

OS2-1

宇宙移住のための3つのコアコンセプト

Three essential "Core" concept for space migration

山敷庸亮¹

Yosuke YAMASHIKI¹

¹ 京都大学大学院総合生存学館 SIC 有人宇宙学研究センター, SIC Human Spaceology Center, Graduate School of Advanced Integrated Studies in Human Survivability#1,

1. Three "Core" Concept

When considering the planetary migration of the human race to other terrestrial planets within our Solar System, it is crucially important to survey what kind of resources can be established for a self-sufficient system. This system cannot depend upon planet Earth to secure food, clothing, or construction materials, to sustain a "space society" on each planet. We call the life-support system and the actual global ecosystem a "core biome complex", and the technical system necessary for maintaining the "life" system "core technology". We named this circular society on each planet the "core society", with the minimum necessary important systems that do not depend on other ecosystems. We use these to scrutinize and examine the realization of a "space society". In particular, in order to sustainably maintain the "core biome complex" existing on the earth for a long period of time, it is important to establish a system that is not overly dependent on other systems¹⁾.

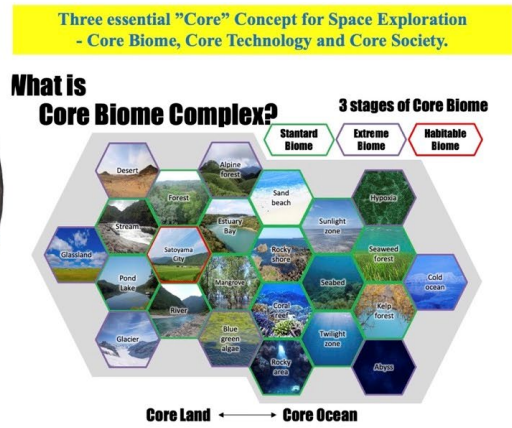
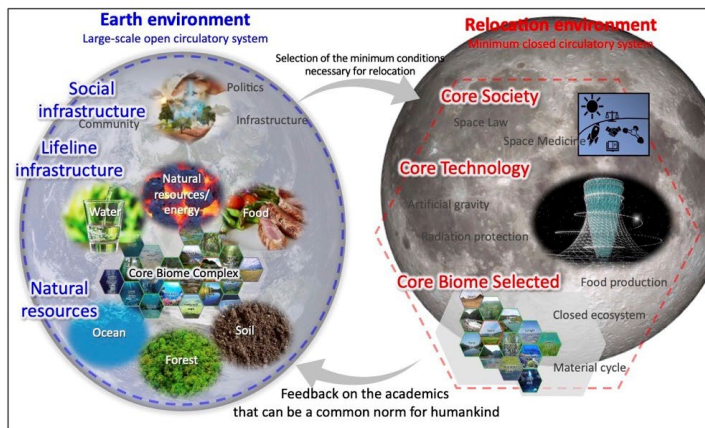


Figure 1: Three "Core" concept, Core Biome, Core Technology, and Core Society. Figure 2: Conceptual diagram of the core biome complex

The "core biome complex" is defined as the basics that are indispensable to the terrestrial (global) ecosystem, and is the simplest form of the global ecosystem by extracting the functions of the dominant biome in each location on the Earth. We define each of the core biome states as "Standard Biome", "Extreme Biome", and "Habitable Biome". The "Standard Biome" refers to a state in which each core biome is generally functioning normally and biodiversity is maintained. Extreme Biome is a biome in which biodiversity is reduced by certain

phytoplankton. To realize human habitation in space, we need a technological system for survival that takes into account the uniqueness of space. Let us name these "core technologies". The two most important technologies for habitation on planets other than Earth are (1) space radiation protection technology and (2) artificial gravity technology. These two items can be selected when the technology of "Life supporting system" has already been established. As the third "core" item of "Core Society", the two major disciplines that will support society in the relocated environment are (1) space law and sociology and (2) space medicine.

The core biome concept is based on the central axis that humans need to bring their own ecosystems in order to settle in space for a long period of time, and it is very important to be able to explain the cost for maintaining ecosystem. There is also the question of how we can think about and control species that are "undesirable" to humans. Once insects such as mosquitoes and cockroaches, which are generally considered "pests," are introduced into the space ecosystem, we will face the "difficult" question of how to deal with them. At the same time, we must also consider pathogenic microorganisms and viruses.

The "ecosystem" we have described here is only a terrestrial ecosystem and is an "alien species" to other planets. If there is an ecosystem at the destination, bringing the Earth's ecosystem along with humans would be an invasion of alien species for that planet. In other words, in terms of Planetary Quarantine, the core biome concept can be a concept that "justifies" the invasion of alien species (terrestrial ecosystem) into different planet.

Considering such a case, it may be difficult to reproduce the Earth's environment on the target planet, but it will be recognized as "correct" to reproduce the ecosystem on the planet in a completely closed dome-like structure that reproduces the Earth's environment and is completely cut off from the planet's external environment. The "core technology" challenge is to create a dome-like structure that reproduces the Earth's environment in a completely closed environment. We determine this as "Terrawindows" which can be compared with the "Terraforming".

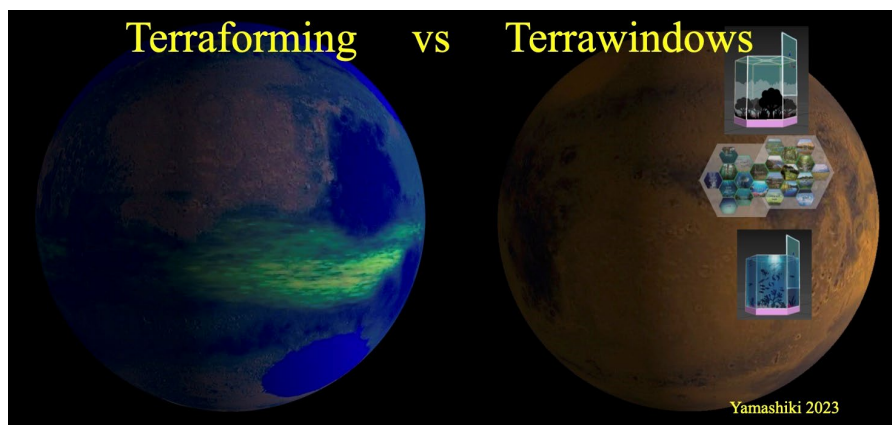


Figure 3 Terraforming vs terrawindows

References

- 1) Yamashiki Yosuke et al.: Human Spaceology, three "core" concept for the space migration, 1st Ed. Kyoto University Press (2023)