

Simulations suggest Earth's oxygen-rich atmosphere will last only another billion years

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A pair of researchers from Toho University and NASA Nexus for Exoplanet System Science has found evidence, via simulation, that Earth will lose its oxygen-rich atmosphere in approximately 1 billion years. In their paper published in the journal *Nature Geoscience*, Kazumi Ozaki and Christopher Reinhard describe the factors that went into their simulation and what it showed.

Scientists all agree that life cannot go on forever on planet Earth—eventually, the sun will run out of energy and destroy itself. Life forms will likely find it increasingly difficult to survive prior to that though, as the sun grows hotter. In this new effort, the researchers sought to find the tipping point for life—when the planet will no longer be able to support most [plants](#) and animals.

To find that tipping point, the researchers created a [simulation](#) of Earth that factored in variables that described the climate as well as geological and biological processes, and most importantly, the activity of the sun. The researchers then ran their simulation to see how the Earth fared far into the future.

The simulation showed that as the sun grew hotter, 1 billion years from now, releasing more energy, carbon dioxide levels in Earth's atmosphere will begin to drop due to the gas absorbing the heat and breaking down. The ozone layer would also be burned away. Then, as carbon dioxide levels fall, plant life will begin to suffer, resulting in reduced production of oxygen. Over a period of just 10,000 years, CO₂ levels will drop so much that plant life would go extinct. Without plant life, land- and sea-dwelling creatures would soon go extinct, as well, due to the lack of a breathable atmosphere. Meanwhile, the simulation also showed increasing levels of methane entering the atmosphere, speeding the demise of creatures needing oxygen to breathe. The result, according to the simulation, would be a planet without life, save for tiny anaerobic creatures such as bacteria—conditions very similar to Earth prior to the evolution of plants and animals.

The researchers suggest that their simulation could be of use to those looking for life on other planets—the window of opportunity, they note, could be shorter than previously thought.

More information: Kazumi Ozaki et al. The future lifespan of Earth's

oxygenated atmosphere, *Nature Geoscience* (2021). [DOI: 10.1038/s41561-021-00693-5](https://doi.org/10.1038/s41561-021-00693-5)

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