

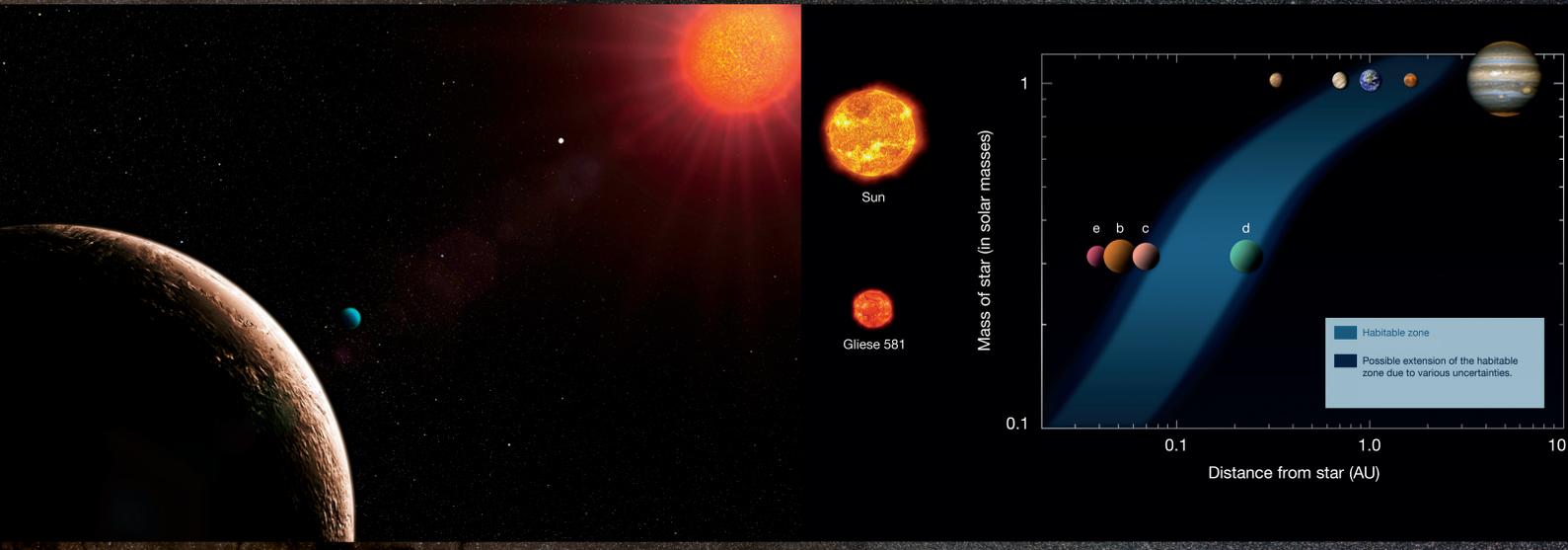
Exoplanets

The search for planets outside our Solar System constitutes a key element of what is possibly the most profound question for humanity: **is there life elsewhere in the Universe?** ESO's observatories are equipped with a unique arsenal of instruments for finding, studying and monitoring these so-called exoplanets. Exoplanets are also fascinating because their study may also help to solve mysteries about our own Solar System.

Since the discovery of the first exoplanet in 1995, this area of astronomy has boomed and astronomers have now found over 700 exoplanets. Due to the limitations in current detection methods, the majority of these have been fairly big — Jupiter-sized or much larger. However, astronomers are now finding so-called super-Earth exoplanets — those with masses greater than Earth's but less than the gas giants such as Jupiter. In 2009, **astronomers discovered an exoplanet only about twice the mass of Earth** in the famous system, Gliese 581, using the most successful exoplanet hunter in the world, the HARPS spectrograph, attached to the ESO 3.6-metre telescope at La Silla, Chile. The team also found

that another planet in this system lies within the habitable zone, where liquid water oceans could exist — a potential waterworld. This discovery marks a **ground-breaking result in the search for planets that could support life.**

Furthermore, the atmosphere around a super-Earth exoplanet was analysed for the first time, using the ESO VLT. The planet, which is known as GJ 1214b, was studied as it passed in front of its parent star and some of the starlight passed through the planet's atmosphere. We now know that the atmosphere is either mostly water in the form of steam or is dominated by thick clouds or haze.



Artist's impression of the lightest exoplanet found so far: Gliese 581 e.
Credit: ESO/L. Calçada

Diagram showing the distances of the planets in the Solar System (upper row) and in the Gliese 581 system (lower row), from their respective stars (left).