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SYMPOSIUM ON VISIONS AND STRATEGIES FOR THE FAR FUTURE (D4)
Contribution of Space Activities to Solving Global Societal Challenges (4)

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EC2LIPSE: AN INTERDISCIPLINARY STUDY OF SPACE-BASED GEOENGINEERING BY SOLAR RADIATION MANAGEMENT USING A SUN-EARTH L1-LOCATED SHIELD

Abstract

Space-based geoengineering is a potential future means of mitigating terrestrial climate change, one of the most pressing societal challenges at this time. This paper presents the results of EC2LIPSE (Exploring a Climate-Change Langrange I Point Solution for Earth) an interdisciplinary project conducted by an independent team of graduate students and young professionals from a wide variety of professional backgrounds at the 2012 Master of Space Studies Program of the International Space University in Strasbourg, France, the aims of which are "To develop from an interdisciplinary perspective a comprehensive, feasible, and, sustainable roadmap for solar radiation management in the Sun-Earth first Lagrangian point in order to mitigate the effects of anthropogenic climate change.

It is demonstrated that solar shielding of Earth at the L1 point can reduce incident radiation via absorption, reflection, or deflection and reduce the net surface temperature of the planet in order to mitigate the primary effect of climate change: global surface temperature rise. EC2LIPSE focuses on a future solution that uses one large shield made from lunar materials to reduce by 1.8% the amount of solar radiation.

This paper provides a comprehensive and holistic approach to completing a project on this scale. Technical, political, ethical, and financial analyses of the shield are provided for the time frame leading up to shield deployment in 2060 and the after effects until the year 2100, encapsulated in a roadmap identifying the necessary precursor activities and technologies were such a project to be decided upon.