Oceans galore: new study suggests most habitable planets may lack dry land

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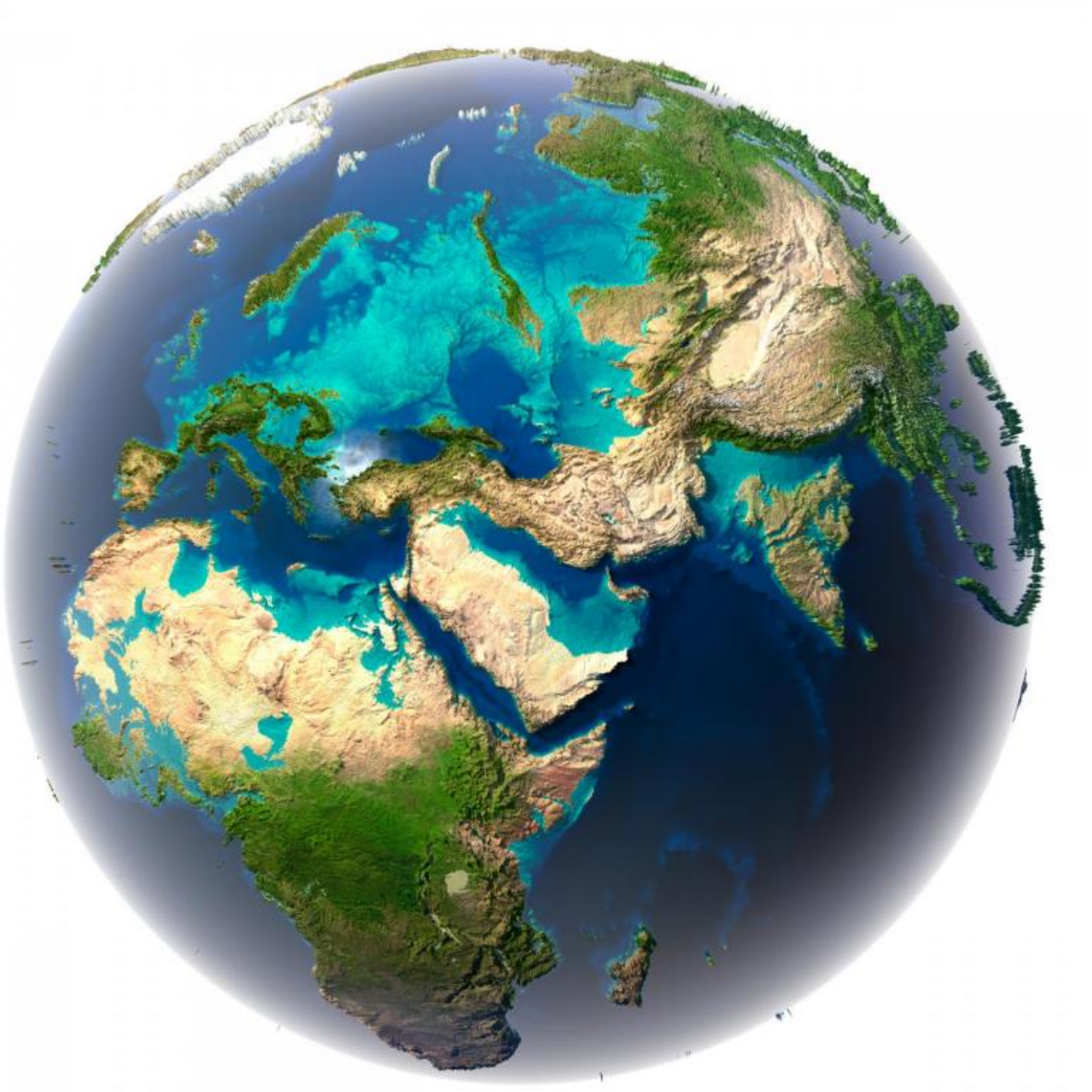

Continents on other habitable worlds may struggle to break above sea level, like much of Europe in this illustration, representing Earth with an estimated 80% ocean coverage. Credit: Antartis / Depositphotos.com

When it comes to exploring exoplanets, it may be wise to take a snorkel along. A new study, published in a paper in the journal *Monthly Notices of the Royal Astronomical Society*, has used a statistical model to predict that most habitable planets may be dominated by oceans spanning over 90% of their surface area.

The author of the study, Dr Fergus Simpson of the Institute of Cosmos Sciences at the University of Barcelona, has constructed a statistical model – based on Bayesian probability – to predict the division between land and water on habitable exoplanets.

For a planetary surface to boast extensive areas of both land and water, a delicate balance must be struck between the volume of water it retains over time, and how much space it has to store it in its oceanic basins. Both of these quantities may vary substantially across the full spectrum of water-bearing worlds, and why the Earth's values are so well balanced is an unresolved and long-standing conundrum.

Simpson's model predicts that most habitable planets are dominated by oceans spanning over 90% of their surface area. This conclusion is reached because the Earth itself is very close to being a so-called 'waterworld' - a world where all land is immersed under a single ocean.

"A scenario in which the Earth holds less water than most other habitable planets would be consistent with results from simulations, and could help explain why some planets have been found to be a bit less dense than we expected," explains Simpson.

In the new work, Simpson finds that the Earth's finely balanced oceans may be a consequence of the anthropic principle – more often used in a cosmological context - which accounts for how our observations of the Universe are influenced by the requirement for the formation of sentient life.

"Based on the Earth's ocean coverage of 71%, we find substantial evidence supporting the hypothesis that anthropic selection effects are at work," comments Simpson.

To test the statistical model Simpson has taken feedback mechanisms into account, such as the deep water cycle, and erosion and deposition processes. He also proposes a statistical approximation to determine the diminishing habitable land area for planets with smaller oceans, as they become increasingly dominated by deserts.

Why did we evolve on this planet and not on one of the billions of other habitable worlds? In this study Simpson suggests the answer could be linked to a selection effect involving the balance between land and water .

"Our understanding of the development of life may be far from complete, but it is not so dire that we must adhere to the conventional approximation that all habitable planets have an equal chance of hosting intelligent life," Simpson concludes.

More information: Fergus Simpson. Bayesian evidence for the prevalence of waterworlds, *Monthly Notices of the Royal Astronomical Society* (2017). DOI: 10.1093/mnras/stx516

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