The sun's plasma in its convective zone between its core and surface is heated from below, rises to surface and cools, and travels back down forming a convective current. It is so hot it is electrically charged, and because it moves up and down, huge magnetic fields in the form of tubes are created. The sun also rotates around its axis, but since it is not solid, different latitudes rotate a different speeds. The regions near the equator rotate once every 25 days, while those at the poles rotate once every 36 days.

This difference in rotational speed causes the suns magnetic fields to become twisted and tangled intensifying their strength. When a tube reaches a minimum threshold, it punctures the sun's surface, and locally inhibits the convection current. This leads to a decrease in surface temperature (6,000 F degrees compared to the normal 10,000 F), and a corresponding decrease in the brightness of the sun known as a sunspot. Sunspots can range in diameter between 10 and 100,000 miles, and can last days or weeks. The local magnetic field near large sunspots can be around 4,000 times greater than the sun's average field.

Sunspot activity is not steady, but cyclical. Approximately every 10.5 years sunspot activity reaches its peak known as the solar maximum which coincides with the reversing of the sun's magnetic poles. There is also a solar minimum where the sun may have no sunspots for months at a time. There is a strong correlation between sunspot activity and other solar activity, namely solar flares and coronal mass ejections. Solar flares are a sudden flash increase in brightness of an area of the sun. Coronal Mass Ejections, or CME, are the ejection of electromagnetic radiation and billions of tons of plasma into interstellar space. Solar flares and CMEs occur approximately 50 and 15 times more frequently, respectively, during the solar maximum. The total amount of solar energy on the earth's upper atmosphere is around .1% higher during solar maximum.

Magnetic fields in observed in sunspots has been decreasing over the last 10 years. As a minimum magnetic field strength is needed to create a sunspot, and if trend continues, magnetic fields may not be strong enough to create sunspots leading to years without sunspots known as a grand minimum. 350 years ago, sunspots almost vanished for 70 years, with no sunspots for several nonconsecutive solar cycles, and a 28-year period of fewer than 50 observed sunspots (compared to the 40,000-50,000 that would be seen in modern times), This period was known as the Maunder Minimum, and coincided with a period of brutally harsh winters in Europe and north America known as the 'Little Ice Age'.

CET - The monthly temperatures are representative of a roughly triangular area of the United Kingdom enclosed by Lancashire, London and Bristol. The monthly series, which begins in 1659, is the longest available instrumental record of temperature in the world.