Beat: Technology

NASA;s Voyager 1 becomes first man-made object to exit solar system

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USPA News - NASA`s Voyager 1 probe has become the first human-made object to leave the solar system and enter interstellar space, the U.S. space agency announced on Thursday, more than 36 years after the unmanned spacecraft launched to explore deep space. The announcement ended months of speculation about when the transition to interstellar space took place.

But after analyzing new data, scientists concluded that Voyager 1 has been traveling for about one year through plasma, or ionized gas, which is present in the space between stars. NASA said its probe, approximately 12 billion miles (19 billion kilometers) from our sun, is now in a transitional region immediately outside the solar bubble, where some effects from our sun are still evident. It makes Voyager 1 the first human-made object to have ever left the solar system. "Now that we have new, key data, we believe this is mankind`s historic leap into interstellar space," said Voyager project scientist Ed Stone at the California Institute of Technology. "The Voyager team needed time to analyze those observations and make sense of them. But we can now answer the question we`ve all been asking -- `Are we there yet?` Yes, we are." Voyager 1 first detected the increased pressure of interstellar space on the heliosphere, the bubble of charged particles surrounding the sun that reaches far beyond the outer planets, in 2004. Scientists then ramped up their search for evidence of the spacecraft`s interstellar arrival, knowing the data analysis and interpretation could take months or years. Because the probe has no working plasma sensor, scientists needed a different way to measure the spacecraft`s plasma environment to make a definitive determination of its location. But a massive burst of solar wind and magnetic fields in March 2012 provided them the data they needed. It took approximately 13 months for the so-called coronal mass ejection to reach Voyager 1, causing the plasma around the spacecraft to vibrate like a violin string. The pitch of the oscillations helped scientists determine the density of the plasma, showing that the spacecraft was bathing in plasma more than 40 times denser than what it had encountered in the outer layer of the heliosphere. The plasma wave science team later reviewed its data and found an earlier, fainter set of oscillations in October and November 2012. Through extrapolation of measured plasma densities from both events, the team determined Voyager 1 first entered interstellar space in August 2012. "We literally jumped out of our seats when we saw these oscillations in our data -- they showed us the spacecraft was in an entirely new region, comparable to what was expected in interstellar space, and totally different than in the solar bubble," Gurnett said. "Clearly we had passed through the heliopause, which is the long-hypothesized boundary between the solar plasma and the interstellar plasma." More precisely, the scientists believe the probe entered interstellar space on August 25, 2012, when its sensors detected abrupt, durable changes in the density of energetic particles. The team said the charged particle and plasma changes were what would have been expected during a crossing of the heliopause. Voyager 1 and its twin, Voyager 2, were launched 16 days apart in 1977 and both spacecraft flew by Jupiter and Saturn, while Voyager 2 also flew by Uranus and Neptune. Voyager 2, launched before Voyager 1, is the longest continuously operated spacecraft and is about 9.5 billion miles (15 billion kilometers) away from our sun. Voyager mission controllers still talk to and receive data from Voyager 1 and Voyager 2 every day, although the emitted signals are currently very dim, at about 23 watts -- the power of a refrigerator light bulb. By the time the signals reach Earth, which takes about 17 hours, they are only a fraction of a billion-billionth of a watt. NASA scientists expects Voyager 1 will continue to send back data through at least 2020, but it is unknown how long it will take for the probe to reach the undisturbed part of interstellar space where there is no influence from our sun. They also are not certain when Voyager 2 is expected to cross into interstellar space, but they believe it is not very far behind. "Voyager has boldly gone where no probe has gone before, marking one of the most significant technological achievements in the annals of the history of science, and adding a new chapter in human scientific dreams and endeavors," said John Grunsfeld, NASA`s associate administrator for science in Washington. "Perhaps some future deep space explorers will catch up with Voyager, our first interstellar envoy, and reflect on how this intrepid spacecraft helped enable their journey."

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