Search For Solutions: Space Sunshade

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Introduction

The space sunshade is a relatively new concept for cooling the atmosphere by sending a thin refractive screen in between the Earth and the Sun to lower the amount of solar radiation hitting the planet.

Costs

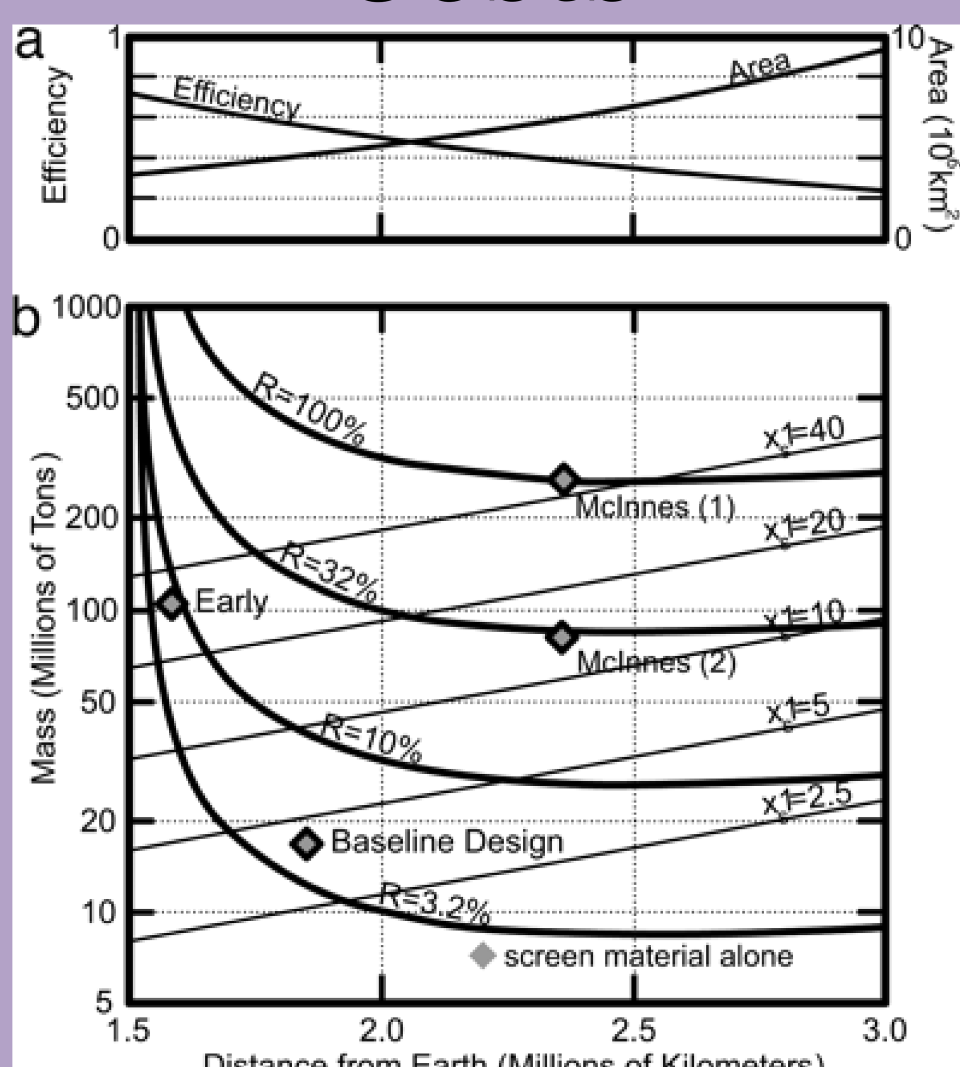

Figure 1: Size Vs. Effectiveness[1]

- Baseline design estimated to be around 20 million tons[1].
- Multistage rocket transport would cost $20,000 per kilogram, but if electromagnetic/ion propulsion is used can lower this to $50[1].
- Would cost trillions of dollars over 25 years to deploy, but maintenance is negligible[1].

How It Works

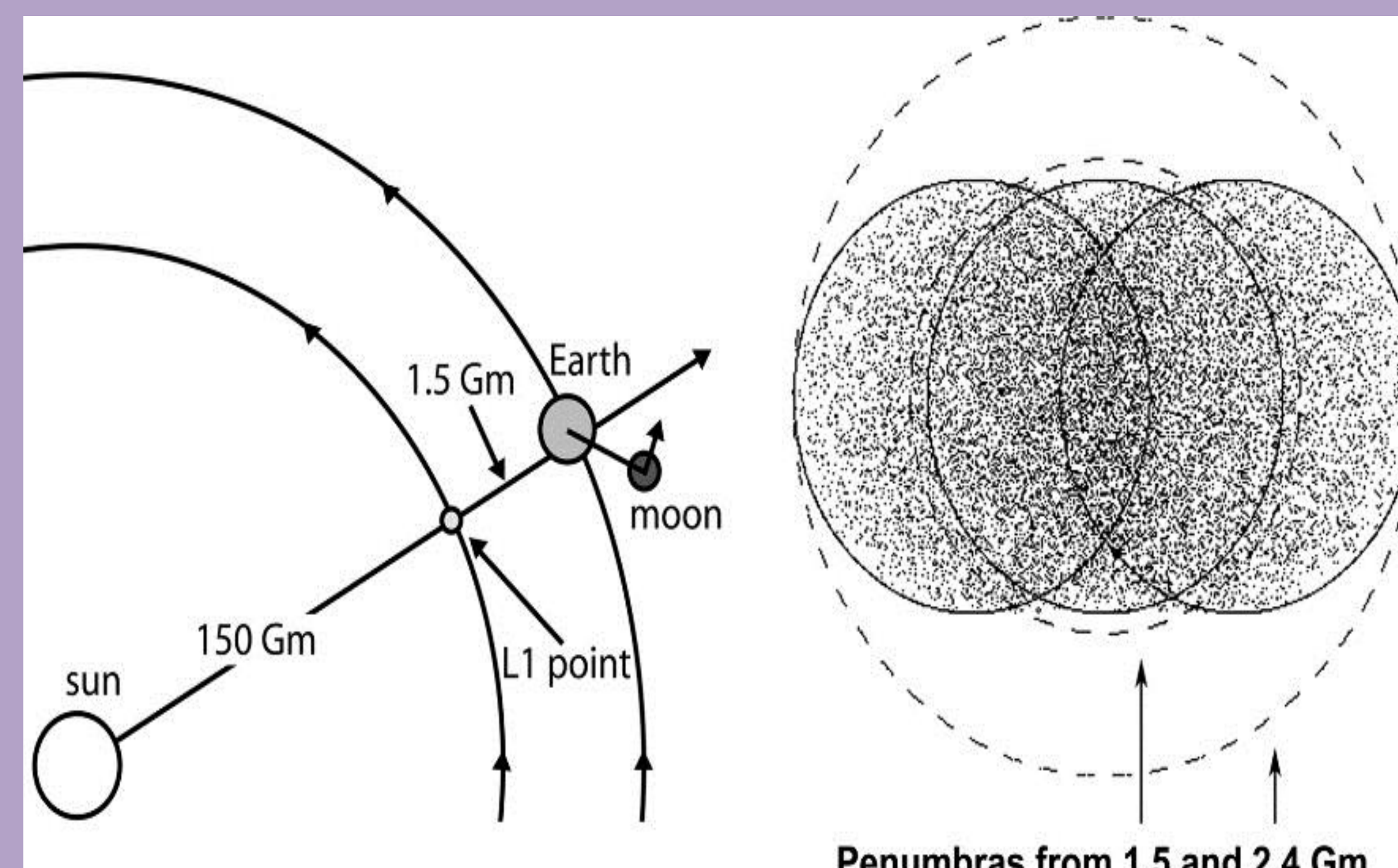

Figure 2: Example of sunshade[1]

- A thin refractive screen with a low level of reflectivity would be put into geosynchronous orbit at the L1(Lagrange equilibrium) point in Figure 1 while being between the planet and the Sun[1].
- This would aim to block an estimated 1.8% of the solar flux from the Sun, which is enough to completely reverse the warming effects of double the current level of CO_2 in the atmosphere[1].
- It will be composed up many autonomous rockets ensuring that the sunshade will stay in place for decades.

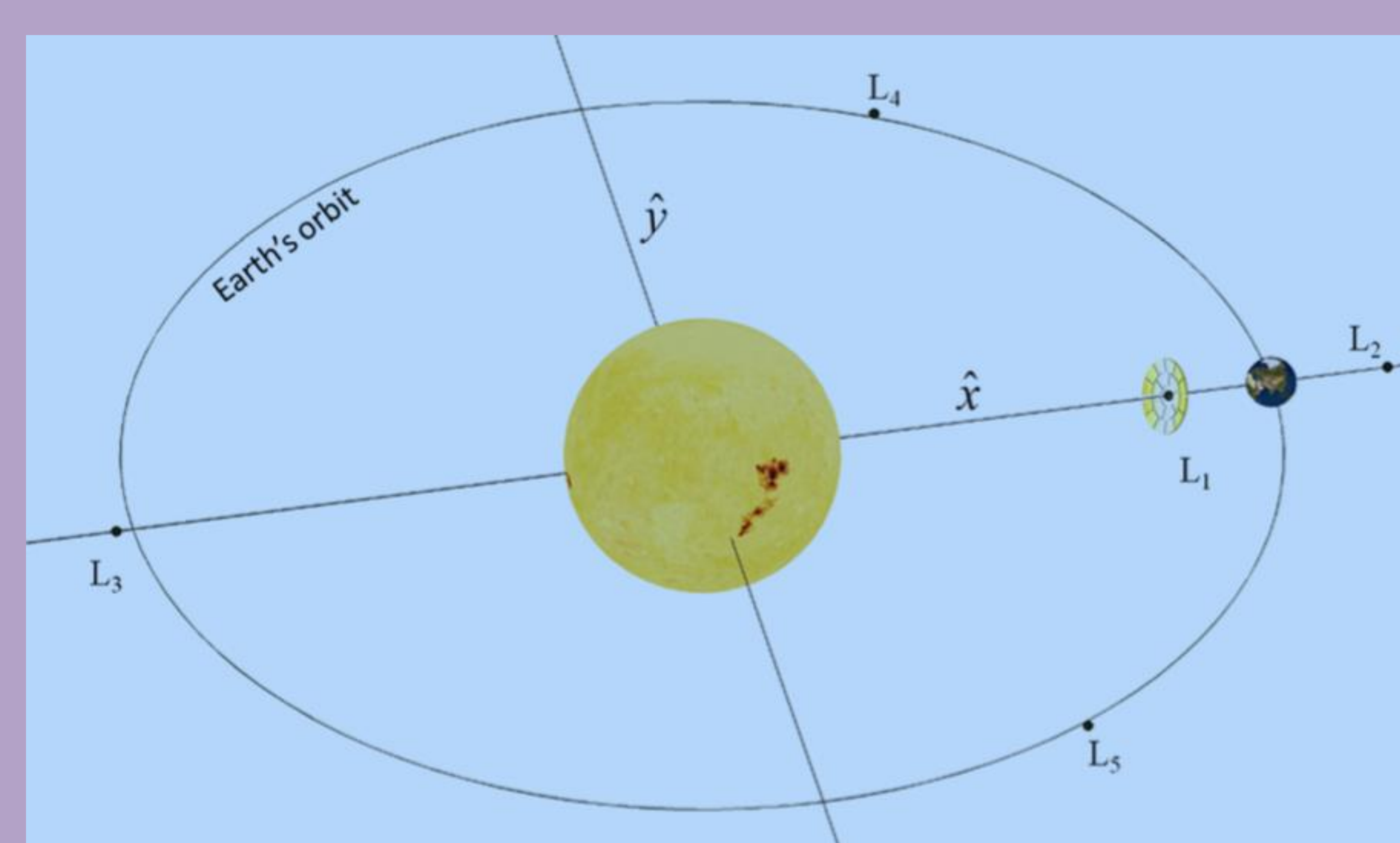

Figure 2-B: Second example of sunshade[2]

Benefits/Drawbacks

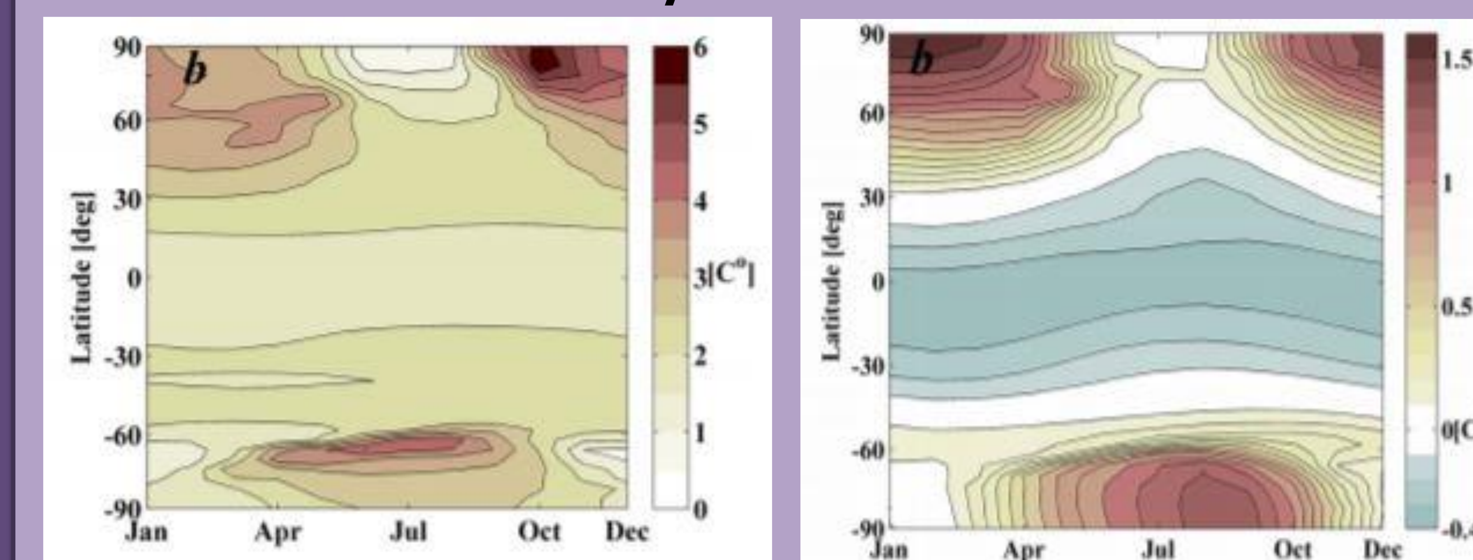

Figure 3: Difference in average temperatures from now to 50 years in the future without sunshade(left) and with sunshade(right)[2]

- As shown in Figure 3, there is a substantial difference in the overall change in temperature with the sunshade, and areas near the equator are expected to even have a decrease in temperature of up to 0.4 degrees Celsius[2].
- Combined efforts to reduce carbon emissions and the use of sunshades can limit the rise of the sea level to only one foot by 2100[3].
- Cooling temperatures will still cause climate change in tropical areas, which could have unforeseen environmental consequences[2].
- A space sunshade does not have any effect on ocean acidification, and, without other methods in place, temperature is only a small part of the oceans rising[3].

Bibliography

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