Lowering atmospheric pressure to save the future

June 2, 10:51 AM Science News Examiner Meg Marquardt

Researchers from the California Institute of Technology have offered a bizarre hypothesis: some time in the far future, between 100 million and 1 billion years from now, the atmospheric pressure will be so great and levels of CO_2 so low that plants will die off, taking with them the ability to support life. In short, they are giving a vague window for a future apocalypse.

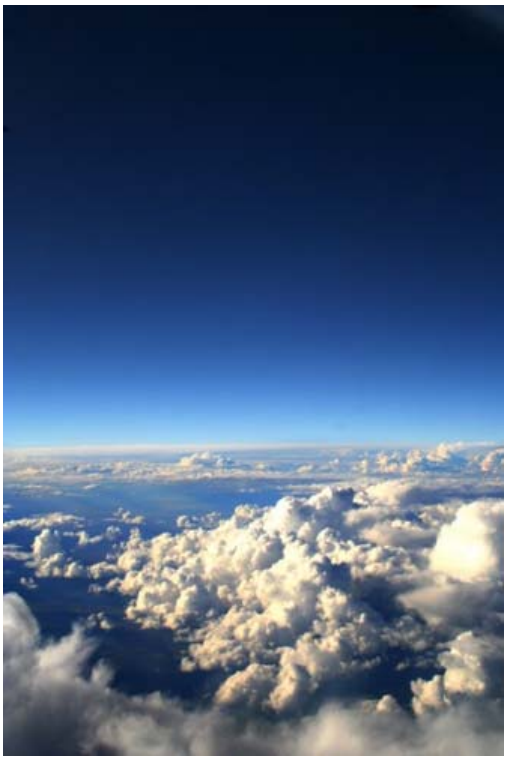
The story becomes truly strange when they offer a suggestion as to how to solve the problem: create a machine that is capable of removing nitrogen from the atmosphere, thus lowering the pressure and extending the expected lifespan of life on Earth another 1 billion years.

This story walks the line of extremely interesting and ludicrously ridiculous. A publication in the *Proceedings of the National Academy of Science* (*PNAS*) certainly lends credibility; *PNAS* is a member of the super three of scientific journals (the others being *Science* and *Nature*). And the science is undoubtedly intriguing, but at the same time it definitely falls into the category of odd.

Take a step back and look at the original hypothesis: low levels of CO_2? After all this time of being warned against the ever-increasing carbon dioxide levels as the culprits of global warming, this statement is a bit confusing--but only if you are looking at the short-term. Geological evidence shows that CO_2 levels have constantly been dropping over the history of the Earth, perhaps because of absorption by rock sediments on top of the better-understood process of photosynthesis. As it

stands, if the trend continues, researchers have found that “Earth would not be able to sustain photosynthesis for more than about a billion years.” [*Science*]

A team led by King-Fai Li began creating computers model to investigate what it would take to maintain the current level of CO_2 in the environment. They found that it would require a drop in atmospheric pressure to about one-sixth of what the current pressure is at sea level. Li states that, “the reduction in atmospheric pressure would counteract the complex interaction of the CO_2 and the nitrogen in the atmosphere with seawater and the rocks on the ocean bottom; the net effect would be less permanent sequestering of carbon and a longer lifetime for photosynthesis.” [*Science*]



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So back to the machine that sucks nitrogen out of the air. Technically, this is survivable by humans—those that live in the high mountains exist in approximately the same environment suggested by the Cal Tech team. And of course the change wouldn’t be immediate. A gradual decrease of nitrogen in the air (and subsequent drop in pressure and rise of oxygen) could be easily adapted to over the generations.

Keeping the human race alive isn’t the only goal of the paper. In the abstract of the article, it is mentioned that the technique can also be used to search for alien life by looking at the infrared spectrum of an atmosphere (if atmospheric pressure is a regulator of global temperature, then theoretically the spectrum could be used to predict a plant’s temperature from a distance).

But back to the meat of the article. Though the research is aimed at protecting our descendents from a world-ending problem, the chances of something more immediate than an event 100 million years (at the earliest) doing in the human race is far more likely. The first thought that comes to mind is, of course, the threat of raising levels of carbon dioxide in our immediate future and the effects of global warming. However, perhaps it is true that it is never too soon to look to the future.

Kenneth Caldeira of the Carnegie Institution in Stanford, California, states that it is very unlikely that “anyone knows what will happen to total atmospheric pressure in the distant future.” [*Science*] However, there is no denying the intriguing argument made by Li, that atmospheric pressure plays a role in temperature control of the planet.

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