

Narrowing the universe in the search for life

December 17 2018, by Laura Arenschiold

Humankind's exploration of space has for years pondered one central question: Is there another world somewhere in the universe where human beings could survive?

And as astrophysicists and astronomers have searched for the answer, they've traditionally looked for a world that has water.

But Wendy Panero, professor of earth sciences at The Ohio State University, has developed a new way of thinking about a planet's habitability. What if, she wondered, the answer to habitability lies within the way rocks and water interact?

Panero presented her theory Dec. 12 at the fall meeting of the American Geophysical Union in Washington, D.C.

"We have traditionally looked for 'water worlds'—places where one-half to one-quarter of the weight of the planet is water," Panero said. "That seems like an optimal thing, to go looking for water."

Instead of just looking for water, Panero thinks, scientists should also look to the planet's atmosphere.

The Earth's atmosphere is stable and habitable in part because of carbon dioxide released when large tectonic plates under the Earth's crust shift and because of the weathering of rocks at the surface.

"You need something that allows volcanic rock to come back to the

surface," Panero said. "It's a cycle."

Panero thinks the Earth's near-constant sea level over geologic time is based on the way water at the planet's surface interacts with shifting plates. The Earth's interior provides energy that powers the dynamics of plate tectonics, which in turn has kept the amount of water cycling between the surface and its atmosphere stable for eons. The weathering and erosion of silicate rock helps regulate [carbon dioxide](#) levels in the atmosphere, and is a key part of the process.

And though astrophysicists have traditionally searched for a world with [water](#) in the hopes of finding a world that can support life, Panero thinks there might be a way to evaluate the stuff of which a planet is made to determine if it could be habitable. The theory she presented Wednesday includes evaluating a planet's mass and radius, along with the composition of its star, which can be used to make predictions about the planet's interior and structure. In a universe of seemingly infinite planets, the theory could help narrow the field of planets that scientists look to for signs of life.

That could help save both time and money in the search for extraterrestrial life.

"It's a way of cutting down your sample set of where you're going to spend your expensive space telescope time," Panero said.

Provided by The Ohio State University

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