Western Knowledge Of The Sun: Solar Observatories

People in the Western world have been studying the sun for over 400 years and it is one of the most prominent sources of interest in our solar system. About 4.5 billion years ago, the whole solar system formed a colossal, rotating cloud of gas and dust (called a solar nebula). As the nebula collapsed due to overwhelming forces of gravity, it spun faster and was flattened into a disc. Most of that material was pulled towards the centre and formed what we now know as the sun.

The sun is a hot ball of glowing gases and electric currents and is the heart of our solar system, its gravity keeping everything from the biggest planets to the smallest particles of debris in its orbit. The connection and interactions between the Sun and Earth drive the seasons, ocean currents, and climate. Many spacecraft constantly observe the Sun, helping us keep an eye on space weather that can affect satellites and astronauts.

Scientists know the age of the sun by looking at the whole solar system and studying the oldest things they can find (moon rocks). Stars like the sun have been found to have a lifetime of about 10 billion years, so our sun has about 5.5 billion years left. When the sun starts to die, it will swell up and engulf Mercury, Venus, and perhaps even Earth. But right now, the sun continues to make life on earth possible, providing warmth and energy and enabling living things to thrive.

One way many astronomers observe the sun is by using larger telescopes on the ground, which have special filters to block out the damaging parts of the sun’s rays. They can examine the sun in different wavelengths of light to examine the surface and use spectroscopy to see the elements produced in different parts of the sun.

The sun’s radiation is studied by radar, and its interior is studied by using an acoustic interferometer, which is an instrument that measures the physical characteristics of sound waves in a gas or liquid form. As technology has developed, scientists have been able to study things like the sun in much more depth, and when NASA are continuously sending spacecraft out into space, we can achieve a much deeper understanding of the structure of the sun and how it continuously produces the heat and the energy which it does.

There are many places for the public as well as scientists to safety and accurately view the sun. The US National Solar Observatory uses two major facilities to look at acoustic waves inside the sun. The New Solar Telescope (1.6 meters across!) in the Big Bear Solar Observatory can view features on the sun that are as small as 80km across. The Solar Dynamics Observatory aims to learn about the sun’s solar cycle, magnetic field and energy to improve space weather predictions. The Solar and Heliospheric Observatory, a NASA and European Space Agency, studies the sun’s interior and the solar “envelope” that surrounds the sun. All of these observatories have only been launched in the last 25 years or less which really shows how the huge progression in technology since then has really made a difference for people studying astronomy. If we look back at when the sun was first observed, it was done so using a simple telescope and anything that couldn’t be seen with the naked eye was mapped. In 1859, the newly invented spectroscope was used to establish that the sun was composed of the same elements that existed on Earth, establishing a physical similarity. The spectral signature of the

sun was compared to other stars and found to be nearly identical, and so the hypothesis that the sun was a star was created, although it wasn’t proven for another 140 years. Technology really has changed so much of our world, but especially our knowledge of things that we’ve only scratched the surface of thus far.