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Habitable planet identified by UT Arlington astronomer and team

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ARLINGTON–Dr. Manfred Cuntz of The University of Texas at Arlington and fellow scientists at the Potsdam Institute for Climate Impact Research in Germany got a surprise during their search for a second Earth.

Gliese 581

The scientists were investigating the habitability of the planetary system Gliese 581 in the constellation Libra, 20 light-years away. With the help of a model for the evolution of Earth-like planets coupled with a climate model, they were able to demonstrate habitable conditions on the planet Gliese 581d, while determining that its smaller brother, Gliese 581c, previously acclaimed as a "second Earth" has to be classified as uninhabitable.

Both planets investigated are so-called Super-Earths; i.e. planets with a mass of up to 10 times higher than that of the Earth. In fact, Gliese 581d very likely has about eight Earth masses, whereas Gliese 581c has five Earth masses.

"Gliese 581c is just too hot for life to exist," said Cuntz, "owing to the fact that the planet is too close to its host star – just like Venus is too close to the Sun." This contradicts the findings of another research team in April of this year that proclaimed Gl 581c the first habitable planet outside our solar system. The new investigations incorporate the thermal evolution of planets, i.e. the cooling of the planetary body from its formation and the connected

geodynamic parameters. Because of their heavy masses the Potsdam scientists consider it likely that both Gliese 581c and Gliese 581d have dense atmospheres. Previous calculations for Gliese 581c derived the habitability of this planet only from temperatures calculated for the radiation balance of the planetary surface without an atmosphere.

Gliese 581d, the other Super-Earth in this system, orbits at a distance of 23 million miles, which would normally make it too cold for liquid water. However, the same greenhouse effect that torches Gliese 581c, the smaller and closer planet, would be able to warm the larger outer one and make it habitable, Cuntz said. He and his colleagues have submitted a paper to the journal Astronomy and Astrophysics detailing their findings.

Cuntz said the planetary system Gliese 581, with probably three planets orbiting a red dwarf star, contains the closest analogues to the Earth that have been found so far. The central star has about 100 times less luminosity than our Sun.

Astronomers will learn more about these planets when upcoming space missions like NASA's Terrestrial Planet Finder and the European Space Agency's Darwin, designed to study terrestrial planets in the realms beyond our solar system, are in operation.

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