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# Comparative Climates of the Trappist-1 Planetary System: Results from a Simple Climate-vegetation Model

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The recent discovery of the planetary system hosted by the ultracool dwarf star TRAPPIST-1 could open new paths for investigations of the planetary climates of Earth-sized exoplanets, their atmospheres, and their possible habitability.Here, a simple climate-vegetation energy-balance model isused to investigateseveral climate scenarios for the seven TRAPPIST-1 planets depending on various factors: the global albedo, the fraction of vegetation that could cover their surfaces, and the different greenhouse conditions. The model allows us to explore whether liquid water could be maintained on the planetary surfaces (i.e., by defining a "surface water zone (SWZ)") in different planetary conditions, with or without the presence of a greenhouse effect. It is shown that planet TRAPPIST-1d seems to be the most stable from an Earth-like perspective, since it resides in the SWZ for a wide range of reasonable values of the model parameters. Moreover, according to the model, outer planets (f, g, and h) cannot host liquid water on their surfaces, even with Earth-like conditions, entering a snowball state. Although very simple, the model allows us to extract the main features of the TRAPPIST-1 planetary climates.

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