The Theoretical Nexus: Investigating the Hypothetical Relationship between Space-Mission and Global Warming

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Abstract: *In this paper we are explaining the relationship between space missions and how it's affect global warming. Through this paper, the reader gets the theoretical relationship between space missions and global warming. In this paper we only explain the idea theoretically, it cannot be proven practically.*

Keywords: Space missions, Global warming, Theoretical relationship, Environmental impact, Nuclear Pulse propulsion Method

1. Introduction

The aim of the study is to convey the idea of how the space mission is related to global warming. This paper is explained based on Newton's law of universal gravity in [1] and statistical data by NASA in [2]. Does the Earth's temperature change when an aircraft moves to space? In future the inter-solar space missions will increase. So there is a small relation between space missions and global warming according to Newton's law of universal gravity.

The paper first goes through Newton's law of universal law. The paper explains the general law between two masses and their radius according to gravity.

The statistical data by NASA gives the relation between each planet's radius, density, and temperature. With these data, we conclude the relationship between space missions and global warming in the paper.

2. Newton's Law of Universal Gravity

There is a relation between the mass of the body and distance from the center of the body. According to [1], the law states that every point mass attracts every other point mass by a force acting along the line intersecting the two points. The force is proportional to the product of the two masses and inversely proportional to the square of the distance between them.
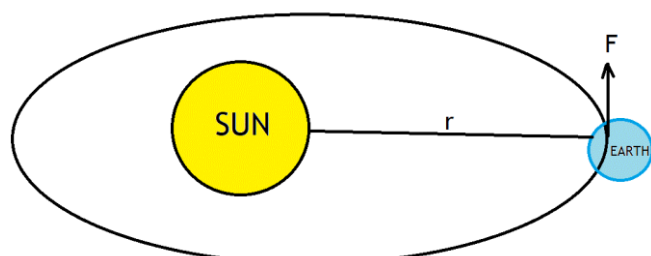

Figure (i): Solar System

$$F = GMm/r^2$$

F – Force between two bodies.
G – Gravity between two bodies.
M – mass1
M – mass2
r – radius between two bodies.

According to the equation, there are two major cases when a change in mass may occur on a planet. Case 1 is the radius between the body changes. The mass and radius are directly proportional to each other. Case 2 is the force between the body may change. The mass and force are directly proportional to each other.

3. Statistical Data

The following planetary fact sheet is published by NASA in [2]. The table gives the radius, mass, density, and temperature. The temperature of the planet not only depends on the radius but it also depends on the density of the planet.

Table (i): Planetary Fact Sheet

Planets	Diameter (km)	Mass (10^{24}kg)	Density (km/m^3)	Temperature (C^o)
Mercury	4879	0.330	5429	167
Mars	6792	0.642	3934	-65
Venus	12104	4.87	5243	464
Earth	12756	5.97	5514	15
Neptune	49528	102	1638	-200
Uranus	51118	86.8	1270	-95
Saturn	120536	568	687	-140
Jupiter	142,984	1898	1326	-110

4. Relation to Global Warming

The temperature of the Earth's surface increases with a decrease in the radius. The temperature of planets also depends on the density, but a specific planet has always

constant density. So we can conclude that the temperature of a particular planet depends only on radius.

In each space mission, a small amount of the mass of Earth is lost. When mass decreases the radius of the earth also decreases. Due to this, the temperature of the Earth increases.

The mass also affects the perpendicular force, if any change in force happens it affects the duration of the year and season of the earth.

5. Conclusion

If the predicted idea is true based on this theory, we want to study further based on this concept.

This effect can be overcome by new space propulsion methods like nuclear pulse propulsions, which have a high weight-to-power ratio. It needs only low-mass fuels compared to chemical combustion propulsion. The nuclear pulse propulsion is explained in [3]. Using this propulsion method, we can also return the spacecraft to Earth.

We can also compensate the Earth's mass by interstellar mining.

References

[1] Isaac Newton, "In [experimental] philosophy particular propositions are inferred from the phenomena and afterwards rendered general by induction": "Principia", Book 3, General Scholium, at p.392 in Volume 2 of Andrew Motte's English translation published 1729.
[2] Dr. David R. Williams, Planetary Fact Sheet - Metric, 2023, NASA, https://nssdc.gsfc.nasa.gov/planetary/factsheet/
[3] Glenn Harlan Reynolds, Juliet Leigh Outten, "Pulsed Nuclear Space Propulsion and International Law: Some Preliminary Observations" , 2022, pp. 445–477.