

Exoplanets and Planetary Habitability

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Are we alone in the universe? About 25 years ago, the first exoplanet was discovered. Now, more than 3,700 exoplanets have been confirmed. Exoplanets represent a dramatic change in our understanding of planetary sciences, and we are very close to find a second habitable Earth nearby our solar system. The detected exoplanets can be classified to several types, including hot Jupiters, cold giants, lava worlds, ocean worlds, as well as rocky planets. One critical question is to know which of these planets are potentially habitable for life. The next target for exoplanet missions is to characterize the planetary atmospheres and surfaces, especially for Earth-size planets in the liquid water habitable zone. In this talk, I will provide an overview of exoplanet detection and characterization, the concept of liquid water habitable zone, and planetary climates. Planetary habitability is determined by many factors, such as planetary size, distance from the star, atmosphere composition, plate tectonics, magnetic field, ozone layer, etc. I will highlight the possible climates and habitability of tidally locked terrestrial planets around K and M dwarfs.