

Our Solar System: In Depth. . . part 2

How big is our solar system?



To think about the large distances, we use a cosmic ruler based on the astronomical unit (AU). One AU is the distance from Earth to the Sun, which is about 150 million kilometers or 93 million miles. Particles from the Sun can reach far beyond

the planets, forming a giant bubble called the heliosphere. The enormous bubble of the heliosphere is created by the solar wind, a stream of charged gas blowing outward from the Sun. As the Sun orbits the center of the Milky Way, the bubble of the heliosphere moves also, creating a bow shock ahead of itself in interstellar space - like the bow of a ship in water - as it crashes into the interstellar gases. The region where the solar wind is abruptly slowed by pressure from gas between the stars is called the termination shock.

Two NASA spacecraft, launched in 1977, have crossed the termination shock - Voyager 1 in 2004 and Voyager 2 in 2007. In late 2011, Voyager 1 data showed that the spacecraft had entered the outermost region of the heliosphere. By 2013, Voyager 1 was about 18 billion kilometers (11 billion miles) from the Sun,

and Voyager 2 was about 15 billion kilometers (9 billion miles) from the Sun. Scientists anticipate that Voyager 1 will cross into interstellar space, where gas and dust from other stars are found as well as the enormous Oort Cloud, within a few months to a few years. Both spacecraft should have enough electrical power to send data until at least 2020. It will be thousands of years before the two Voyagers exit the Oort Cloud, a vast spherical shell of icy bodies surrounding the solar system.

As we explore the universe, we wonder: Are there other planets where life might exist? Are we alone? These are the great questions that science is now probing. Only recently have astronomers had the tools - sensitive telescopes on Earth and in space - to detect planets orbiting stars in other solar systems.