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A Telescope's Long Journey

NASA's new observatory will travel to a spot where it can block light from Earth and the sun

The most ambitious space telescope built to date is about to start peering at the universe through infrared eyes. The \$10-billion James Webb Space Telescope (JWST) is designed to see farther back in space and time than ever before, where light has been stretched by the expansion of space into much longer wavelengths. To see this faint light, the telescope must observe far from Earth and its contaminating light and heat. After launch, JWST will

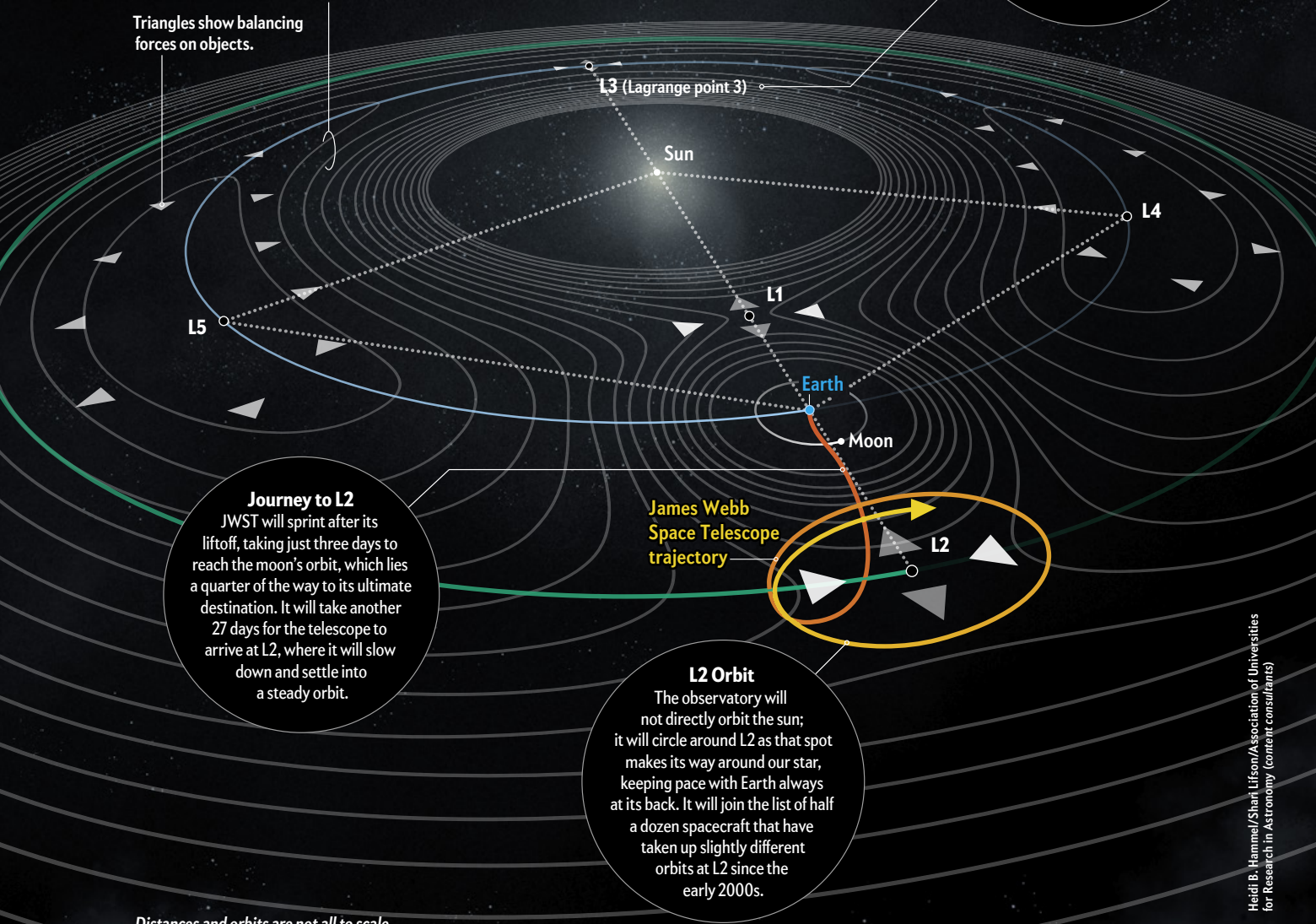
travel 1.5 million kilometers to Earth's second "Lagrange point" (L2), a spot in space where the gravitational forces of our planet and the sun are roughly equal, creating a stable orbital location. This vantage point will allow JWST to orbit with its giant sunshield positioned between the telescope and the sun, Earth and moon, shielding the telescope and keeping it at a frigid -370 degrees Fahrenheit.

What Is a Lagrange Point?

Postulated in the 18th century and named after Italian-French mathematician Joseph-Louis Lagrange, the five Earth-sun Lagrange points are locations where a small object can orbit steadily around the sun along with Earth.

Contour lines show where forces are stronger (where lines are closer together) and weaker (farther apart).

Triangles show balancing forces on objects.



Journey to L2

JWST will sprint after its liftoff, taking just three days to reach the moon's orbit, which lies a quarter of the way to its ultimate destination. It will take another 27 days for the telescope to arrive at L2, where it will slow down and settle into a steady orbit.

James Webb Space Telescope trajectory

L2 Orbit

The observatory will not directly orbit the sun; it will circle around L2 as that spot makes its way around our star, keeping pace with Earth always at its back. It will join the list of half a dozen spacecraft that have taken up slightly different orbits at L2 since the early 2000s.

Distances and orbits are not all to scale.