145 million km in 8 minutes). The Sun is nearly 93 million miles (approx 145 million km) from Earth.