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# Seek a Minor Sun: The Distribution of Habitable Planets in the Hertzsprung-Russell-Rosenberg Diagram

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## Abstract

The Sun-Earth system has long been used as a template to understand habitable planets around other stars and to develop missions to seek them. However, two decades of exoplanet studies have shown that many, if not most planetary systems around G dwarf stars do not resemble the Solar System. Moreover, an objective census of our Galaxy might ignore solar-type stars and focus on M dwarfs, which constitute some 80% of all stars in the neighborhood. Recent work has shown that M dwarfs have more close-in planets than solar-type stars, and perhaps more planets in the "habitable zone" defined by stellar irradiation. M dwarfs also burn hydrogen over a vastly longer time; slow evolution on the main sequence means a planet can remain habitable for much longer, providing a more permissive environment for the evolution of life and intelligence. If M dwarfs are such compelling locales to look for life, why are we ourselves not orbiting a red Sun?

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