Crossing the Edge of Our Solar System

The Voyager 1 and 2 spacecraft have now both left the *heliosphere*, the bubble containing the Sun's magnetic field. Outside lies the interstellar medium, full of particles and magnetic fields from other stars. The edge between these two regions is the *heliopause*.

Many think of the heliopause as a sharp, static boundary. That's not true. Not only do its thickness and structure vary with location, its distance from the Sun changes based on the solar cycle and the solar wind's dynamics.

Voyager 1 crossed the heliopause in 2012 near solar maximum and found a thick, turbulent boundary. Voyager 2, on the other hand, encountered a thin, stable region when it crossed during solar minimum in 2018.

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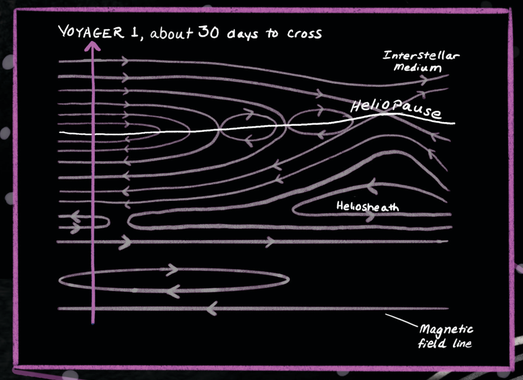
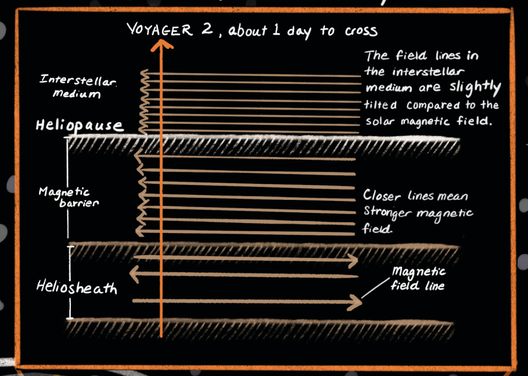
Voyager 1 observed the heliopause as a thick, turbulent boundary.



VOYAGER 1

Fluctuations in magnetic field strength and the intensity of energetic particles during the crossing suggest the boundary contains a series of complex, dynamic magnetic structures.

Voyager 2 observed the heliopause as a thin, stable boundary.



VOYAGER 2

Unlike Voyager 1, Voyager 2 saw few variations in particle intensity and three clear magnetic regions.

BOW WAVE?

Astronomers thought that the fast-moving heliosphere creates a shock wave, called a bow shock, as it plows through the slower-moving interstellar medium. But the difference in speed may not be enough to create a bow shock.

HELIOPAUSE

Where the pressure from the solar wind equals the pressure from the interstellar medium. Thickness and structure vary with location.

HELIOSHEATH

The distance between the termination shock and the heliopause

122 au

VOYAGER 1

28au

94au

119 au

VOYAGER 2

35au

84au

Beyond here, the solar wind slows below the speed of sound.

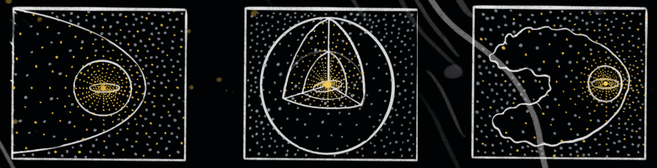
TERMINATION SHOCK

43°

SUN

PLANETS

SHAPE OF THE HELIOSPHERE



The actual shape of the heliosphere is still a mystery. It could look like a bullet, a sphere, or even a croissant.