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The habitability of stagnant-lid Earths around dwarf stars

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The habitability of a planet depends on various factors, such as delivery of water during the formation, the coevolution of the interior and the atmosphere, as well as the stellar irradiation which changes in time. We have studied the habitable zone evolution of Earth-like stagnant-lid exoplanets around M, K, G and F-type dwarf stars, i.e. planets without plate tectonics, by using a 1D cloud-free radiative-convective climate model which accounts for the outgassing history of CO_2 and H_2O from an interior evolution and outgassing model. We show that Earth-like stagnant-lid planets allow for habitable surface conditions within a continuous habitable zone that is dependent on interior composition. Furthermore, secondary outgassing from the interior may allow for habitability of planets around M-dwarf stars after severe water loss during the high-luminosity pre-main sequence phase by rebuilding a surface water reservoir.