

Towards quantifying habitability

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Abstract

Whilst qualitative cause and effect relationships between environmental parameters and habitability are known, we lack a reliable formalism for quantitatively expressing how habitable an environment is. Without such a formalism we cannot compare the effectiveness of environmental variables in supporting life and therefore we cannot compare different environments and their habitability. We propose a formalism for quantifying habitability. Whilst our model is more specific than previous models in terms of the methods proposed, its applicability in terms of the dimensions of habitability is at present more limited; in this paper we merely consider the effect of electromagnetic radiation to illustrate our idea. Ultimately, we hope that the impact of other known variables affecting life can be quantified in a similar fashion, thus possibly leading to the construction of a single, normalised indicator of habitability, a habitability index.