

Offered Title: 13 Billion Miles...Are We There Yet?

Forty years ago, Voyagers 1 and 2 started a journey to explore our outer solar system. They did that marvelously. Voyager 1 went to Jupiter and Saturn, then headed out toward interstellar space. Voyager 2 also studied Jupiter and Saturn, then used their gravity to sling-shot it toward where Uranus would be about 4 and a half years later. Voyager 2 studied Uranus and finally Neptune before heading toward deep space.

Let's not forget, there are three other spacecraft heading toward deep space, Pioneers 10 and 11, and New Horizons. Both Pioneer craft are farther out than Voyager 2, but not as far as Voyager 1. Unfortunately, both have stopped communicating with NASA, due to low power levels. New Horizons is headed farther into the Kuiper belt to rendezvous with object *2014 MU69* in 2019. After that...?

Getting back to the Voyager program, both spacecraft continue to collect and transmit data back to NASA. After their primary mission goals were accomplished, they were given a mission extension called VIM (Voyager Interstellar Mission). Each has enough power (plutonium-238 radioisotope thermoelectric generators) to last another decade.

What are the Voyagers studying? They are measuring the conditions of space (dust, plasma, x-rays, cosmic radiation, etc.) beyond our solar system, out of the Sun's influence. Solar wind plasma defines the Sun's influence. Solar wind radiates outward, is like a bubble around the Sun, and is called the heliosphere. Within the heliosphere are two areas of study, the termination shock and the heliosheath. The termination shock is where solar wind slows down quickly from supersonic to subsonic speed. The heliosheath an area where solar wind continues to slow and is turbulent. The point where solar wind no longer pushes outward, the heliopause, is where interstellar space begins. In August 2012 Voyager 1 entered interstellar space. Voyager 2 is still in the Sun's domain. Not there yet.

Voyager 1 has traveled farther out than any other human made spacecraft, over 13 billion miles so far, travelling at 39,600 miles per hour. It takes 19.5 hours for data transmitted to reach NASA, and in about 40,000 years Voyager 1 will be in the neighborhood of the star *Gliese 445* located 17.6 light years away in the constellation Camelopardalis. Don't wait up.

Each Voyager spacecraft has a gold-plated copper phonograph record attached. A greeting from Earth, the records contain photos, spoken languages, various sounds, and music. The album cover is aluminum, electroplated with pure uranium-238 for age determination. It is etched with instructions for playback, our Sun's position, and a description of the hydrogen atom. Greetings. I hope you're friendly.

What's in the Sky?

ISS viewing

Nov 26: 7:04:58 pm look W. Highest point is 24 degrees.

Nov 27: 8:12:05 pm look WSW. Highest point is 52 degrees.

Nov 28: 8:58:47 pm look NW. Highest point is 11 degrees.

Nov 29: 8:04:39 pm look W. Highest point is 19 degrees.