

Exoclimates and planetary habitability

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Current statistics of exoplanets suggest that the number of terrestrial planets yet to be discovered is quite large. However, Earth-sized planets are difficult to characterize with observations, and the study of their habitability requires a large effort of modelization aimed at exploring the space of unknown planetary parameters. In this presentation I will briefly report an ongoing project aimed at exploring the habitability of terrestrial planets by means of a set of specifically designed climate tools. I will present our novel Earth-like planet surface temperature model (ESTM) for habitability studies based on the spatial–temporal distribution of planetary surface temperatures [1]. The ESTM adopts a surface energy balance model (EBM) complemented by: radiative–convective atmospheric column calculations, a set of physically based parameterizations of meridional transport, and descriptions of surface and cloud properties more refined than in standard EBMs. I will discuss strengths and weaknesses of our model and I will present an example exploration of a few, test-case Kepler exoplanets.

[1] Vladilo, G., Silva, L., Murante, G., Filippi, L., Provenzale, A., 2015, ApJ, 804, 50

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