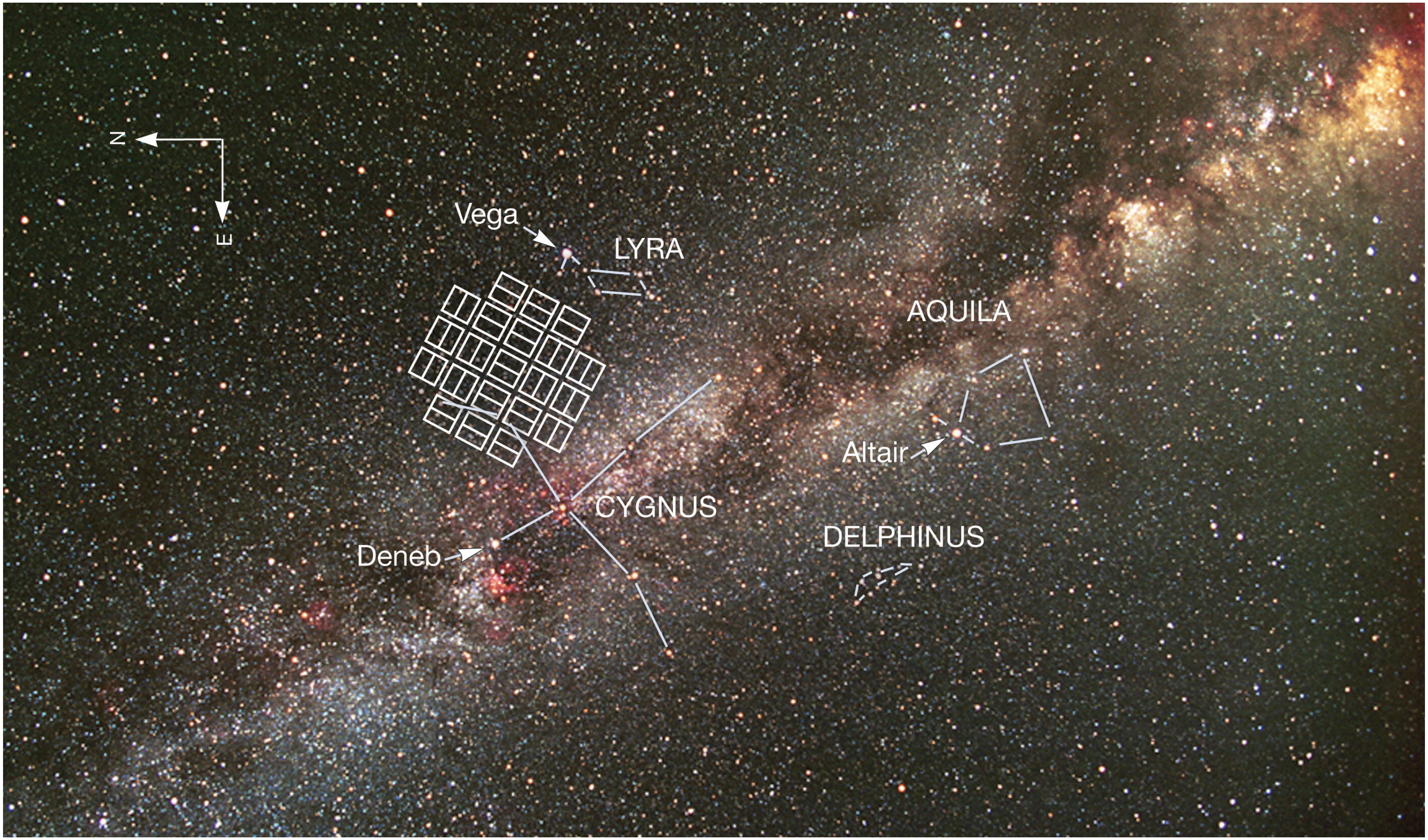
National Aeronautics and Space Administration



The *Kepler Mission* Star Field

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Kepler is NASA's first mission capable of finding Earth-size and smaller planets in the habitable zone of stars similar to our Sun.

Selecting the *Kepler* Star Field

The star field for the *Kepler Mission* was selected based on a number of constraints:

1. The field must be continuously viewable throughout the four-year lifetime of the mission.
2. The field needs to be rich in stars like our Sun. Kepler needs to observe 100,000 stars all at once.
3. The spacecraft and photometer, with its sunshade, must fit inside a standard Delta II launch vehicle.

One needs to look close to the plane of our galaxy, the Milky Way to have a rich star field. But the size of the optics and the space available for the sunshade require the center of the star field to be more than 55° above or below the path of the Sun as the spacecraft orbits the Sun each year trailing behind the Earth. This left two portions of the sky to view, one each in the northern and southern sky. The Cygnus-Lyra region in the northern sky was chosen, as it is richer in stars than the southern field. Also, all of the ground-based telescopes to support the *Kepler* team's follow-up observation work are located at northern latitudes. The selected field is centered on RA=$19^h22^m40^s$ and Dec=+44°30'00"(J2000).

Locating the *Kepler* Star Field

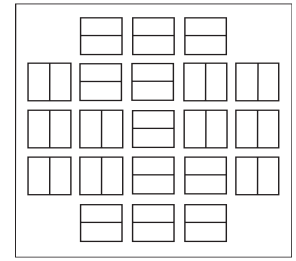
As shown in the photograph of the star field (over), the *Kepler* field is located between two of the brightest stars in the sky, Vega and Deneb, which form the summer triangle along with Altair. The three stars of the summer triangle are part of the constellations Cygnus, the swan; Lyra, the harp; and Aquila, the eagle. Delphinus, the dolphin, is not part of the summer triangle, but is a nearby easy-to-find group of stars. It looks like a kite. The field is directly overhead at midnight in late July for mid-northern latitudes. The star field is about 15° across or bigger than your hand held out at arm's length. Compare this to the *Hubble* field of view, which is typical of most astronomical telescopes, and is about equal to a grain of sand held out at arm's length.

Distances to the *Kepler* Stars

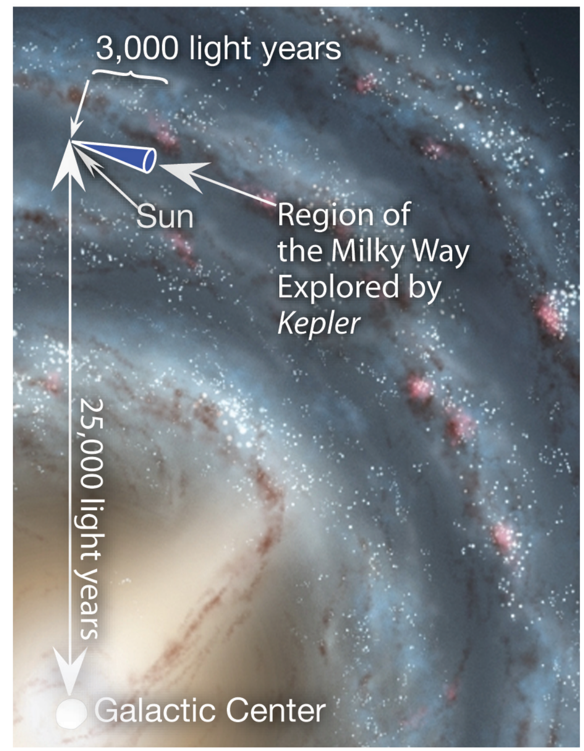
The illustration at the right shows our understanding of the shape of our galaxy and the location of our Sun relative to the galactic center. The Sun is about 25,000 light years from the center of the galaxy, about half the distance from the center to the edge. The blue cone shows the region of the Milky Way that *Kepler* will explore for planets. *Kepler* will be looking along a spiral arm of our galaxy. The distance to most of the stars for which Earth-size planets can be detected by *Kepler* is from 600 to 3,000 light years. Less than 1% of these stars in the region are closer than 600 light years. Stars farther than 3,000 light years are too faint for *Kepler* to observe the transits needed to detect Earth-size planets.

What are the Squares on the *Kepler Mission* Star Field?

Kepler measures the light coming from the 100,000 stars using charge-coupled devices (CCDs). The CCDs are similar to those used in consumer digital cameras for taking pictures. However, unlike a digital camera of a few megapixels, *Kepler* has a total of 95 megapixels. The photograph of the star field (over) shows the orientation on the sky of the array of the 42 CCDs used. Two CCDs form a square module with each of the 21 modules covering about 5 square degrees of the sky. Each CCD is about 3x6 cm in size.



Layout of the 42 CCDs.



NASA/JPL-Caltech/R. Hurt (SSC)

Learn more, visit the *Kepler* website
http://kepler.nasa.gov

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