**ABSTRACT**

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TOPIC : surface temperature

We introduce a novel Earth-like planet surface temperature model (ESTM) for habitability studies based on the spatial-temporal distribution of planetary surface temperatures. The ESTM adopts a surface Energy Balance Model 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. The parameterization is valid for rotating terrestrial planets with shallow atmospheres and moderate values of axis obliquity (epsilon >= 45^o). Comparison with a 3D model of atmospheric dynamics from the literature shows that the equator-to-pole temperature differences predicted by the two models agree within ~5K when the rotation rate, insolation, surface pressure and planet radius are varied in the intervals 0.5 <= Omega/Omega\_o <= 2, 0.75 <= S/S\_o <= 1.25, 0.3 <= p/(1 bar) <= 10, and 0.5 <= R/R\_o <= 2, respectively. The ESTM has an extremely low computational cost and can be used when the planetary parameters are scarcely known (as for most exoplanets) and/or whenever many runs for different parameter configurations are needed. Model simulations of a test-case exoplanet (Kepler-62e) indicate that an uncertainty in surface pressure within the range expected for terrestrial planets may impact the mean temperature by ~60 K. Within the limits of validity of the ESTM, the impact of surface pressure is larger than that predicted by uncertainties in rotation rate, axis obliquity, and ocean fractions. We discuss the possibility of performing a statistical ranking of planetary habitability taking advantage of the flexibility of the ESTM.