OUR SUN

The Sun is a yellow dwarf star, a hot ball of glowing gases at the heart of our solar system.

The Sun's gravity holds the solar system together, keeping everything, from the largest planets to the smallest particles of debris, in its orbit. The connection and interactions between the Sun and Earth drive the seasons, ocean currents, weather, climate, radiation belts and auroras. Though it is special to *us*, there are billions of stars like our Sun scattered across the Milky Way galaxy.

The Sun has many names in different cultures. The Latin word for Sun is 'sol', which is the main adjective for all things Sun-related: solar.

Formation and evolution The Sun was born about 4.6 billion years ago from a giant cloud of gas and dust. It has enough nuclear fuel to stay much as it is now for another five billion years. After that it will swell and become a red giant star. Eventually, it will shed its outer layers and the remaining core will collapse to become a white dwarf.

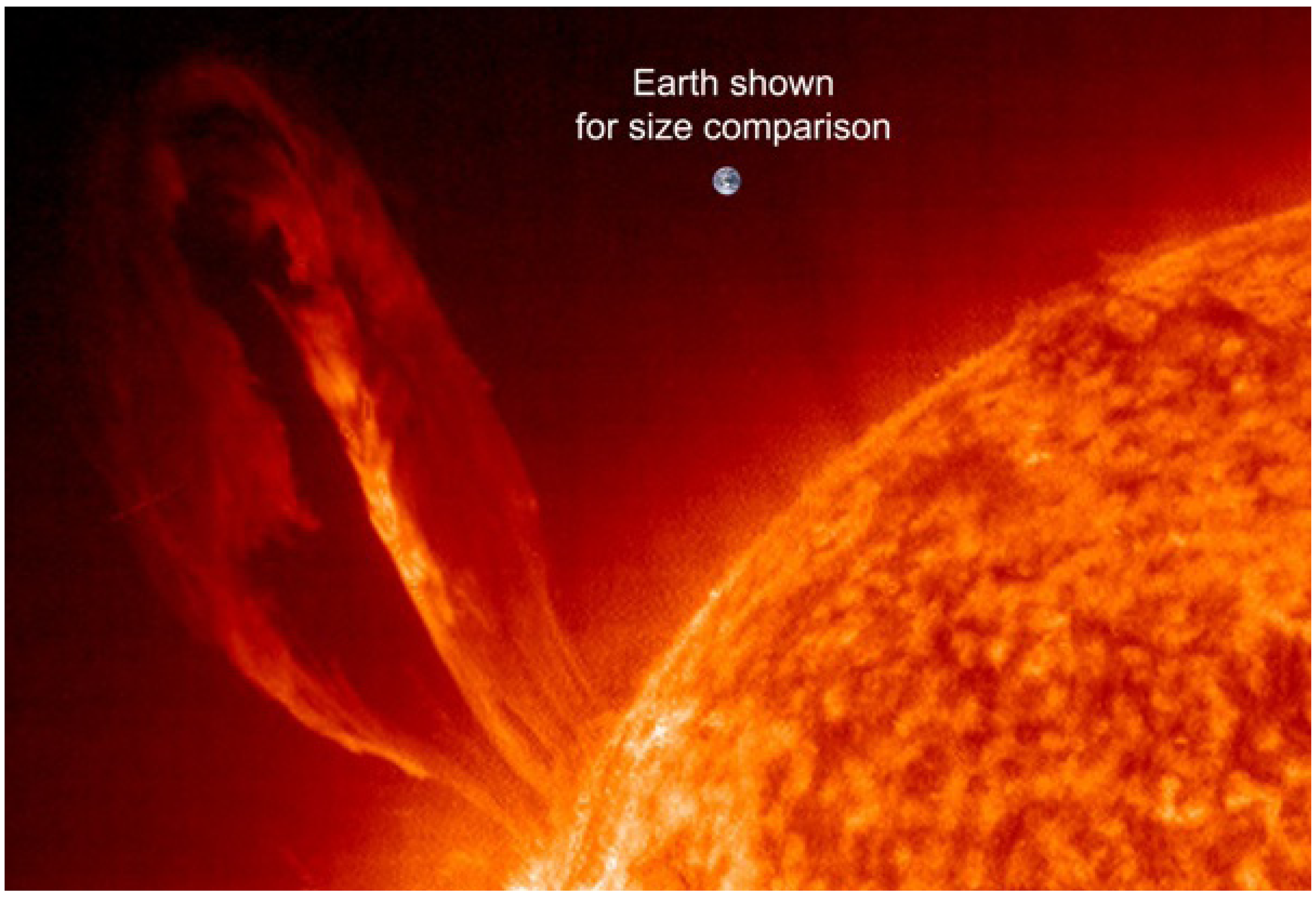
Quick facts about the Sun

<u>Radius</u> 659 508 km

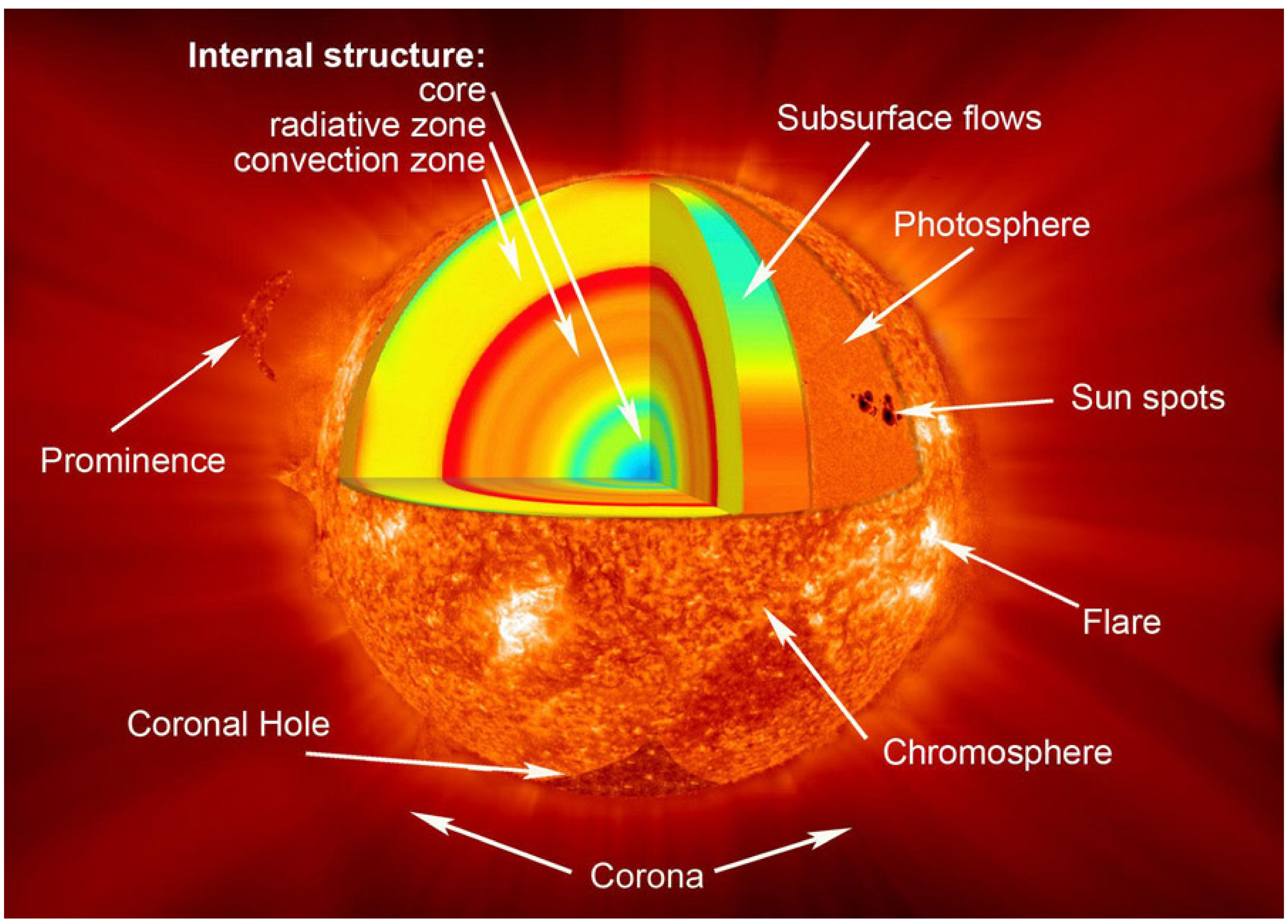
<u>Distance</u> from Earth 149.60 million km

= one astronomical unit (AU)

<u>Mass</u> 332 946 Earth masses match the mass of the Sun.



Internal structure and atmosphere The Sun, like other stars, is a ball of gas. In terms of the number of atoms, it is made up of 91% Hydrogen and 8.9% Helium. By mass, the Sun is about 70.6% Hydrogen and 27.4% Helium. Other elements, such as Oxygen, Carbon, Neon, Magnesium, Nitrogen, Iron and Silicon, are also present. The Sun's enormous mass is held together by gravitational attraction.



Structure of The Sun

Structure
At its core the temperature is about 15 million degrees Celsius, which is sufficient to sustain thermonuclear fusion. This is a process in which atoms combine to form larger atoms and, in the process, release staggering amounts of energy. In the Sun's core, Hydrogen atoms fuse to make Helium.

The energy produced in the core powers the Sun and produces all the heat and light that it emits. The photosphere at the surface of the Sun has a temperature of 5500 degrees Celsius and is a 500 km thick region from which most of the Sun's radiation escapes outwards. We see this radiation as sunlight when it reaches Earth about eight minutes after it leaves the Sun.

Above the photosphere lies the chromosphere and the corona which make up the thin solar atmosphere. It is in the photosphere where features such as sunspots and solar flares occur.

Magnetic field
The electric currents in the Sun generate a complex magnetic field that extends out into space to form the interplanetary magnetic field known as the heliosphere. The strength of the Sun's magnetic field is typically only twice that of the Earth's field, but it may become highly concentrated, reaching up to 3 000 times stronger in small areas. These twists in the magnetic field develop because the Sun spins more rapidly at its equator than at the higher latitudes and because the inner parts of the Sun rotate more quickly than the surface.

These distortions create features ranging from sunspots to spectacular eruptions known as flares and coronal mass ejections. Flares are the most violent eruptions in the solar system while coronal mass ejections are less violent but involve extraordinary amounts of matter. A single ejection can spout about 18 billion metric tonnes of matter into space.

The Sun does not behave in the same way all the time. About every 11 years its geographic poles change their magnetic polarity. When this happens, the Sun's photosphere, chromosphere and corona undergo changes from quiet and calm to violently active. These solar maximums can release huge amounts of energy and particles. Some of them reach us here on Earth and are called 'space weather', which can damage satellites, corrode pipelines and affect power grids.

Flares erupting from the Sun