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Extrasolar planets in the Gliese 581 system - model atmospheres and implications for habitability

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Abstract

The planetary system around the M dwarf Gliese 581 contains at least four planets, three of them are considered Super-Earths with masses between two and seven times the mass of the Earth.

The planets Gliese 581 c and d were the first planets which merited a detailed study of their potential habitability. The first published studies concluded that Gliese 581 c was too hot for habitable conditions, whereas Gliese 581 d was located just beyond the outer edge of the habitable zone.

However, the orbital distances of the two planets have recently been revised based on a longer radial velocity baseline, putting them about 10% closer to the star (Mayor et al. 2009, submitted to Astronomy&Astrophysics).

In order to investigate the habitability of Gliese 581 c and d under these new conditions, we applied a 1D radiative-convective model to potential atmospheric scenarios by varying the surface pressure and atmospheric composition.