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NEW NUMERICAL DETERMINATION OF HABITABILITY IN THE GALAXY: THE SETI CONNECTION

Abstract

In this paper we determine the habitability in the Galaxy using Monte Carlo simulations, guided by the parameters of the Drake Equation for the considerations of the astrophysical and biological parameters needed to generate and maintain life on a planet's surface. We used a simple star distribution, initial mass function, and star formation history to reproduce the stellar properties and distribution of the Galaxy. Using updated exoplanet data mainly from Kepler mission, we assigned planets to some of the stars, and then followed the evolution of life on the planets that met the habitability criteria. We predicted than around 79.5% of Earth-like planets in the Habitable Zone (HZ) are inhabited by primitive life and 0.5% by technological life. We also calculated the numbers for the Kepler Field of View, and predicted that there should be at least 8 Earth-like planets in the HZ, 6 of them inhabited by simple life. According to our model, non-technological life is very common if there are the right conditions, but communicative civilization are less probable to exist. However, we predict a still considerable number of detectable civilizations within our Galaxy, which make worthy the search.