

Symposium : Presentation 3

Space: Strategy of the Fourth Dimension —The Theories of Space Power—

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Introduction

Hello everyone. My name is Masashi Okuyama. Thank you for this opportunity to speak today. In my presentation I will be talking about space power.

I am not an expert in space power. However, I have translated several books on the topic with a geopolitical perspective, and some of the people around me, who are mainly Americans, are researching space power when I was doing my PhD research back in UK. I have heard a great deal about it from them, so it has been always my academic interest. During my presentation I will discuss space power from a theoretical and abstract standpoint, based on what I have learned from them.

Before my presentation, I would like to begin by sharing my conclusions first. There are three points. First is that the relationship between geographic constraints and technology plays a critical role when considering space power. Second is that political context is extremely important for space power. Third is that the importance of the narrative. You may find it strange that I use the word “narrative” here. This word is often used in the social sciences, and actually has extreme significance in discussions of space power and technology in general. Today, my presentation will focus on these three points.

1. Strategic Geography of Outer Space

In Part 1, I will explain about the strategic geography of outer space. There are several people with us today who are experts in space topic in general. Therefore, I would like to narrow my focus down to “strategic geography” of space in particular.

There is an on-line book called *Toward a Theory of Spacepower*. According to this book, the theory of space power has not really been advocated until now. The first time that the presence of outer space became an area of focus as a “fourth dimension” of war potential was around 1957 when the Soviet Union became the first in the world to launch an artificial Earth satellite called Sputnik 1.

I believe Professor Tsuchiya of Keio University may have written a paper about this “dimension” of warfare. They say that there are “five dimensions” of strategic spaces in total, which are land, sea, air, outer space, and cyberspace. Then Professor Tsuchiya discusses that there is a possible sixth dimension where wars or battles will be fought. I, too, believe this notion makes sense.

I believe all of you already fully understand that the strategic domains I have listed overlap a great deal, and they are increasingly becoming more complex. Of course, through your jobs, I believe you are well aware of the fact that each military branch, such as the army, navy and air force, has constraints from their own geographic environment of land, sea and air. To overcome this limitation, they employ hardware and specialists. Then our question, what type of strategic and geographic conditions does outer space have?

Simply put, this should be easy to grasp by looking at the explanations in the paper authored by Everett Dolman and the figures appearing in the book I translated called *Geopolitics: Geography and Strategy*. According to Dolman, outer space is clearly broken up into domains geographically. In other words, outer space comprises the four domains of Earth, the space around Earth, the space around the Moon, and the space around the Sun (Figure 1).

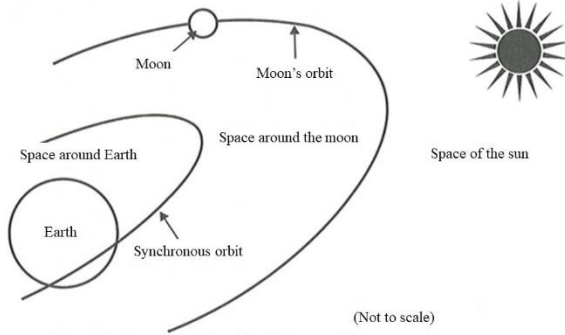


Figure 1

Figure 1 above shows domains focused on several orbits. These spaces can be separated into several domains. Each of them has rather clear geographic characteristics.

I believe many of you in attendance are from the generation that watched the early Gundam (The One Year War) series on TV. This anime was about humankind creating colonies in space and wars in the Space Century. In the story, there is a space colony called Side 3 of the Principality of Zeon that caused hostilities with the Earth Federation. This references Lagrange points already observed by the French mathematician in the 17th century (Figure 2). Lagrangian points refer to the space between the moon and the Earth where the gravitational forces of them balance each other out in a way that causes satellites to maintain a stable position without fuel.

Theoretically, it is said that there are five Lagrangian points. Simply put, the second Lagrangian point (L2) is located on the other side of the Earth and the moon opposite L1, where there is an equilibrium of gravity between the moon and the Earth. There is a stationary point on the opposite side of the moon and the Earth, which is called L3.

These points where it is possible to place a satellite using the equilibrium point of the moon and Earth's gravity without using fuel are extremely important. In Gundam, they say that Side 3 caused the hostilities. It was located at L2, the furthest Lagrangian point from the Earth.

As a side note, the United States views the fourth and fifth Lagrangian points as extremely vital spaces militarily because L4 and L5 are located at points where the Earth and the moon's gravity are balanced. Previously, there was a lobby group advocating for the US Congress that the government should secure these points. They said it is because the first to secure these points will hold a hegemony in space. In this manner, there are strategic geographies in outer space, too, that are vital for establishing space power.

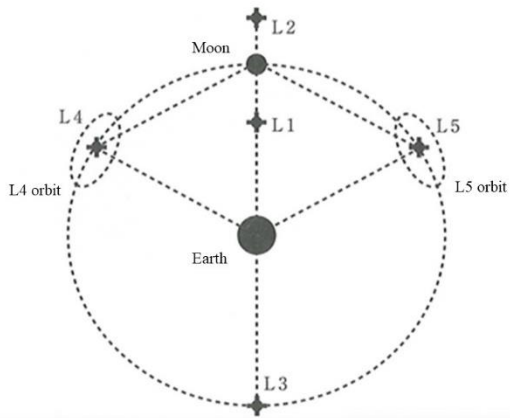


Figure 2

Naturally, being closer to the equator provides an advantage when it comes to launching satellites into space. This is because the Earth is rotating and launching from around the equator makes it possible to carry a heavier payload with less fuel. The

Earth's gravity can be offset to a certain extent by using the Earth's own centrifugal force. Have you ever wondered why North Korea launches its missiles from as far south as possible or why Japan launches satellites from Tanegashima? This is because the further south a launch site the better as it is closer to the equator. For this reason, the space connected to southern outer space is extremely important when thinking of the geopolitics of space. If there is a Space Force that can utilize space, it is extremely important to control the airspace above this area.

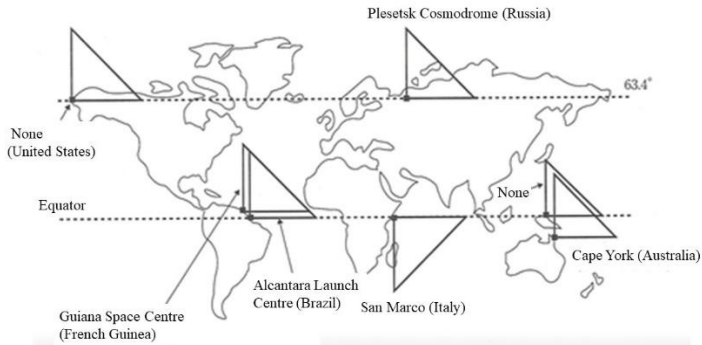


Figure 3

Next, the Van Allen radiation belt has a strategic importance (Figure 4). The Earth has magnetic force, and there are places where this magnetic force is disrupted. Satellites must avoid these areas. In this case, launching large stationary satellites should be avoided wherever possible.

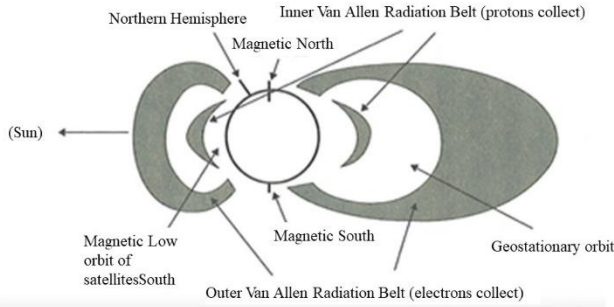


Figure 4

Looking at the whole of Earth, when placing three satellites into orbit, how can they be placed into the Earth orbit? How and where will you place a satellite at an altitude of 22 thousand meters? Where will you stop it? Where will you leave the satellite? In this sense, these questions become extremely important in discussions of space power. The location for launching satellites into orbit will be very crowded. This is because the placement of satellites will provide a strategic advantage. And this shows there are extreme constraints to the geography of space.

Space is the ultimate 'high ground'. Different rules of physics apply onto the space compare to any other domains. Therefore, it is reasonable to consider a Space Force as a separate branch of military services. In the United States, among the people lobbying for Congress and people involved in space with the US Air Force, some believe that space must be completely isolated as its own domain. Of course, as I spoke about earlier, several of these different areas geographically exist and follow Kepler's laws. The movement and location of a satellite is not a national secret. But if satellites exceed a certain size, this information is known to all countries. In other words, there really is no flexibility for satellites in terms of orbits.

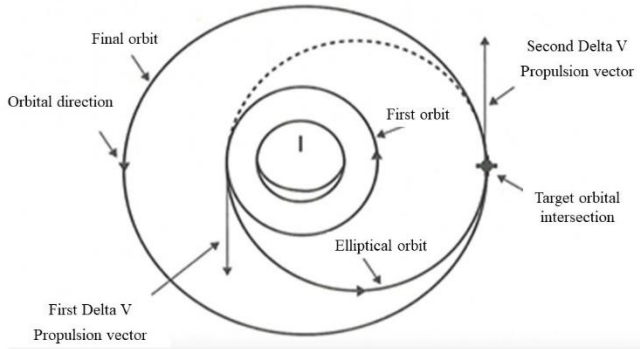


Figure 5

Satellites are always circling in the same path. Changing the orbit, which is called Hohmann transfer orbit, involves activating the engine two times from a certain point to make major orbital changes. This means the satellite must carry a large amount of fuel when launched into space. In other words, this capability depends on fuel and payload. As I noted earlier, the ideal location for the launch is, geopolitically speaking, equivalent to a “choke point”. This could become an effective geographic constraint. My point is that outer space is a geography that is extremely constrained by its unique physics.

2. Technology

Here, my discussion will change direction slightly. I would like to talk about technology. Have you heard of a man named Alvin Toffler? He was a “futurist” who popularized the term “three waves” in the 1980s. He passed away several years ago. Toffler’s notion on waves consists of three. Agriculturalization was the first wave, industrialization the second, and modern information the third. Recently, critics put forth the

ideas that the fourth and fifth waves are coming in the form of systemization and computerization. By looking at this figure, I think you all will be able to grasp the concept rather easily. The important point here is that each of the previous waves remains in place (Figure 6).

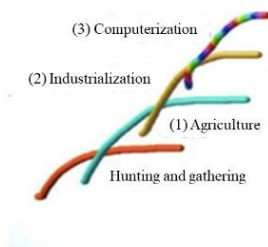


Figure 6

The same can be said not only for technology, but the military as well. The role of the land force will always remain as the first dimension. This means that the subsequent second, third, and fourth waves will remain and become a role in the overall strategic picture. In this case, while I spoke earlier about a form specialized in technology, we need to consider the question of the essence of technology.

This was a problem that I had trouble with when I studied abroad. The definition of the word “technology” used in Japan, to me, sounds more about hardware, tools and skills. In overseas countries, however, I have found that the philosophy of technology is very popular academically, and definitions that I found in *Philosophy of Technology* by Val Susek were quite useful. His book notes that there are three types of definitions regarding the concept of technology.

The first one is that technology is hardware. The sense of manufacturing with the

definition in Japan likely overlaps with this line of definition.

However, the second definition is quite contrary. It is found in the information of craftsmen. The information within the brain of a craftsman is technology itself. In other words, technology is seen from the approach of rules, skills, and knowledge.

The third one is an approach that has become a sort of accepted consensus since the 1990s leaning toward technology as a philosophy. In other words, technology is a system that includes both the tangible hardware and the software in the head. They say that viewing the definition of technology from a system standpoint now commands discussions in the philosophy of technology.

Another one of my favorite books is *Machines as the Measure of Men*, by Michael Adas, a famous researcher in the field. The amazing part of this book is the story about how technology has a psychological impact. In support of his theory, the author uses as a historical example the Portuguese people in the 16th century going to Goa in India. He writes about how Europeans viewed Indians in terms of technology, how they were aware of their technology, and how their technology, or the development of machines, had a major impact on the awareness of other ethnic groups. When the Portuguese traveled across the seas and arrived in India, initially they were amazed at the Indian textile machines, and felt like they were inferior in this technology. However, once they became able to build larger size ships, they began to look down on Indians realizing that their ships were bigger than theirs. Within a person's head, technology, for example, is connected to discrimination. In other words, technology itself will change the awareness of the people who own it, or in other words, the users.

Another aspect of interesting features of technology is that it changes people. I think you may have felt this in the earlier presentation on AI by Professor Yamaguchi. There is another famous book called *Consider the Fork*. The Japanese translation is called literally 'The History of Kitchens'. This is a deeply interesting book. I encourage you to read it. I was shocked when I first read the chapter that said that Europeans did not eat meat with a knife until the late 18th century. Until then, Europeans were so-called "barbarians" who picked up a mound of meat and bit off chunks. They had been

doing this since their childhood, which is why they had buckteeth. Then table manners were introduced in the late 18th century. They represent a “system” that includes manners of how to use a knife and fork to eat meat neatly. Once it became commonplace to cut meat into pieces using a knife and fork, and use a napkin, there was no longer the need to bite off chunks from a mound of meat. This has apparently been proven through excavations of European’s bones at the time. Their buckteeth became straightened and their teeth became normal like ours today. In other words, the system called technology was able to transform human being’s physical features.

Today, people, especially young people, are losing their power of concentration. From around 2004 when the smartphone was developed, a survey showed that major changes have taken place in young people’s attention span. In 2004, a 15-year-old adolescent’s attention span was on average 20 seconds, but in 2014 it had fallen to less than 9 seconds. Twenty seconds turns to nine seconds. This dramatic shift is a major problem for our society. Technology itself, again, is changing human being.

A professor at the University of London, Christopher Coker, who I became indebted to personally, often says people are becoming “cyborgs” today. Computers now stand in the middle of communication between people’s brain. Once you start using an App called LINE (equivalent to WhatsApp) on your smartphone, there is a computer and network in between the brains of the people using it. This is exactly the same meaning as when the concept of a cyborg appeared. In other words, we are changing society with technology and people themselves are being transformed by technology.

Recently, they say there is a very large number of children with bad posture. Even my niece in junior high school has a serious one. This is an impact from the spread of smartphones. This posture problem and the problem of declining eyesight will become major problems in the future. In this manner, the fact that people’s skeletons are changing is perhaps not the same as the knife story from earlier, but in this sense, we can say that technology will physically change human being. Knowing this, what should the Self-Defense Forces do? This may be a difficult job for those involved, but

it is also a very interesting task to grapple with. We have no choice but to focus on the role of technology both in society and human being in the future.

3. The Theory of Space Power

I would now like to move onto Part Two of my presentation, where I will explain the theories of space power. In the past 20 years, various theories have emerged on how to utilize space and how to view space strategically. This approach of practice followed by theory is the same as for cyberspace. The fact that theory comes after practice may be unavoidable, but by the 1980s, there was no concrete strategic theory in place in the field of space. Following the paper written by David Lampton in the 1980s citing the importance of a theory for space power, finally discussions began between academic societies and working level professionals in the 1990s.

The theory of space power can be largely categorized into two camps. The “pro-sanctuary camp” and the “weaponize camp.” Simply put, today’s theory of space power is formed by the opposition between the two thoughts of making space a sanctuary without weaponizing it and the other that believes weaponization is unavoidable.

First, I would like to begin with the pro-sanctuary camp. The most notable figure in this camp is James Moltz. He is said to be an “idealist.” In his book *The Politics of Space Security*, Moltz claims that “space is a sanctuary and we must not touch it and we must not weaponize it; therefore, it is important to keep outer space clean internationally.” Next, while the beliefs of liberalism can be strongly felt in terms of international relations theory, *Space Warfare in the 21st Century* by Joan Johnson-Freese discusses space as a “shared property that must be protected.”

Furthermore, Michael O’Hanlon, who often talks about Japan-US security, wrote in his book *Neither Star Wars nor Sanctuary* that “space must be developed as a national interest; in reality, although I don’t like it, America may need to be the first to weaponize space.” O’Hanlon is also known as a “nationalist.” These three people belong to the pro-sanctuary camp.

The other side of the debate is the weaponize camp. They argue that the only option for space is to weaponize it. One person in this camp is John J. Klein, an officer in the US Navy. He was a course mate of mine during graduate school back in UK. He is also known as a “racer.” This is because he believes that America has no other choice than to take the lead in the race, and weaponize space since the future international space race will take place with other countries inevitably. Although he is not very enthusiastic about it, his emphasis is its inevitability. Klein treats this topic in greater detail in his book called *Space Warfare*.

The second person in this camp is Brent Ziamick. He is also called a “controller.” He believes that “America must actively and aggressively take the lead because it is impossible to avoid competition.” He is best known for his book *Developing National Power in Space*.

The third person who belongs to the weaponize camp is “hegemonist,” Everett C. Dolman. In his book *Astropolitik*, Dolman asserts “space is a place of complete hegemonistic competition and must be controlled fully. All Lagrangian points must be controlled by someone.” His hawkish argument has attracted many criticisms.

Today these theories are still being actively discussed, and it seems that there is no settlement for the debate. Amidst this, we still cannot see how the world’s space power situation will play out in future. In short, future is still uncertain for space power.

Several discussion points of the theory includes; the possibility of international cooperation in space; whether weaponization is unavoidable; and what is the definition of “weaponization.” In addition, there is the part of its relationship with consumer goods. There are some people discussing the issue of whether we can use the same analogy as when the railroads were first created in the 19th century. In other words, railroads served a dual-purpose during war as soon as they spread around the world. The archetypical example of this is the Franco-Prussian War of 1870. The main concern from this analogy is that, as soon as humankind makes full-fledged inroads into space, it will be weaponized immediately as in the past. As was the case with passenger airplanes soon being converted to bombers, the boundary between civilian

transportation and weapon system is extremely vague. These are the type of discussions currently taking place in the space power community.

America is thinking about the idea of space control. Conversely, countries that have fallen behind the United States take the approach of not allowing the United States into their region, as in an A2/AD manner.

Ultimately, space power demonstrated through space is only one player in joint war potential. Just because you win in space, that does not mean that you will win the war. Some talk about how space war potential will be exhibited. If I talk about the details my presentation will go over time. I would like to stop here.

4. The Future of Warfare

Finally, I will talk about the role of the ‘narrative’. I believe the narrative will be extremely important in the area of strategy. I heard that if you go to a space power conference in the United States, attendees can be largely categorized into three groups. The first group consists of military people, and in particular, air force officials. This group accounts for about 30% of those in attendance. The second group consists of engineers, who are highly knowledgeable of details of technology. Those are from aerospace companies such as Boeing or Lockheed. They also account for around 30% of those in attendance. The final group consists of science-fiction enthusiasts. These Sci-fi enthusiasts apparently play a major role whenever these conferences take place. The idea of developing something like ABC similar to what you saw in XYZ movie is easy to convey to these sci-fi enthusiasts. In general, I believe, any technological development requires ease of understanding and forming an image from popular cultures.

In Japan, these science-fiction works includes Space Battleship Yamato or Gundam. In the United States, though, Star Trek and Star Wars are the most popular by far. Apparently, there are many weapons that were developed based on these fictions. Recently, hints come from online games, too. I have not seen many Star Trek movies, but I heard that they serve as a set of major inspirations for space weapon

development.

Last year, I read a book that I believe one of the best I've ever read in the year of 2017. In the future I hope to translate it into Japanese. The book is *The Future of War* by Lawrence Freedman. This book contains a big hint for thinking about the future of war, including in the area of space power. In the book, Freedman discuss how "novels portraying future war affected policy making process." For example, he introduce a book called *The Battle of Dorking*, which was published in Britain in 1871. This book was about a future scenario where Britain was attacked, following the unification of Germany and establishment of the German Empire during the Franco-Prussian War. In the book Germany attacks at Dorking, located close to Wimbledon, the site of the famous tennis tournament, south of London, which would turn out to be a largest land battle between Germany and Britain. It would be like the German army fighting a decisive battle with the British army after landing at a location like Musashi Kosugi in Japan. Such a scene similar to this appears in a recent Japanese movie Shin Godzilla. Freedman believes that imaginative future scenario has greatly affected the future of war plans in the past. For your interest, there is a book by H.G. Wels called *Open World*, which apparently coined the word 'atomic bomb'.

You may already know that *Ghost Fleet* by Peter Singer did not receive much acclaim in Japan, and I was quite disappointed by this development. This book, which portrayed one future vision for the next war, became a must-read book among people involved in national security in the US several years ago. This book was translated into Japanese as *Destroy China's Army! Ghost Fleet Sorties*. It received poor reviews on Amazon Japan. Why? The genre of alternate military history is already well-established in Japan. There are many books for some reason written about how Japan "won" World War II. This book faced stiff competition in this genre with so many other ones. People who rated the book on Amazon said the plot had too many holes and it was too unrealistic. However, from my perspective, this was not Singer's aim. His focus was on the part about how the next war will be fought. For some reason or another, this point was not understood well for Japanese readers. The book begins with

China making a pre-emptive strike on Hawaii. The story is similar to Japan around World War II. Following the pre-emptive attack, which carries over to space, the US can no longer use its satellites. The book ends with rail guns fired from the fleet of Zumwalt. Freedman argues that we should focus on the hints provided in such future war histories.

When thinking about the future of war, however, we tend to be caught up in the image of these amazing, huge robots with magnificent weapons. But if we take a look at the wars that have occurred since 1945, in reality we have seen many cases, such as Kurdistan women using AK-47 machine guns to fight a guerilla warfare. In other words, people have continued to say a major war would break out in future, but in reality, those that have occurred were small scale bloody wars and protracted ones that have no end in sight.

Thinking about the future of war, this fact demonstrates that there are many instances when the reality is totally different from what we expected. Freedman believes this is why we need to pay attention to uncertainty. In other words, technology is not the determining factor of winning in war. It is just one option among many to choose from. Freedman asserts that trends don't proceed in a straight line, conflict will likely become protracted, diplomacy beats military action, and the advantages of containment policy will likely continue. I, too, believe such points will be important when thinking about the development of future technology.

Conclusion

Finally, I would like to introduce an famous quote of Ralf Peters, a famous former military man who has known to have extreme views. That is, "true revolution ultimately happens in the people's head." The same can be said for future war, space power and AI. If we do not actively change our own thoughts, we will find that we are out of touch with the reality of the battlefields.

To summarize, the relationship between geographic constraints and technology is critically important for future wars. The theory of space power is emerging in various

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formats from its correlation with political context. And last but not least, the narrative of future warfare is certainly significant, but we need to look at it critically.

With AI continuing to develop as it has, I am becoming worried that my occupation of translation will soon no longer be needed. Until then, I would like to continue publishing books that keep me interested, and hopefully you will find them interesting too.

Thank you for your kind attention.