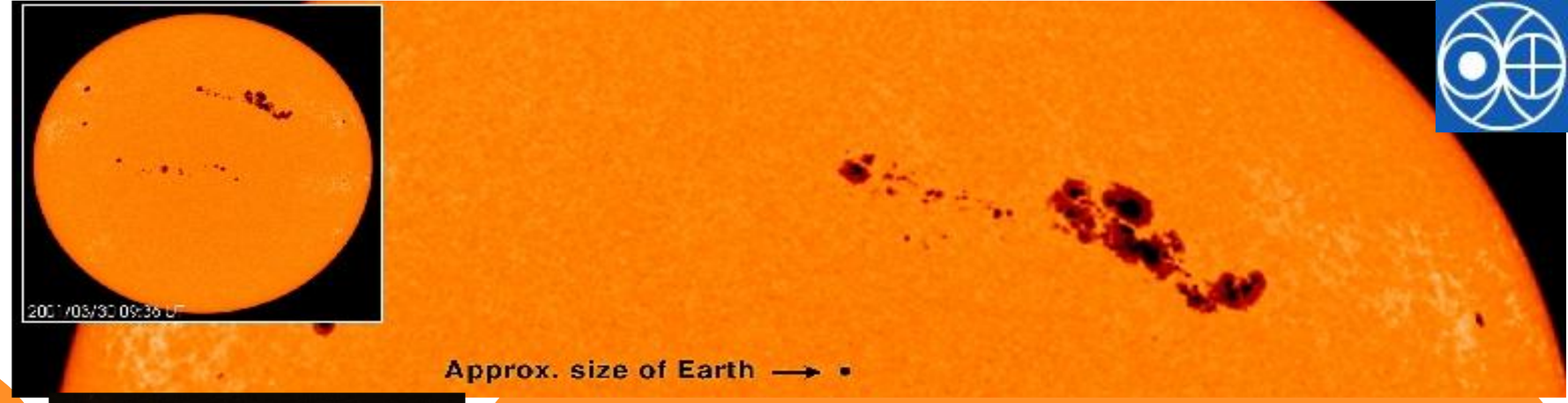
SUNSPOT: BEAUTY AND THE BEAST

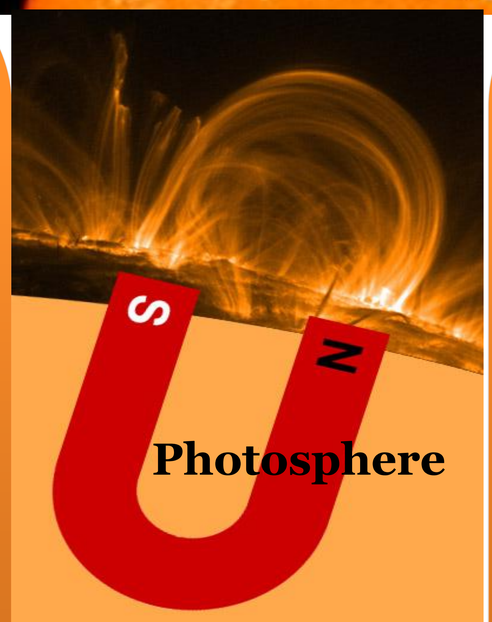
The Sun has got its spots on!



How Sunspots are formed?

➢Sunspots are caused by very strong magnetic fields on the Sun.

➢The best way to think about the very complicated process of sunspot formation is to think of magnetic "ropes" breaking through the visible surface (photosphere) of the Sun. Where the rope comes up from the solar surface is one sunspot and where the rope plunges into photosphere is another sunspot.



➢If we could put a giant horseshoe magnet inside of the Sun, it would make a magnetic field a lot like the magnetic field that two sunspots make. Sunspots tend to come in pairs. One sunspot is like the North pole of a magnet; the other sunspot is like a South pole.

Interesting Facts

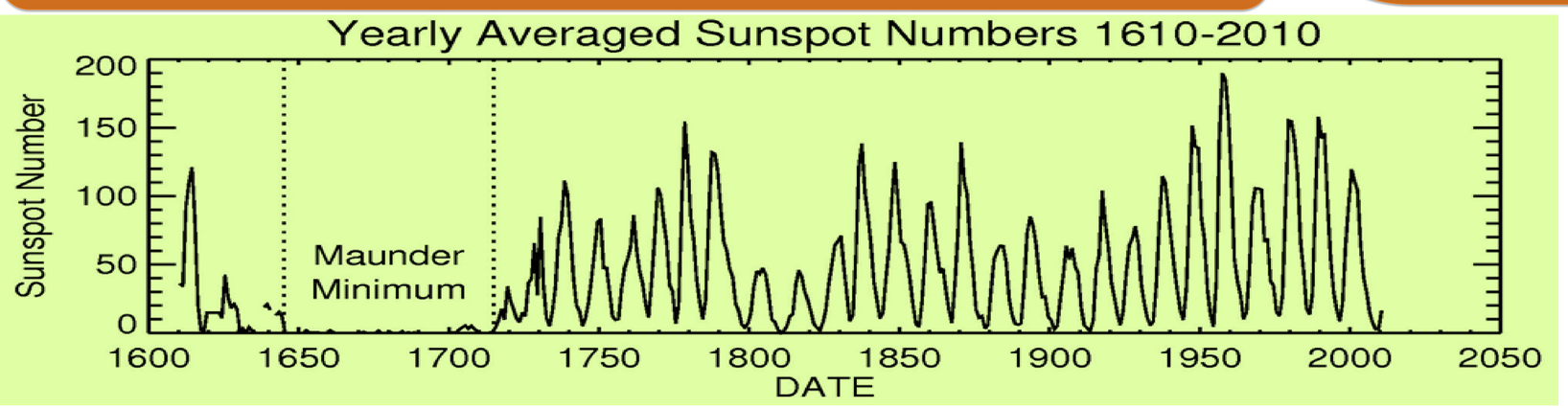
➢"South" sunspots become "North" sunspots on the next solar cycle. Sunspots can grow to gigantic sizes - some are much bigger than the Earth!

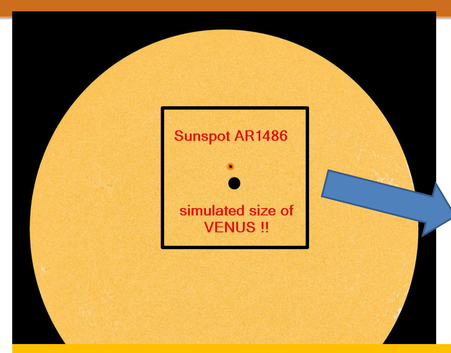
➢Sunspots have a dark centre called the Umbra and are surrounded by a lighter colored region called the Penumbra.

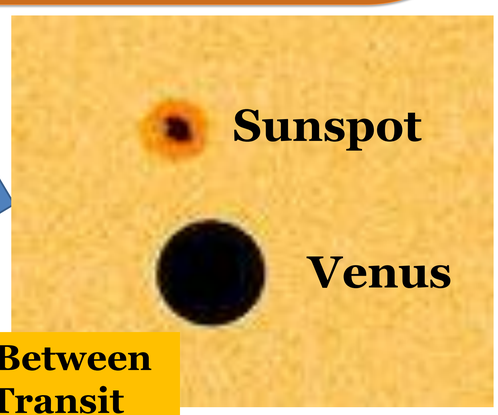
➢Sunspots are around 1,500 degrees Celsius (2,732 degrees Fahrenheit) cooler than the rest of the Sun.

➢The solar corona, or outer most surface, is estimated to be about 1 million Kelvin. That equals 1,799,540 degrees Fahrenheit and 999,727 degrees Celsius.

➢The Sun is responsible for the Northern lights, which are also known as the Aurora Borealis. In the Southern Hemisphere, they are known as the Aurora Australis.







Observable difference Between Sunspot and Venus Transit

History of Sunspot observation

➢You may not know that humans have observed sunspots for a very long time. These records have been around so long in fact, that we can link sunspot number with solar activity.

➢The first written record of sunspots was made by Chinese astronomers around 800 B.C. Court astrologers in ancient China and Korea, who believed sunspots foretold important events, kept records off and on of sunspots for hundred of years. An English monk named John of Worcester made the first drawing of sunspots in December 1128.

➢Soon after the invention of the telescope, i.e. around 1600, several astronomers used the telescope to make observations of sunspots.

➢ Astronomers of that time weren't quite sure what to make of these spots on the Sun. Some thought they were shadows of undiscovered planets crossing the Sun, while others believed they were dark clouds in the Sun's atmosphere.

➢The movement of sunspots across the face of the Sun allowed astronomers in the early 1600's to make the first estimates of the Sun's rotation period (about 27 days).

➢In 1843, an amateur German astronomer named Samuel Schwabe discovered the rise and fall of yearly sunspot counts we now call the sunspot cycle (Shown above). He first guessed the cycle's length at 10 years.

➢Two French physicists, Louis Fizeau and Léon Foucault, took the first photo of the Sun and sunspots in April 1845.

➢Around 1852, four astronomers noted that the period of the sunspot cycle was identical to the period of changes of geomagnetic activity at Earth, giving birth to the study of Sun-Earth connections we now call "space weather".

Hints:

Large sunspots can sometimes be seen with NAKED EYE, when the Sun is viewed through fog near the horizon at sunrise or sunset. (WARNING: Never look directly at the Sun! Even a brief glance can damage your eyes!)

References:

➢Wikipedia

➢http://www.windows2universe.org/sun/activity/sunspot_history.html

➢www.nasa.gov

➢http://www.kidsastronomy.com

➢**For further reading:** Historical Sunspot Observations: A Review (http://arxiv.org/abs/astro-ph/0702068)