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MODIFYING THE EARTH SIMILARITY INDEX TO ASSIST THE SEARCH FOR EARTH 2.0

Abstract

Searching for the Earth lookalike planet is not new. The similarity between Earth and an exoplanet can be measured in several ways .One of the most common methods is using Earth Similarity Index (ESI) value, calculated using surface temperature, density of the planet, escape velocity and radius. Planets such as Kepler 438b, Gliese 667 Cc , Tau Ceti have higher ESI values but they have many other significant differences such as orbital period, atmosphere, and composition when compared with Earth. Measuring the habitability of an exoplanet is not an easy task and, in this paper, planets with ESI value greater than 0.7 are identified and a comparative study is performed between those planets and the Earth to estimate how much similarity is required for habitability. Based on various factors such as composition, atmosphere, orbital parameters, distance from the main star, surrounding environment, planetary events a modified way for calculating similarity or Exoplanet Habitability Index (EHI) value is proposed and this EHI value will help in future exoplanet planet exploration based study projects.