Space Bubbles: an out-of-this-world proposal to address climate change

An interdisciplinary group of scientists at the Massachusetts Institute of Technology is exploring a space-based solar shield to reduce incoming radiation on Earth's surface—hence combatting climate change.

May 18, 2020

Cambridge, MA – FOR IMMEDIATE RELEASE.
As the Earth's temperature increases, the question of our response to climate change grows more urgent: has our negative impact gone too far? Is it too late for us to reverse the damage done? A new proposal currently being developed by a transdisciplinary team at the Massachusetts Institute of Technology suggests an approach that would supplement current climate mitigation and adaptation solutions. 'Space Bubbles,' inspired by an idea originally proposed by astronomer Robert Angel, is based on the deployment of a raft in space consisting of small, inflatable bubbles with the aim of shielding the Earth from a small portion of solar radiation.

This project is part of a solar-geoengineering approach—a set of technologies aiming to reflect a fraction of sunlight coming to the Earth—to contest climate change. Unlike other Earth-based geoengineering efforts, such as dissolving gases in the stratosphere for increasing its albedo effect, this method would not interfere directly with our biosphere and therefore would pose less risks to alter our already fragile ecosystems. The raft itself (researchers hypothesize a craft roughly the size of Brazil) composed of frozen bubbles would be suspended in space near to the L1 Lagrangian Point, a location between the Earth and the sun where the gravitational influence of both the sun and the Earth cancel out.

This proposal addresses many questions: How to engineer the best material for the bubbles to withstand outer space conditions? How to fabricate and deploy these bubbles in space? How to make the shield fully reversible? What are the potential long-term effects on Earth's ecosystem?

The interdisciplinary team at MIT is not only committed to advancing this area of research, but also to starting conversations about the challenges a solar-geoengineering solution brings to light. "We believe that advancing feasibility studies of a solar shield to the next level could help us make more informed decisions in the years to come should geoengineering approaches become urgent," said Professor Carlo Ratti of MIT Senseable City Lab. The project should not be seen as a replacement to current adaptation and mitigation efforts, but as a backup solution should things get out of control. The research team includes Professor Carlo Ratti, MIT Senseable City Lab; Charles Primmerman, MIT Lincoln Laboratory; Professor Daniela Rus, MIT Computer Science and Artificial Intelligence Laboratory (CSAIL); Professor Gareth McKinley, MIT Mechanical Engineering; Professor Markus Buehler, MIT Mechanical Engineering and Civil and Environmental Engineering.

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