# Astropolitics: The selected essays

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**Geopolitical Studies Research Centre, Institute of Political Studies, Faculty of Social Sciences, Charles University**

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# 1. Introduction

Bohumil Doboš

Astropolitics, or geopolitics of the outer space, is an increasingly important part of the social sciences in general and political science concretely. Given the ever increasing importance of the domain to human activities and military conduct, the growing amount of literature dedicated to the topic is the only natural development. Disregarding whether the experts deal with the futuristic projections of human colonization of the Solar System or modern rocketry, the variety of issues connected to the outer space politics is enormous.

Throughout the winter semester of 2016, students taking the course on Astropolitics at the Institute of Political Studies, Faculty of Social Sciences, Charles University were expected to work on an essay dealing with the topic of their interest. Given the amount of work the students gave into the essay, it seemed as a waste to let these essays be forgotten. In a following proceeding you can find selected essays dealing with topics as broad as application of geopolitical theories to the sci-fi universe, future of Baikonur spaceport and issue of space piracy.

It must be noted that the contents did not undergo any formal peer-review process or language corrections nor wish to present itself as more than a collection of ideas regarding the topic of astropolitics. Nevertheless, the novelty of thinking about many of the important issues surely overcomes these formal issues and will bring the readers food for thought. The outer space is an important strategic domain and the awareness about the processes related to it becomes an essential knowledge of any expert on international politics.

## 2. Astropolitical Reality Of The Expanse Universe

Mihajlo Kopanja

# 1. Introduction

Throughout history, different authors stressed the importance of a specific domain crucial in achieving supremacy over others. From Mahan`s importance of sea, Mackinder's importance of land, de Seversky`s importance of air to recently Dolman`s importance of space (or to be more precise Low Earth Orbit), the gradual technological advancement of the human race has opened new domains in which states are trying to achieve dominance over other states. But the "opening" of the new domain also opened our doors to the Brave New World different to the one we have known for ages. Unlike Mahan, Mackinder, De Saversky and even Dolman whose views stay firmly geocentric, humanity`s interests (braced by its technological development) begin to strive beyond our planet and the questions start to appear: what after Earth?

In the sense of everything mentioned before, the main goal of this paper lies in identifying how will the potential future of colonized Solar System manifest in a geopolitical perspective? Can we even call it geopolitical or astropolitical seems to be a better term? Undoubtedly, mankind has never faced such a unique environment in its history as space is. Therefore striving for identifying parallels between historical events and those that could happen as well as finding trends troughout history simply cannot give us a proper base for prediction. Thus, this paper will turn to a fictional universe, to the ideas of science-fiction authors, for inspiration as well as a frame of reference. As *Dominique Moisi* writes: "television script writers have become the best analysts of society and the modern world, if not the most reliable futurologists[1]". In that regard, we will focus on the Expanse book series[2] turned a television show, a universe of colonized Earth, Moon, Mars, Asteroid Belt as well as Jovian Moons, for a frame of reference in explaining the astropolitical future.

In order to achieve the main goal we set up in the previous paragraph we must provide questions on several crucial questions. First, we must provide the answer the question of how will space change our understanding of geopolitics or, on the contrary, to show that it will not. Second, we will seek to find correlations between classical geopolitical theories and the

[1]Dominik Mojsi, *Geopolitikatelevizijskihserija*, (Beograd: CLIO, 2016), 11.
[2]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012). And Džejms S. A. Kori, *Kalibanov rat*, (Beograd: Laguna, 2013).

Expanse universe in an attempt to prove or disprove their validity in this potential future. And third, we will analyse the effects of the outer space environment on human beings in a broader geopolitical sense. In order to explain the astropolitical reality of the Expanse universe we will observe it through fields of Dussouy`s analysis[3] in order to get a more systematic approach to answer those research questions.

## 2. Physical Space

According to Fraser MacDonald states the most important determinants characteristics regarding the physical space of the outer space that are of interest to astropolitical considerations are "the Earth`s mass (which determines its gravitational pull); its orbit; and its relation to other space phenomena[4]". From the perspective of this paper, these views are too geocentric, but clear lines of thought can be defined and can be expanded in order to observe astropolitics of the Solar System in general.

Therefore in order to understand the physical space or field of the Expanse universe one must start with the explanation of three important notions. Firstly, one must distinguish the main difference between observing static world of Terrestrial Geopolitics and the dynamic world of Astropolitics described in the Expanse universe. Secondly, it is the question of the vast space and mobility issues regarding interplanetary travel. And thirdly, it is the question of the celestial bodies colonized within this universe. The cornerstones of those questions lie in gravity like MacDonald mentioned. Therefore this chapter will be divided into three subsections dedicated to presenting answers these to questions as well as solutions presented in the Expanse universe.

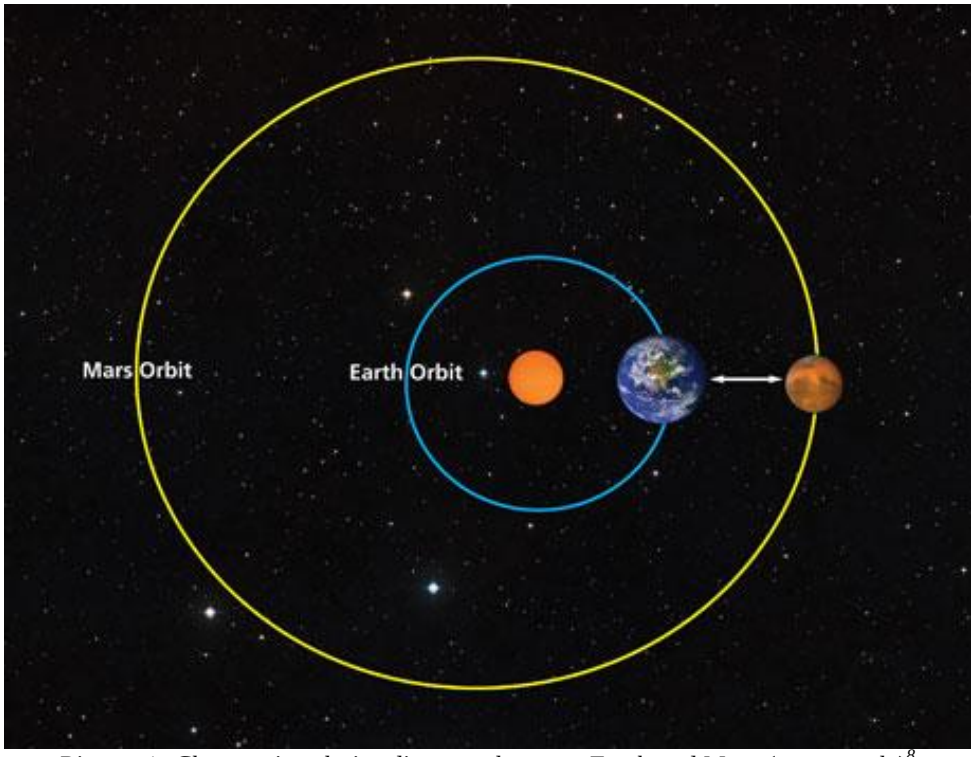
### 2.1. Dynamic world of Astropolitical interactions

If we were to observe Mackinder`s Heartland Theory we can see one important notion that is redundant if we were to focus only on Terrestrial Geopolitics and that is the notion of relative distance between two states. Terrestrial Geopolitics doesn't need to consider these questions because distance between two states is always the same. It is just in the sense of mobility that interaction is observed. The dynamic world of Astropolitics must take into account that the relative distance between two celestial bodies changes because of the constant motion of these bodies.

[3]Gérard Dussouy (2010) *Systemic Geopolitics: A Global Interpretation Method of the World*, Geopolitics, 15:1, 133-150

[4] Fraser MacDonald (2007), *Anti-Astropolitik – outer space and the orbit of geography*, Progress in Human Geography 31(5), 599.

Although the celestial bodies move in "famous regularity of the heavens[5]", the ability of interaction greatly depends on the relative position between two bodies within the Solar System (see Picture 1). Therefore, if Mackinder lived in the world of the Expanse universe, he would not only worry about mobility in a sense of transportation means[6] and the inability to use certain means of transportation[7] but also the relative a distance between two celestial objects in different periods of time.




*Picture 1: Changes in relative distances between Earth and Mars (not to scale)*[8]

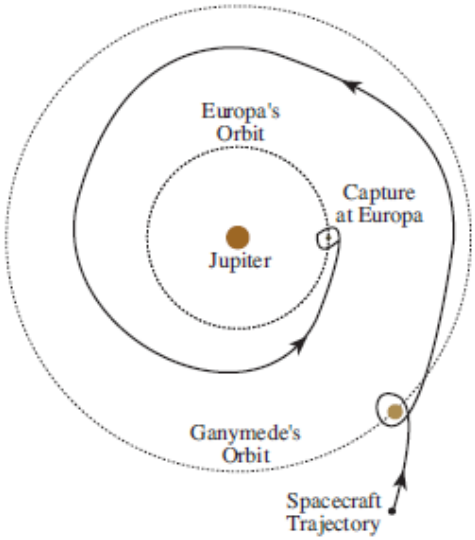
Another important notion regarding the dynamics of astropolitical reality is regarding communication. The distances between two celestial bodies are so vast that the ability of instant communication between two celestial bodies (not counting Earth and Moon[9]) is impossible[10]. For example, the communication delay between Earth and Mars varies from 3

[5] Shane D. Ross (2006), *TheInterplanetarz Transport Network*, American Scientist 94 (3), 230.
[6] H. J. Mackinder (1904), *The Geographical Pivot of History*, The Geographical Journal, Vol. 23, No. 4,
[7] H. J. Mackinder (1904), *The Geographical Pivot of History*, The Geographical Journal, Vol. 23, No. 4,
[8] http://www.downtoearth.org.in/news/mars-mission-isro-eyes-november-2013-launch--38752 accessed on 26.12.2016.
[9] The time delay between Earth and Moon is 1.3 seconds making it possible to communicate but with minor difficulties. http://www.spaceacademy.net.au/spacelink/commdly.htmaccessed on 26.12.2016.
[10] Although radio waves travel at the speed of light the distances are too vast to make instant communication possible at those speeds. On the other hand since according to Einstein nothing can travel faster than the speed of

minutes to 22 minutes depending on their relative distance.[11] This might not have such a large importance during times of peace whereas delayed communication will not make that large of an effect, but it does have significant importance in strategic sense during times of war. Also, it this property of physical space will have great impact on the way of communication people are used to in the world of today.[12]

## 2.2. Importance of the Interplanetary Transport Network

The ability to travel between celestial bodies in an economical way lies in the usage of gravitational force of different celestial bodies in order to maximise the efficiency of a spacecraft`s propulsion. Not only that it is the most economical way, but the influence of gravity by different celestial objects also causes the unfeasibility to travel in a straight line in outer space. Therefore complex calculations are needed in order to reach from point A to point B in outer space observing N bodies and engineering constraints[13] (see picture 2).




*Picture 2: Example of travel to Europa`s Orbit regarding gravity wells of other celestial objects*[14]

Although the usage of gravitational force is inevitable and more efficient, the sheer expanse of outer space means that travel between two celestial bodies is long and our current

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light we can state that instant communication on a Solar System scale using radio waves is impossible. http://www.spaceacademy.net.au/spacelink/commdly.htmaccessed on 26.12.2016.

[11] http://www.mars-one.com/faq/technology/how-does-the-mars-base-communicate-with-earthaccessed on 26.12.2016.

[12] Džejms S. A. Kori, *Kalibanov rat*, (Beograd: Laguna, 2013), 456.

[13] Jerrold E. Marsden and Shane D. Ross(2005), *New Methods in Celestial Mechanics and Mission Design*, Bulletin of the American Mathematical Society, Volume 43 (1),46.

[14] Jerrold E. Marsden and Shane D. Ross (2005), *New Methods in Celestial Mechanics and Mission Design*, Bulletin of the American Mathematical Society, Volume 43 (1), 49.

propulsion technologies are still far from overcoming this issue. In the Expanse universe the *Deus ex machina* moment is applied and the introduction of a propulsion engine called Epstein Drive,[15] which overcomes this issue is presented. Nevertheless, there is still the need for calculations of gravitational influences on trajectories of spacecreafts.[16]

Recent research has found out that these gravitational influences form what some authors call an interplanetary transportation network.[17] This network is fluid and dynamic, depending on relative position of celestial objects and as Shane Ross observes, space crafts can "jump from lane to lane on the interplanetary highway in such a way that they can travel vast distances using practically no fuel[18]". In a sense this reminds us of Mahan`s observations regarding sea lanes of trade[19] as well as choke points in areas of Lagrange points[20] where two "interplanetary transportation lanes" meet as well as Dolmans argument regarding Hohmann`s transfer orbits.[21]

### 2.3. Effects of space environment on physiology

Observation of physical space is also very important from the perspective of its effects on human physiology with the most noticeable effect being the difference in the gravity pull. There is no consensus regarding the potential effects of living in a different gravity well only certain assumptions. In the Expanse universe since Moon, Mars, Asteroid Belt and Jovian moons are colonized these effects are noticeable and play a significant role. Also to this we must add that because of military, merchant, transportation and other space crafts, we must focus our attention on the solutions regarding artificial gravity within space crafts.

With the differences in gravity between celestial object colonized in the Expanse universe and human life present on these celestial objects the effect on human body is paid much attention in the book series. Overpopulation on Earth caused people to find home on another celestial body, like Dolman notices[22], and the argument reminds us of Ratzels description of *lebensraum*. Physiology of people living in the Asteroid Belt[23] with significantly lower gravity than the one on Earth evolved, as stated in the book, "long, thin, unbelievable

[15]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 11.
[16]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 20.
[17] Shane D. Ross (2006),*The Interplanetary Transport Network*, American Scientist 94 (3), 230.
[18] Shane D. Ross (2006), *The Interplanetary Transport Network*, American Scientist 94 (3), 230.
[19]See A. T. Mahan, *The Influence of Sea Power Upon History*, (New York: Little, Brown and Company, 1890).
[20] Shane D. Ross, *The Interplanetary Transport Network*, American Scientist 94 (3) (2006), 231 and 232.
[21] Everett C. Dolman (1999) *Geostrategy in the space age: An astropolitical analysis*, Journal of Strategic Studies, 22:2-3, 95-96.
[22] Everett C. Dolman (1999) *Geostrategy in the space age: An astropolitical analysis*, Journal of Strategic Studies, 22:2-3, 92-93.
[23]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 22, 24 and 170.

bones[24]", "thin as pencils[25]" and "too tall to be considered a child from Earth[26]". In order to have and sustain strong muscles and bone mass, another *Deus ex machina* moment is introduced in the form of pharmaceutical cocktails.[27] On the other side the same effect is manifested on Martians where they are described as thin compared to people from Earth but built more solidly than people from the Belt.[28] This "geographical determinism" can be correlated with ideas by several philosophers of Ancient Greece that stated the predominant impotence of geographical factors on human body and psyche.[29] The consequence of difference in physiology is manifested in the new form of racism[30] on all sides as well as the introduction of torturing with gravity.

Similarly to thisthe long exposure to outer space travel can be just as destructive to the human body. In the Expanse universe, an interesting concept of artificial gravity in spacecrafts is presented. Unlike popular concepts of using Centripetal force for creating artificial gravity, in the Expanse universe, the gravitational force equivalent is generated by the thrust of its propulsion engines.[31] The space craft constantly accelerates and by doing so mimics the gravitational force. When the space craft is on the halfway point it reverses its position and the propulsion engines act as breaks whereas also by breaking they mimic gravity.

## 3. Diplomatic-Military Field

Questions regarding colonization of outer space always carry with them the connotation of sovereignty. If a country A sets up a habitat or even a base on a celestial body X does it then mean that this habitat or a base belongs to the country A? According to Article 2 of the Outer Space Treaty no country can claim sovereignty over a celestial body[32] but Article 1 and Article 3 state that Moon and other celestial bodies are free for use for all states.[33]Therefore, celestial objects are everybody's and nobody's at the same time. *Per se* and on our current level of technological development this isn`t such a huge issue even if some country sets up a base on the Moon or some celestial body but colonizing, therefore creating a society, must

[24]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 15.
[25]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 33.
[26]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 42.
[27]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 42.
[28]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 33.
[29]According to: ZoranKilibarda, OsnoviGeopolitike, (Beograd: Službeniglasnik. 2008), 28-29.
[30]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 64.
[31]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 151-152.
[32]http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html accessed on 26.12.2016.
[33]http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html accessed on 26.12.2016.

take into account issues like law and order and enforcement of it, an attribute of sovereignty. But, primarily because we observe these issues through realist perspective, the Outer Space Treaty, as well as other treaties, is of little importance and power relations are essential.

This chapter will observe two important issues regarding diplomacy and military in the reality of the Expanse universe both concerning the notion and the difficulties of implications stated above. First, we will observe actors in this interplanetary arena through the prism of sovereignty and military power. And second, we will focus on the issue regarding Earth´s dominance over other colonized celestial bodies through the prism of colonialism.

With the stated limitations of physical space highlighted in the previous chapter, the development of actors in the interplanetary arena followed a path influenced by limitations of distance and mobility. The first sentence of the first chapter of the book says: "one hundred and fifty years ago, when parochial disputes led Earth and Mars on the edge of war, the Belt was a distant horizon of immense mineral wealth which was unavailable.[34]" The very next sentence talks about the development of the drive mentioned in the previous chapter. The quoted sentence shows us two things: first, mentioning Earth and Mars being on the brink of war, it shows us that the two celestial bodies act as individual actors in the interplanetary arena; and second, that they separated long before future colonization.

### 3.1. Actors in the interplanetary arena

Although we mentioned Earth and Mars in the previous chapter, it is important to stress from the beginning that they are not the only actors in the interplanetary arena of the Expanse universe. On the other hand they are the closest actors inside that universe to resemble sovereign states of the world of today. Besides them the third actor in this arena is the *Outer Planets Alliance* which is the movement for aiming at the establishment of the third "sovereign" actor in the realm of the Asteroid Belt, Jovian moons, Saturn`s moons as well as Uranus` moons.

As previously stated in the quotation from the book, one hundred and fifty years before the timeframe of the universe we observe that Earth and Mars were on the brink of war. It is somewhat natural that the first human colony outside the Earth space was to be on Mars, but as previously stated, they separated before inventing the drive that "gave" humans the Solar System. Limitations of mobility lead to the inability of Earth to control Mars on the one side

[34]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 11.

and the wish of Mars to be independent shows us that in the Expanse universe Mars is self-sufficient. Regarding political systems of those celestial bodies both have governments on the celestial body level whereas on Earth (and the Moon as well) it is the United Nations[35] and on Mars it is Martian Congressional Republic[36]. Regarding the celestial bodies claimed by the Outer Planets Alliance, it is nominally governed by the United Nations whose rule is enforced by private companies like *Star Helix Security, Protogen* and *Carnage Por la Mahina*[37] due to the physical limitations of space and the expense of that endeavour that cannot be overcome by the regular United Nation forces.

Although there are basically three players in the interplanetary arena of the Expanse universe, only the United Nations and Martian Congressional Republic can be seen as fully sovereign actors whereas the Outer Planets Alliance strives to become one. This reality somewhat reminds us of a Cold War order with two superpowers competing against each another and a collective of other celestial bodies being influenced by their power play. In this comparison the Outer Planets Alliance could be interpreted as located between a Non-Aligned Movement and an anti-colonial movement striving for achieving sovereignty.

Regarding military power of those actors, although more populous and economically stronger, the United Nations are not qualitatively superior to the Martian Congressional Republic.[38] This factor is explained through the perspective of geographic determinism where rough conditions of living on Mars act as a catalyst which pushed Martians into a faster technological development.Unlike the previous two actors the Asteroid Belt doesn`t have any central government and therefore no navy of its own. In the events following the destruction of a Martian spacecraft, the Belters were accused and hostilities broke out between those two actors with Mars "maintaining order".[39] Although the Outer Planets Alliance doesn`t have a navy that doesn`t mean that they couldn`t retaliate, as stated in the book, "we can tie chemical rocket on several hundred rock the size of a twin bed and shower Martian dome cities with Armageddon`s rain[40]". This shows us that in the future of colonized Solar System; relatively small rocks in space are just as dangerous as missiles. Also, this kind of "weapons" must take

[35]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 181.
[36]*Ibid*
[37]For an example Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 24. Or Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 44.
[38]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 112.
[39]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 201.
[40]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 187.

into account the limitations of physical space namely the influence of gravity of other celestial bodies in order to be efficient.

### 3.2. Neo-colonialism

In the usage of the term "world colony" we can find different connotations that are diametrically opposite one from another. Therefore we must separate the meanings of the words colonization and colonialism. Undoubtedly, colonization happened in the world of the Expanse universe where people from Earth went to other celestial bodies in order to establish their societies there. Their dependency on Earth and recourses originating from Earth is existent in the early days of colonization but after they achieve full self-sufficiency is that the period when colonization turns to colonialism?

According to Dolman, the recourses of the Solar System vast amounts of raw materials that could spark a neo-industrial age[41] but also, by his own statement the Solar System can become a new Lebensraum for Earth`s ever growing population which we already discussed above. In this contrast exploitation of the natural recources of other, non-Earth, celestial bodies that has a negative impact on the lives of future colonists of those celestial bodies can be an indicator of colonization turned colonialism. It is precisely because of this that we classified the Outer Planets Alliance as an anti-colonial movement. Their fight is namely driven by the desire to break free from United Nations governance which they think as being colonial.[42]

Therefore if the mankind ever becomes able to break the limitations of the physical space and able to utilize vast recourses of the celestial bodies of the Solar System and to colonize those bodies, the Expanse universe provides us with a glimpse of how that might manifest in the relations between people living on Earth and those on celestial bodies. Self-sufficiency of those bodies in regard to the harsh environment is perhaps the biggest indicator when relations of mutual interest become relations of dominance of one side over another. And continual relations of dominance of one side over another can evolve into a conflict between the two sides, one trying to sustain dominance and one trying to achieve independence and self-government. Although these questions are heavily influenced by the socio-economic factors, in their core they are political and diplomatic primarily because of the notion of self-governance and relations between terrestrial "overlords" and other celestial bodies´ subjects.

[41] Everett C. Dolman (1999) *Geostrategy in the space age: An astropolitical analysis*, Journal of Strategic Studies, 22:2-3, 93.
[42] This is implicitly stated on:Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 106.

## 4. Socio-Economic Field

The outer space with its vast raw material potential could become a catalyst in the rise of our economy which will in turn affect society as a whole. Those raw materials, some of whom are scarce and even barely existent on Earth (like He-3), will greatly contribute to Earth`s industrial capabilities and will enable us/humankind to produce different kinds of products that we are not able to produce nowadays because of the scarcity of certain raw materials. On the other side, physical limitations that affect the price of those recourses will focus much attention, at least at first, to the materials whose price is large on today`s market. If we jump several steps and reach a level of development existent in the Expanse universe we will see another angle of the socio-economic picture that economic utilization of space will create.

Although not mentioned explicitly, we can assume, through the aspects of colonialism mentioned before, that raw materials are very important for the economy of the United Nations and therefore they strive to sustain their control over the Belt and Jovian moons despite the Outer Planets Alliance`s resistance. In turn, we will focus on two different aspects. First, we will focus upon recourses that are extremely valuable in the Expanse universe but in the world of today we don`t need to think much about them. And second, we will focus on how exploitation of outer space from the early days of this activity affected the accumulation of wealth.

### 4.1. The most valuable recourses in Outer Space

Even though we mentioned that the economic utilization of outer space will begin in order to acquire resources that are rare or non-existent on Earth, the reality of the Expanse universe puts value on the recourses that are on Earth abundant and free. Those resources are breathable air and water. Since other celestial bodies do not have the amounts of air and water needed to sustain their population and the need for those recourses is evidently extremely high, air and water are the most valuable resource of the Expanse universe. The ability to extrapolate air from water makes water a crucial resource that is needed.

When we observe the colonized worlds of the Expanse universe, we see some that do not have a problem with water storages, if we take as true currently existing assumptions and theories. For example, Mars and Europa probably will not have a problem regarding this issue, but Eros for an example would.[43] If we connect the statement of water as the most

[43]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 64.

valuable recourse in Outer Space and its scarcity we can see the level of dependence form Earth and the inability of self-sustainability.

This demand caused the formation of companies dealing with the gathering of frozen water and delivering it to the celestial bodies of the Asteroid Belt and the Jovian Moons. The book notably mentions the demand for water by stating: "No matter how you look at it, the number of inhabitants was huge and they needed a lot of water[44]". Regarding the exact amount of ice from just one ice hauler, the book states that it had "over one million tons of ice[45]". Although this number seem impressive, the destruction of just one ice hauler, as depicted in the book, caused major riots in the belt,[46] primarily because of their fear that the lack of water will destabilise their ecosystem.[47]

Even though the raw materials of outer space will be extremely important and beneficial for the economy in general, the importance of water will cause ice hauling to become a major and important branch of economy with deep social implications. In this reality we are somewhat reminded of Malthus's predictions where societies lacking water are faced with a Malthusian trap of a sort, being heavily dependent on the ability to "produce" water in an environment of ever growing population whose precise number is unknown.[48]

### 4.2. Deepening of inequality

If we observe the economic utilization of outer space from today's perspective, even if we eliminate technological obstacles, the great income upon the completion of one job is preceded by great expenses of implementing the job itself as well as the time to complete the job. Thus, only a selected group of companies will be able to start the future exploitation of outer space`s natural recourses. When we combine that with the immense profit a company can gain from that endeavour, companies that are already the strongest will even more solidify their position whereas other companies will not be able to compete with them. On the other hand, with this mass influx of wealth and monopolisation of the market share, owners of those companies will become even richer. From a Marxist perspective exploitation of recourses for outer space will create an even stronger and more influential class of capitalists which will, because of their wealth, be able to restrain politicians from bringing decisions that are not in their favour.

[44]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 14.
[45]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 19.
[46]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 65-72.
[47]Džejms S. A. Kori, Buđenjenemani, (Beograd: Laguna, 2012), 64.
[48]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 14.

The relationship between politicians and major companies are explained in the best way when stating that a certain artificial station is the safest place in the Solar System because they "finance campaigns of both politicians from Earth and Mars in amounts that big that (…) if someone attacks us (them), half of UN assembly and entire Martian Congress will want to destroy them[49]". In a sense the main antagonists of the Expanse universe in the beginning are private companies who through the influence over the politicians as well as through the financial capabilities are able to act almost as an independent actor in the interplanetary arena.

The main antagonistic company in the first book of the Expanse universe is *Mao-Kwikowski Mercantile* which "wasn't one of the top ten corporations in the Belt but was for sure in the top fifty[50]". Although not even the strongest company in the Belt alone it was powerful enough to, at least partially, influence events in the entire Solar System. This shows us that the future of space exploitation can have deep effects in the sense of accumulation of capital, monopolization of the market, as well as even bigger influences on the policy makers that will undoubtedly be in the favour of those companies.

## 5. Conclusion

The lack of literature and thought that are related to the issues of space colonization is not unusual or surprising given the fact that the reality of the Expanse universe is still far from our grasp. We are still several decades away, if not a century and more, from even starting to consider these issues and to see the effects they have on human society and relations between different human societies. The complexities of achieving human exploitation and habitation of different celestial objects in our Solar System in technological terms alone is the main reason for the futuristic aspect of this paper. But no one could negate that it will, at least to a certain extent, affect our society. This affects like the entirety of society will also affect our understanding of geopolitics, and this paper is our attempt to understand these effects on geopolitics. By analysing the astropolitical reality of the, fictional, Expanse universe we aimed at unravelling of these questions or at least at getting a glimpse into what the answers will be like and through Dussouy's analysis we observed the astropolitical reality of the Expanse universe in order to answer our research questions.

The answer to the question whether or not outer space environment will change our understanding of geopolitics has both sides of the coin. On the one side, the dynamics of

[49]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 183.
[50]Džejms S. A. Kori, *Buđenjenemani*, (Beograd: Laguna, 2012), 27.

celestial body`s constant mobility has a profound change on one of the basic assumptions when thinking of spatial distribution and interaction of sovereign actors in the international arena. Also, vast distances and limitations of speed will not enable instantaneous communications that modern humans are used to. But on the other side, which is connected to the second research question, we can find correlations between classical geopolitical theories and the reality of the Expanse universe. Celestial mechanics and the Interplanetary Transportation Network reminds us of Mahan`s thoughts or Mackinder`s thoughts on mobility. Geopolitical, or rather astropolitical, considerations will undoubtedly suffer some changes but that doesn`t mean that some classical geopolitical thoughts cannot help in understanding the reality of outer space.

On the other side, regarding the third research question, outer space environment will affect human beings to a much larger extent than on a scale captured by geopolitical considerations. Effects of gravity on human physiology will probably lead to newer forms of racism; life on other celestial bodies will lead to the struggle for basic recourses needed for life and the economic benefits of exploitation of outer space will have severe effects on human beings. If we follow historical trends, astropolitics in the age of human habitation of the Solar System (if it ever comes), will be affected by geopolitics in the same manor that to the terrestrial world in which we live in. These questions will be more frequently raised as our technology develops and it will be more frequently discussed, brought up and become more important. Thus, the ideas and vision of the authors of the Expanse universe serve as a potential model that allow us to observe and discuss these issues in order to understand how outer space will affect the international (?) relations in the future.

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## 3. Russian-Kazakh Relations and Baikonur Future

Ksenia Galtsova

### Introduction

The name Baikonur is widely known all over the world. If you ask anyone what is it famous for, you can be sure that you will hear that it is the town from where the first flight to space was launched. However, not everyone knows that it is only the name but not the location, as people tend to think. During the Cold war era, the USSR did not want to share exact location of the space facility. In reality, spaceport is roughly 300km away from Baikonur; it is close by town called Tyuratam.

Undoubtedly, the Russian Federation faced many issues, which came after the dissolution of the USSR. They all varied in accordance to their importance. For instance, secessionist regions or economic decline were the biggest issues at that time. Nevertheless, the most important cosmodrome, which the USSR had, fell under Kazakhstan's sovereignty. The problem that could not have been even imagined back in the Soviet Union became an issue for Russia later on. However, fortunately for Russia, Kazakhstan had no aspirations and possibilities to use this facility. Therefore, a lease contract was signed by the two newly emerged states in 1994.

In this research paper, I am going to cover the significance of Baikonur Cosmodrome, relations between Russia and Kazakhstan regarding the lease agreement and cooperation in the space launch facility. The main goal of this work is to make a prediction of what would happen when the lease agreement ends? Will Russia initiate a new agreement in spite of the fact that at this point the construction of cosmodrome Vostochny will be finished? Will Kazakhstan lease cosmodrome to any other actor? Or better to ask if any other actor will show interest in it? In order to analyze Russia-Kazakhstan relations, I will refer to two schools of thought, namely space nationalism and technological determinism, presented by James Moltz.

### Background

Baikonur cosmodrome was one of the most significant projects for the Soviet Union as well as the whole world. Moscow decided to build it in Kazakhstan due to, first, its proximity to the Equator, where the surface of the Earth has higher rotation speed, and second, the fact that it is surrounded by plains and non-inhabited areas. So, it met the technical requirements usually assigned to the launching facilities. However, it is worth to point out that Moscow did not choose more southern location inside Uzbekistan or Turkmenistan, which was the most

southern point of the USSR assuming that this decision was based on security issues. Stationing cosmodrome in Kazakhstan gives a buffer zone from Afghanistan and Iran and allows to keep research and nuclear activity in secret.[51] In general, it is strategically wise to have it almost in the middle of Kazakhstan, far from other borders. Thus, possible confrontation with the neighboring countries would not bring implications for launches. For example, Israel has hostile relations with its neighbors, so it has no other option but to launch due west. It is more energy consumptive to launch westwards because Earth rotates eastwards, thus rockets launched eastwards receive an extra boost from Earth's rotation speed. Therefore, launching eastwards saves fuel and time. Second of all, if the communist party could have thought of a possible dissolution, it would have never been constructed outside of the territory of Russia. Of course, there was no room for such thoughts. Nevertheless, Kazakhstan terrain is more suitable for launching. Hence, Kazakh steppe was an optimal option.

The station was used for the first time in 1957. Following launches such as Luna 1 or the first manned and orbital flight by Yuri Gagarin, Baikonur became world history and national heritage site of the USSR and, nowadays, Russia. Since technically Russia as USSR "capital" state built the complex, it was and still is very crucial to keep the station for use of the Russian Space Agency. Moreover, Baikonur is an integral part of history towards which Russian population has very strong national pride.

Baikonur cosmodrome is the busiest space launch center in the world. In addition, it attracts space actors such as Roscosmos, NASA, the European Space Agency, and other states and private companies that work in this field.[52] Thus, Baikonur gives a room for cooperation in space exploration for all interested actors, while some of them are rivals in the international politics. Undoubtedly, every agency pursues its own goals, but nevertheless, better a lean peace than a fat victory. Joint work is beneficial for every actor and most of all for the humanity.

With the collapse of the USSR, the first problem arose as the cosmodrome was also used as nuclear weapon facility. The USSR had its nuclear weapons in three republics besides Russia itself; it was Kazakhstan, Belarus, and Ukraine.[53] With no doubts, it was a complicated agenda since those three nuclear republics felt unprotected and threaten to some extent by the fact that they had to give up nuclear facilities and shift them to Russia. Another problem arose with the West's concern over the issue. According to the Treaty on the Non-Proliferation of

[51] Yelena Zabortseva, *Russia's Relations with Kazakhstan: Rethinking Ex-Soviet Transitions in the Emerging World System*, 1st ed. (New York, New York: Routledge, 2016).
[52]"Baikonur – Most used spaceport in 2013," KAZinform, January 20, 2013, accessed December 28, 2016.
[53]Ibid., 65.

Nuclear Weapons, Kazakhstan, only Russia is allowed to have nuclear weapons, but not the other post-Soviet Republics. Thus, the US was anxious that Kazakhstan, Belarus or Ukraine would not agree to move nuclear facility to Russia. However, after long negotiations, all nuclear facilities were shifted to Russia. Nevertheless, there was implications for Kazakhstan, Ukraine, and Belarus since they insisted on military barter in order to increase their security and military capabilities.

Nuclear facility in Kazakhstan was located in Baikonur, moreover it was the second location of the Soviet biological weapons program.[54]Also Kazakhstan acquired the largest testing facility, Semipalatinsk (where 465 nuclear tests were conducted during the Soviet era)[55], in the world. Negotiations over the future of the nuclear facility lasted four years, by the end both states agreed on the removal of nuclear weaponry. However, one crucial issue remained unresolved, namely who would have jurisdiction over the facility meanwhile. Finally, Treaty on Military Cooperation between the Republic of Kazakhstan and the Russian Federation was achieved and signed on March 28, 1994.[56] One of the articles of the Agreement stated the unresolved question. It was decided that the President of Russia has a right to decide on the need to use nuclear weapon but needs an approval of the President of Kazakhstan. The time period during which these weapons must be withdrawn from Kazakhstan was set for three years. In addition, Kazakhstan received guarantees from Russia, the US, and the UK:

> *...the promise of UN Security Council action to furnish assistance to Kazakhstan as a non-nuclear weapon state if it were to face an act of aggression or a threat of aggression in which nuclear weapons were used; and economic assistance from Washington and the Western European countries.*[57]

At the same time negotiations over the use of Baikonur for space exploration purpose were in progress. In 1994, Kazakhstan and Russia concluded Baikonur Lease Agreement. In accordance with it, Russia was obliged to provide Kazakhstan with a supplementary weapon such as SU-27 fighters, several MIG-29s, SU-25 ground-attack aircraft and three S-300 P air defense missile units.[58] Additionally, Moscow and Astana signed an agreement on military and technological cooperation. This agreement gave benefits to Kazakhstan. It stated that

[54]Ibid., 61.
[55] Ibid.
[56]Ibid., 62.
[57]Ibid., 64.
[58]Ibid.,65.

Russia provides joint use of naval forces in the Caspian Sea since Kazakhstan had no navy or trained sailors. Moreover, Russia organized military trainings for the Kazakhs and later on, opened a military training school to Kazakh service members.[59]

As it was mentioned above, the most crucial and complicated issue was the nuclear facilities. Space launch agenda was on the second place, however, as soon as Kazakhstan realized that it was militarily dependent on Russia, negotiations on this question went smoothly. The agreement on Baikonur was reached. The annual rent price was set for an amount of $115 million. Moscow pays it through different help to Kazakhstan, for instance infrastructure repairs or training of the Kazakh army in Russian military facilities.[60] At first, lease was to last due to 2014. In 2004, it was extended until 2050 with the same annual price plus $50 million for maintenance of facilities.[61]

## Russia-Kazakhstan Relations

Moscow and Astana are partners in many spheres, and with no doubts, it could be said that these relations are interdependent. In many questions, it seems that Russia and Kazakhstan are on the same wave. However, when it comes to Baikonur, there is always some disagreement or tension between these states which quickly change into cooperation mode and then again back to strains.

Russia launches 20-25 rockets a year from Baikonur. It is also a good strem of revenue for Moscow: the cosmodrome is used by NASA to send American astronauts to orbit (every "passenger" costs $70,7 million; it is planned to increase up to $81,7 million in 2017), space tourism, or joint projects with Europe and the USA.[62] But on the other hand, it demands investments in sustaining facilities and rent cost, which all together are very high. In addition, Roscosmos develops and sustains the space complex, which they might lose after the agreement ends. Moreover, in this case, leak of information and technologies might occur as well. Thus, it possesses a serious risk to the Russian side. Nevertheless, both sides benefit from the Baikonur agreement so far, even though sometimes they face difficulties in a joint work.

If we take a look at the USSR at its peak in space exploration, one may notice that the Soviets preferred space nationalism policy over cooperation. The whole space program was

[59] Ibid.
[60] Ibid., 64.
[61] "Kazakhstan Finally Ratifies Baikonur Rental Deal With Russia," Kazakhstan Finally Ratifies Baikonur Rental Deal With Russia, April 12, 2010, accessed January 29, 2017.
[62] Rich Smith, "Should NASA Pay Russia $82 Million for Astronaut Rides?," The Motley Fool, February 03, 2016, accessed January 01, 2017.

influenced by a rivalry with the USA. Thus, there was no possibility to cooperate and at that point of time, the Soviets did not need any help from any side. Unfortunately for the Soviets, slow decline and following dissolution of the country brought former leading space state to the last positions in this sphere. That became the point, when they were willing to switch from nationalism to cooperation, which is defined by technological determinism school. Its core idea is that cost and complexity of a space exploration would bring different actors together. Thus, new technologies will be reached quicker and at cheaper cost.[63] It can be illustrated with US-Russia joint MIR work in the beginning of 1990s or Russia-Kazakhstan cooperation in the case of the Baikonur space launch station. According to the agreement, Roscosmos provides professors to universities in Kazakhstan, so they could participate in space programs together with Russians by working at Baikonur with them. Let us imagine a scenario, where Baikonur was an integral part of the Russian Federation after the collapse of the USSR, it could be hardly imagined that any possible cooperation with Kazakhstan, which did not have a space agency at that time would take place. Or, for instance, if the USSR or Russia was able to meet space expenses on its own it would not shift to joint missions with other agencies. Therefore, we could conclude that only certain benefits can force actors to work together.

**Prohibition of Launches**

Even though Russia has the lease agreement signed, Kazakhstan has a room to protect its interests in this temporary "Russian territory" and promotes its interests. The year 2012 was intense for Russia-Kazakhstan cooperation. The roots of this lay in the existence of a drop zone for rocket debris created after launch.[64] The problem was that after lift-off the rocket debris such as rocket boosters fall on the Kazakh soil, namely Oktubinsk and Kustanai regions, which are not under the lease. Therefore, demand from Astana was to amend the agreement. Astana and Moscow negotiated a deal, according to which drop zone would cost another $460 million to Russia.[65]

Due to the debris issue, Kazakhstan blocked three scheduled satellite launches in May 2012. Among those postponed flights are the launches of the European meteorological

[63]James Clay.Moltz, The politics of space security: strategic restraint and the pursuit of national interests (Stanford, CA: Stanford Security Studies, 2008), 24, 31.
[64]"Kazakhstan blocks Russian satellite launches: reports," Phys.org - News and Articles on Science and Technology, May 28, 2012, accessed December 28, 2016.

[65] "The world's largest space center," Regions and facilities of Baikonur, accessed February 07, 2017.

satellite MetOp-B, the launch of Belorussian, Canadian, German and two Russian satellites and the launch of the Russian satellite Resurs-P.[66]

In January 2013, both sides agreed on adding new drop-off zones and limiting number of Proton launches to 12 from previous 14.[67] However, for instance, MetOp-B was launched in September 2012 from Baikonur without new agreement in force. I assume that prohibition of launches could be a tool for intimidating Russia. It could be seen that Kazakhstan was successful in pursuing its interests, while at the same time it allowed MetOp-B launch before signing of new drop-off agreement took place.

**Baiterek JV**

On January 9, 2004, Putin and Nazyrbayev signed an agreement, which not only extended lease term, but also paved a way to Russian-Kazakh joint venture - Baiterek. This program is intended to develop Angara-5 rocket and build a pad for launching it in Baikonur. In this deal, Kazakhstan is taken as an equal partner; and both parties arranged a payment schedule. The main goal was to quit using Proton rockets and replace them with Angara-5 by 2015. Angara-5 can reach orbits with inclination 48 degrees toward the Equator; with such trajectory it will be possible to deliver maximum cargo to orbits.[68] Angara rocket is capable of delivering up to forty tons of cargo to space. Moreover, Proton rockets´ launches cause environmental pollution, thus start of using Angara-5 rockets will improve ecological situation in the region.

Initially, there was also another modification plan for launch pads at Baikonur. In addition to start exploiting Angara, it was agreed to design a pad for Zenit carrier rockets that are more environmentally friendly than Proton. Zenit rockets are produced at Yuzhmash in Ukraine. By 2013, two Zenit rockets were purchased by Roscosmos. However, following the crisis in Russian-Ukrainian relations in 2014, Moscow announced that it would cease cooperation with Yuzhmash factory. One year later, Yuzhmash manufacturer and Roscosmos made a deal, where they agreed that Ukrainian specialists would come to Baikonur and assist a Zenit launch.[69] It resulted in a successful liftoff and delivering weather satellite into orbit in December 2015.

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[66]"Kazakhstan blocks Russian satellite launches: reports," Phys.org - News and Articles on Science and Technology, May 28, 2012, accessed December 28, 2016.
[67] "Kazakhstan approves Russia's schedule of space vehicles launches from Baikonur for 2013 - Industry, Infrastructure | Tengrinews," Tengrinews.kz, January 15, 2013, accessed February 07.
[68]Zak Anatoly, "Site 250 in Baikonur: Energia test stand," Site 250 in Baikonur: Energia test stand, October 24, 2015, accessed December 28, 2016.
[69]"Ukraine to Help Russia Launch Space Rockets Despite Ban on Defense Cooperation," The Moscow Times - News, Business, Culture & Events, April 6, 2015, accessed December 28, 2016.

First difficulties in Baiterek project occurred in 2010, when Russia delayed payments, by 2012 there were still contradictions regarding delays in the project. Kazakhstan was concerned with Russia's will to participate and convinced that Russia would build a pad for Angara-5 rocket in Vostochny. Musabayev, commented on it:

*without the interest of the Russian side in creation of Baiterek space rocket complex its further implementation will become inappropriate for Kazakhstan, as ground complex for Angara rocket carrier created at Vostochny cosmodrome will be the direct competitor of Baiterek ground space rocket complex.*[70]

Thus, at some point the project was cancelled, due to unexpectedly high cost and Russian refusal to fund it. Another reason was the Ukrainian crisis that was followed by sanctions on Russia by many prominent world powers. Consequently, it almost destroyed Russian currency and affected economy big time, so there was simply not enough funding for the space field. Nevertheless, Roscosmos was seeking the way to keep its technologies only for its own use without sharing them with any partner. Kazakhstan's prohibition of few Roscosmos launches from Baikonur in 2004 and 2012 also added fuel to the controversy, thus becoming another source of contradiction in Baiterek project.

By the end, in 2015, after long postponement, joint construction of Baitrek was resumed. Here again, we can back up Russian move by technological determinism school: it turned back to cooperation only when it needed it. To point out, Kazakhstan follows almost the same logic. It might have its own concerns and discontent with Moscow's policy; however, it does not play the leading role in the decision-making since Kazakhstan comprehends that without help from the Russian side, any space project will not be realized, at least nowadays.

**Environmental Issue**

It is known that Russia is slowly losing its position as a leading space country due to various reasons such as relatively poor financing, brain drain, corruption and so on. Since December 2010 Russia experienced five Proton-rocket launch failures.[71] The question here is not why and how these happened, but how did Kazakhstan react to them? The head of Kazakhstan National Space Agency, Musabayev said that it did not concern Kazakhstan because the rocket crashed on the territory, which is rented to Russia, and this issue was a

[70]Catherine Putz, "Kazakh-Russian Space Cooperation Muddles Forward," The Diplomat, July 15, 2016, accessed December 01, 2016.
[71]Tariq Malik, "Russian Rocket Explodes, Crashes in Failed Launch," Space.com, July 2, 2013, accessed December 28, 2016.

concern of Roscosmos only.[72] Notwithstanding, it did and does concern Kazakhstan for following reasons. First, one the last rockets that crashed in July 2013 burnt 5ha of steppe.[73] Second, every crash spills radioactive/toxic fuel and other dangerous chemicals over Kazakhstan soil that is a "territory of Russia" in accordance with the Baikonur agreement. However, after all, this is the Kazakhstan land, which the state will get back at some point. Hence, I would assume that Kazakh citizens want to see it as little polluted as possible.

According to the environmental report of 2014, ecological condition in Baikonur City and its surrounding regions are terrifying. Undoubtedly, to some extent it is impossible to escape this issue while operating spaceports. Nevertheless, launch facilities must not be located close to civilian areas as is the case of Baikonur. Besides radioactive pollution caused by rocket launch failures, there is a permanent pollution from other kinds of activity at the facility. The fuel that is widely used by Roscosmos is highly toxic.[74] With every test head of the rocket separates and falls on the ground. Consequently, the fuel is carried by wind, water, animals, cars, people and so on. Thus, all raw materials that are manufactured there are very dangerous and cause cancer, birth of children with abnormalities and many other serious diseases.

To summarize, one may conclude that complete abandonment of Baikonur spaceport would be very desirable among the local population. However, we have to admit this is not likely to happen. Therefore, the best what Kazakhs could hope for is following all environmental norms and laws should be followed by the Russian side and strictly controlled from the side of Kazakhstan's government. In addition, nearby towns could be abandoned and their population supplemented with new homes in safe areas. But here a question arises - who will invest in it?

**Kazakhstan's benefit**

I have covered Kazakhstan-Russia relations in terms of Baikonur lease and the complications of this arrangment above. From that research, one may point out that it is not always beneficial for Kazcosmos and Kazakhstan itself. Thus, there is a new question to be investigated - what are the benefits from Baikonur lease agreement besides good income for Kazakhstan? If Russia withdraws from the agreement, Kazcosmos will face many problems.

[72]Alexander Vorotilov, "КогдаРоссияуйдет," Www.forbes.kz, August 01, 2013, accessed December 01, 2016.
[73]Ibid.
[74]Aydana Usentaeva, "Ecological problems of Baikonur," Prezi.com, December 24, 2014, accessed December 14, 2016.

First of all, 80% of specialists working at Baikonur are Russians.[75] Thus, if they leave, then there will be no one to sustain the cosmodrome, continue research and so on. Hoping that specialists from other countries will have interest in working at Baikonur is risky and Kazakhstan cannot rely on it. The most crucial issue here is that Kazakhstan cannot afford or does not want to cover expenses of the spaceport, facilities such as airport, railways and roads around it, and the Baikonur city itself. To illustrate it, Russia spends €29 million annually only on maintaining the Baikonur city.[76] Moreover, by keeping relations with Moscow, Astana receives an opportunity to educate future Kazakh space specialists at Russian universities and to employ them within Baikonur cosmodrome. Therefore, on the long run it will raise Kazakhstani capabilities and prestige at this field.

Analyzing current relations under the lease, it can be noticed that often Russia does not take Kazakhstan as an equal partner but as a little brother. Unfortunately for Astana, it cannot influence or change Moscow´s decision by intimidation, since Roscosmos has an alternative to Baikonur in Vostochny or Plesetsk. With no doubt those two spaceports are not as frequently used as Baikonur is, however, this will change in the near future.

**Russia's benefit**

With no doubts, Russia was more interested in Baikonur after the dissolution of the USSR than it is nowadays. At the beginning of the 1990s, Russian Space Agency was left with no cosmodrome developed for civilian purposes. Therefore, signing a lease agreement with Kazakhstan was crucial. In addition, at that time there were other actors that had no launch facilities and might have shown interest in acquiring Baikonur through a lease agreement, for example China or Japan.

Now situation has shifted towards Russia dominating in decision-making regarding Baikonur because Astana comprehends that it is more beneficial for them than for Moscow since now there is an alternative cosmodrome built - Vostochny.

Nevertheless, even though present situation is in favor of Russia, this does not mean that Moscow will pursue harsh policy regarding the use of the cosmodrome. The reason is that the construction of Vostochny spaceport has turned to be more time consuming than it was planned, due to different reasons but mainly corruption. Thus, it is impossible to replace the

[75] Vadim Volovoy, "Ближнийкосмос: спорвокругБайконура," ИноСМИ.Ru, March 16, 2015, accessed December 14, 2016.
[76] Ibid.

current Russian space program that is in progress at Baikonur to Vostochny now since the new cosmodrome is not completely finished yet. Moreover, so far, Vostochny has only one launching pad for Souyz family rockets. So, if Russia wants to start using Anagara rockets for manned flights, then Vostochny does not meet technical requirements for it so far. Lastly, terrain around Vostochny is not, as NASA engineer concludes, compatible with the Soyuz's emergency landing protocols.[77]

One of the most determining reasons to extend the agreement is that Vostochny is intended for civilian flights only, while Baikonur combines both purposes - military and civilian for manned and unmanned flights. Even though it was claimed that Baikonur would not be used for testing missiles, there is still a possibility to do so. Another important factor is international prestige. Russia enjoys joint work with many other agencies in Baikonur, so if Moscow loses the cosmodrome to another actor, it will probably lose most of its partners that might give a preference to cooperate with another actor that will get control over the spaceport. In addition, it is a good source of revenue for Roscosmos. Baikonur is the busiest launch facility that is trouble-proof and well-known around the globe. Annually it generates almost half of Russian budget on space exploration. Therefore, Russia is still dependent on Kazakhstan but to a lesser extent.

According to Asif Siddiqi, an expert on the Russian space program:

*The place [Baikonur] is gigantic. It has tons and tons of pads, tracking stations, control stations. What's going to happen to all that? I think that's something the [Russian] security folks will want to get involved in. That's probably the only bargaining chip the Kazakhs have.*[78]

**Possible Future of Baikonur after 2050**

As was mentioned above, Baikonur lease agreement ends in 2050, so what will happen to Baikonur? The Kazakh authorities believe that if Russia decides to leave, then the western private companies will fight for the facility. However, equipment that Russia will "lose" there in case of termination of the agreement is proprietary, so it can be used only with Russian rockets. Therefore, if any other agency decides to lease the pad, it will need to customize it, and this requires big investment and a long time period. Anyhow, let us imagine possible scenarios by analyzing agencies that might have interest in Baikonur.

[77]David Trilling, "With Russia Building New Spaceport, Will It Need Kazakhstan's Baikonur?," EurasiaNet.org, November 14, 2014, , accessed December 28, 2016.
[78]Ibid.

## Russia

So far, Russia has been the only tenant Kazakhstan has had, and I personally believe that nothing will change between in relations between those two states. Roscosmos has plenty of reasons to stay that have been discussed above in the previous section. Therefore, I think that Moscow and Astana will extend the agreement.

## Japan

The National Space Development Agencyhas been developing since the 1970s. Since 2003, it has known as Japan Aerospace Exploration Agency (JAXA). However, the main constraint to Japanese space ambitions is a lack of territory that would perfectly meet the launch site requirements.[79] Currently JAXA actively uses two spaceports - Tanegashima and Uchinoura. Tanegashima is located on an island and Uchinoura is located in prefecture Kagoshima. Both facilities are very small compared to other agencies' ones, and especially taking Japan's ambitions in space exploration into account. However, this is not the essential issue. The problem is that launches are permitted only 45 days in January-February and another 45 days in August, due to fish industry. Thus, Japan is highly dependent on the USA and Russia that assist in sending Japan's astronauts to the ISS.[80]

Therefore, one may conclude that Japan might be interested in signing a lease agreement with Kazakhstan if Russia decides to withdraw. It is worth to point out that Japan has tight relations with the US that could possibly grow into a joint work at Baikonur, if such an agreement would ever take place.

## Israel

The Israel Space Agency (ISA) is one of the few agencies that is capable of producing and launching its own/indigenous satellites. There is only one spaceport in Israel; it is located in Palmachim Air Force Base.[81] The main challenge for Israel's launch facility is its hostile relations with neighboring countries and heavily populated areas of the Middle East. Due to those factors, Israel has no other choice but to launch its rockets westward over the Mediterranean Sea.

[79]Presentation, *Japan's Space Program,* at class by Liis Peets.
[80] Ibid.
[81]Presentation, *Space Program of Israel*, at class by Linda Kuznecova.

Thus, considering this constraint, I would claim that Israel could be potential partner of Kazakhstan and lease Baikonur. The ISA is rapidly developing and it needs a room to grow further. In addition, I believe Israel is not satisfied that it has to rely on other actors such as Russia, the USA, and Canada and so on for its launches.

## Virgin Galactic and SpaceX

Talking about private actors, I suppose Virgin Galactic or SpaceX are the prominent companies that might conclude a lease agreement with Kazakhstan. Currently they share one pad - Spaceport America -, which is located in New Mexico.[82] I assume that the decision whether to lease Baikonur or not depends on time. So, for instance, if Russia withdraws anytime soon, then Virgin Galactic or SpaceX might show interest in Baikonur. However, if Russia stays until the lease agreement finishes, by that time, I am certain that both private agencies will have their own spaceports built.

To summarize this part, I would like to point out the main challenge all-possible future actors will meet in case of leasing Baikonur is equipment. Everything that is located at the cosmodrome nowadays was developed by Russian engineers for Roscosmos's program. Thus, a coming agency will have to customize it or start buying needed spare parts, rockets and so on from Russia. This requires time and big investment.

### Conclusion

I have conducted a research on Russian-Kazakh relations regarding Baikonur lease agreement. Thus, one may see that this relationship has its ups and downs and that Kazakhstan tries to protect its interests as we could see in prohibition of launches or in Baiterek cooperation. Nevertheless, Kazakhstan has not succeeded in it so far. I assume that whenever conflict of interests occurs, Astana tries to defend its position but Moscow does not big make concessions. Nevertheless, Kazakhstan manages to defend its interests, while at the same time, it allows Russia to continue with its policy. I think that it is the case because Kazakhstan does benefit a lot from the agreement: financing, revenue, developing of Kazcosmos, education for Kazakh population at space engineering and science, and so on. In addition Nazyrbayev understands that it is not likely that any other space agency that might lease Baikonur, will assist and develop Kazcosmos as Russia does. Moreover, if Kazakhstan decides to keep it for its own use, I doubt that it will be able to cover expenses of running it

[82]Presentation, *Space Companies,* at class by Dominic Goland.

and it will lack specialists to run the facility. That is why Astana agrees with Moscow. We could see that relations between these two actors can be comprehended through the school of technological determinism. They have turned to cooperation only because they need to.

As I argued above Russia will not leave Baikonur even after the lease expires. Even if it does, it is not very likely that someone else would like to lease the facility. Then, most probably, Kazakhstan will try to sustain and develop it on its own. However, so far Astana alone cannot reach this height. The other option for Astana would be to start cooperation with some other agency in terms of joint missions. But in this case Kazakhstan cannot expect to be treated equally. Probably, it could end up worse and in less equal position than with Russia nowadays. Currently Kazakhstan has only the launch facility to offer to other actors, while it lacks its own technologies, engineers, scientists and finance; moreover, the facility is designed for the Russian program. These are the main reasons why Astana cannot afford to dictate terms. It can project its conditions but only to a certain extent. In addition, most likely possible tenants would prefer to conduct its own research without Kazcosmos participation since it is not needed and undoubtedly, any agency would choose its interests and prestige over cooperation when it is possible. As it was already mentioned, Kazakhstan cannot qualify as an equal partner due to lack of resources. Russia votes for cooperation with Kazcosmos and provides aid because it needs a reliable partner in other areas of international relations. Since it has intense relations with western countries, so Russia must always turn towards support and friendly relations with its post-Soviet countries. However, Moscow keeps a room for promoting its interests while sustaining relations. Therefore, I would conclude that present agreement is optimal for both sides.

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# 4. Small States in Space Environment

Linda Kuznecova

## Introduction and Background information

The outer space environment is a relatively new, unique and critically important domain for the interests of many countries of the world, starting with the Cold War space race between the United States of America and the former Soviet Union in the 1950's. Thanks to emerging world economies and technological advancements, the space environment has become interesting and much more accessible to many other countries besides the two most influential space rivals, and even besides the contemporary great group of countries with advanced space capabilities. Characterized by a wide array of innovative platforms and satellite the systems, outer space is a perspective and progressive economic sphere and a high ground with multiple functions such as observation or reconnaissance, ensuring worldwide communication, command and control, and positioning, navigation, and timing. The microgravity environment of outer space is critical and crucial for important research and specialized production activities that could not be duplicated on the surface Earth, so naturally states with emerging economies are showing serious interest in space exploration and facilitation. Space environment also offers a frontier to explore and inspire and to ensure the survival, advancement, and expansion of the human civilization and its possibilities to progress and strive beyond the planet Earth.

The space sector in respect to science-based missions has been characterized as a monopoly market in which the government of the state in question is the main investor in space related technologies.[83] It can be argued that the military has similar dynamics while the commercial market resembles more an oligopolistic market structure. Finally, there is one more difference between the space market and the general mass market. In the mass market, the product (or technology) is usually operated directly by the end user.[84]

According to a report by the US Space Foundation, regarding the importance of maintaining the US leadership in the space exploration and technology sector, 14 countries, including North Korea, currently operate their own launch vehicles and more than 100 nations have some type of space program.[85] The two most prolific commercial launch vehicles are operated by the European Union (France-based Ariane Space) and Russia (Proton). At least

[83]Szajn- farber& Weigel, 2007; Summerer, 2012

[84] der Veen, E. J. Et. Al. (July-December 2012) *Disruptive space technologies*. International Journal of Space Technology Management and Innovation, 2(2), 24-39, available at: https://www.researchgate.net/publication/259899671_Disruptive_Space_Technologies

[85] The US Space foundation briefing. Ensuring U.S. Leadership in Space

four countries are presently investing billions of dollars in the development of new launch systems. The USA is beginning to gradually increase its share of the market of commercial satellite launches for the first time in over a decade. Governmental policies that promote open competition and innovation should be prioritized to maintain this positive trend, because like in general economics a large variety of actors and stakeholders, but mission assurance for national security launches remains paramount. Currently, only China and Russia are capable of launching humans into space. The USA now depends upon Russia to launch American astronauts to the International Space Station (ISS). Between 2012 and 2017, NASA will pay Russia over $2.1 billion to ferry astronauts to and from the ISS. Fully funding NASA's commercial crew program to restore USA capability for independent access to the ISS and low Earth orbit remains paramount.[86] The space related institutions and governmental institutions of the USA are concerned for the status of the US efforts in space exploration and rightfully so – in the 21st century the outer space is not only reserved for hegemonic powers and actors of the bipolar balance of power from the Cold War era. As it is apparent that in the global environment there are the powerful states that are financially, technologically and scientifically more capable of pursuing space interests and they are not hesitant to use these opportunities. Some small states are emerging and attaining their place in the space market alongside the major players, proving that sometime in the distant future the space environment could be potentially opened for everyone.

To better understand the overall structure, concepts and purpose of this research paper, the author emphasizes a few important and distinct key words and terms and they are the following: **Key words: Small powers/small states; participation in space economics; space interests; economic bandwagoning.**

The aim of this research essay is to find empirical answers for these particularly set research questions that will guide and set direction for the study.

**Research questions:**

1) **How are the smaller states able to participate in the space activity?**

Based on empirical overview on multiple minor cases of small states that have shown their interest in space or space related activities. After the selection of the small states in question, it will be possible to find out the various ways for them to be a part of the space exploration activities, keeping in mind the limitations and obstacles.

2) **Is it possible to achieve their space ambitions without "bandwagoning"?**

[86]The US Space foundation briefing. Ensuring U.S. Leadership in Space

This question is directed towards the assumption that it's not entirely possible for a small state with very limited financial and knowledge-based resources to fully participate in space activities without any cooperation or economic bandwagoning to bigger players in the arena.

**3) Space programme for space programme's sake?**

This last question is much more philosophical in the sense of the main reasons behind the will of the small states against all odds, budgetary and other restrictions and limitations to pursue a space programme or include space activities in their national development plans and policies.

**Theorethical framework of the research paper**

**Selection of States in question**

In order to proceed with the empirical study, it is crucial to define the term "small state" according to the aim and main concept of the research study. A small state can be characterized by 4 main attributes of the concept of the state: the size of the territory, the size of population, the size of the gross domestic product (hereinafter – GDP) (or other socio-economic indicators) and military power (from the size of the army to government spending on military activities). For the purposes of this particular essay, as it is connected with space interests and space economics, because of the high costs of space-related activities, the economic factor would be the dominant, followed by population, as the number of inhabitants and the structure of the society heavily influence all economic factors of the state.

The World Bank characterizes small states by a small population, limited human capital, and a confined land area. They face labour market and capacity constraints: the limited number of workers and production capacity is often inadequate for local production or export at scale, and few in-country education facilities means a dearth of adequate specialization.[87]

The most commonly applied criterion has been population size, on the basis that this provides an indication of the stock of human capital and a rough approximation of the size of the domestic market.[88] This criterion has been supplemented at times by land area and by total income referring to the amount GDP. However, no widely accepted and precise definition of small states has yet been developed. In the absence of an accepted definition, many recent studies have referred to existing literature and definitions to justify the choice of criteria applied. The academic literature has generally been lacking in quantitative analysis or

[87] The World Bank official website, *Small states – overview*, available at: http://www.worldbank.org/en/country/smallstates/overview
[88] Ibid.

reasoned arguments for the applied cut-off levels, lacking the distinction of particular aspects of the small states and failing to come to specific common term.

According to the GDP factor, the selected small states in question have their GDP below 100 million USD. The Commonwealth member states are mostly corresponding to this characteristic and therefore susceptible to the study. The Commonwealth countries by region are the following: Africa - Botswana, Cameroon, Ghana, Kenya, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, Seychelles, Sierra Leone, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia; Asia – Bangladesh, Brunei Darussalam, India, Malaysia, Pakistan, Singapore, Sri Lanka; Carribean and the Americas - Antigua and Barbuda, The Bahamas, Barbados, Belize, Canada, Dominica, Grenada, Guyana, Jamaica, Saint Lucia, St Kitts and Nevis, St. Vincent and The Grenadines, Trinidad and Tobago; Europe - Cyprus, Malta, United Kingdom; Pacific – Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu.[89] With exception of Australia, United Kingdom and Canada for their much higher GDP and India for its emerging economic power.

According to the International Monetary Fund, the small states (excluding the previously mentioned Commonwealth states and the smaller European Union member states) are Sudan, Angola, Ukraine, Sri Lanka, Syria, Dominican Republic, Ethiopia, Guatemala, Myanmar, Uzbekistan, Oman, Costa Rica, Panama, Uruguay, Lebanon, Belarus, Tanzania, Macau, Tunisia, Democratic Republic of the Congo, Jordan, Libya, Serbia, Turkmenistan, Bolivia, Azerbaijan, Côte d'Ivoire, Bahrain, Yemen, Paraguay, El Salvador, Uganda, Trinidad and Tobago, Nepal, Honduras, Zambia, Cyprus, Papua New Guinea, Iceland, Cambodia, Afghanistan, Bosnia and Herzegovina, Senegal, Gabon, Georgia, Zimbabwe, Mali, Jamaica, Laos, Nicaragua, Albania, Mozambique, Burkina Faso, Mauritius, Equatorial Guinea, Mongolia, Armenia, Macedonia, Chad, Namibia, Madagascar, Benin, Republic of Congo, Haiti, Niger, Guinea, Moldova, Tajikistan, Kosovo, Kyrgyzstan, and at least 40 other less developed countries with a relatively low GDP.[90]

The main specific factor for the selection of the states is, in fact, the existence of a space programme or defined national space interests or actual practical experience in space exploration and utilization such as successfully launched satellites currently circulating the

[89] The Commonwealth official website, *Member countries*, available at: http://thecommonwealth.org/member-countries

[90] International Monetary Fund (2016). World Economic Outlook Database.

Earth, which can be a precise indicator of a states' willingness and capability to actually pursue their interests in the space sector.

According to the US-based Space Foundation, by 2015, at least 70 different government space agencies are in existence; 13 of those have launch capability. 52 nations (including 19 member states of the European Space Agency ESA) have space interests - government, commercial or academic organizations were operating one or more satellites, or planning to launch a satellite in the next few years. Having a national space programme doesn't necessarily mean that the states are actually operating a satellite or any other technology in outer space at this moment, but it definitely indicates their interest and future prospect of attaining some level of presence in the space market.

The existing national space agencies (excluding the international agencies) are: **Belarus Space Agency, Central American Association for Aeronautics and Space (Costa Rica), Aeronautics and Space Research and Diffusion Center (Urugway**), Mexican Space Agency, Algerian Space Agency, Austrian Space Agency, **Azerbaijan National Aerospace Agency, Bahrain's National Space Science Agency,** Belgian Institute for Space Aeronomy, Bolivarian Agency for Space Activities (Venezuela),Brazilian Space Agency, UK Space Agency, **Bolivian Space Agency, Bulgarian Space Agency**, Canadian Space Agency, China National Space Administration, Colombian Space Commission, Centre for Remote Imaging, Sensing and Processing (Singapore), Commonwealth Scientific and Industrial Research Organisation (Australia), **Croatian Space Agency**, Ministry of Transport of the Czech Republic - Space Technologies and Satellite Systems Department, Geo-Informatics and Space Technology Development Agency (Thailand), German Aerospace Center, Hungarian Space Office**,** Indian Space Research Organisation, Spanish Technical Aerospace Institute, **Iranian Space Agency** alongside space agencies and institutes of Argentina, Chile, Colombia, Denmark, Egypt, Indonesia, **Kazakhstan**, **Laos**, **Luxembourg, Malaysia**, the Netherlands, Norway, **Pakistan**, Portugal, Romania, Saudi Arabia, South Africa, Sweden, Thailand, Turkey, **Venezuela, Vietnam**, Israel, Italy, Japan, North Korea, South Korea, **Lithuania, Estonia**, USA, France, Peru, Mongolia, Tunisia, **Uzbekistan, Ukraine**, Nigeria, **Morocco**, Russian Federation, **Sri Lanka**, **Bangladesh**, Poland**,** South Africa, Saudi Arabia, Sweden, Switzerland, **Turkmenistan,** United Arab Emirates. The agencies in bold are corresponding with the previous GDP indicator and therefore chosen to get specific attention for the purposes of this particular study.

**Economic bandwagoning**

In the political sense, bandwagoning occurs when a state chooses to align with the strongest or the most threatening state it confronts. It is essentially a form of appeasement: by bandwagoning, threatened states seek to convince the dominant power to leave them alone. According to some theorists bandwagoning behavior has been historically rare and has generally been confined to very weak and isolated states. In theirs opinion the main reason for this is simple: the decisions to bandwagon requires the weaker side to put its fate in the hands of more powerful state whom it suspects (usually with good reason) of harboring hostile intentions. By bandwagoning with the main source of danger, a threatened state accepts greater vulnerability in the hope that the dominant power's appetites are sated or diverted.[91]

According to the Business dictionary, bandwagoning, which also includes the economic version of bandwagoning, can be explained as a psychological theory where individuals will do something primarily because other individuals are doing it, regardless of their own beliefs, which they may ignore or override to the extent of almost completely changing them, comparing to the initial ideas and iniatives. This effect has the capability to produce wide implications, but is most often seen in the areas of politics as well as in consumer behaviour. For instance, in politics, individuals may vote for a candidate because he or she is the most popular and the voters want to be considered as part of the majority. It can also be seen during bull markets and the growth of asset bubbles. It can also be referred to as herd mentality.[92] This term can be used in the situation of space exploration and other space-related activities in the sense of the notion of small states thriving to develop some sort of a space programme, regardless of the actual need for it or the available financial and scientific/technological resources that the states are willing to contribute to the cause. Utilisation and exploitation, and possibly, even space colonisation, of the outer space environment is definitely the future of humankind development, so from one perspective it is quite rational for even the small states to be interested on getting their own segment of the space market, but on the other hand, some of the currently existing attempts on developing legitimate and feasible space programmes does not show much promise on their own, raising the question, whether it could possibly be achieved more successfully within the frameworks of international associations and agencies, where the contributions (which in the normative

[91] Walt, M. S. (2009), "*Alliances in a Unipolar World*" World Politics, Vol. 61, No.1: 86-120, p. 100-108
[92]The Business Dictionary, *Bandwagon effect*, available at:
http://www.businessdictionary.com/definition/bandwagon-effect.html

sense should be equal or at least proportional to the state capacity of doing so) pooled together could be beneficial for a bigger part of the population.

Economic bandwagoning goes hand in hand with another term – the free rider effect or the free rider problem, which can be explained as a phenomenon which usually takes place when those actors who benefit from resources, goods, or services do not pay for them or contribute only the least possible amount of financial resources, which results in an under-provision of those goods, services or benefits.[93] The free rider problem is the question of how to limit free riding and its negative effects in these situations. The free rider problem may occur when property rights are not clearly defined and imposed.[94]

Free riding is considered an economic problem when it leads to the non-production or under-production of a public goods, a situation known as a Pareto inefficiency, or when free riding leads to the excessive use of a common property resource. Providing public goods fairly is difficult because the group leadership does not have the required information.[95] When people are asked how much they value a particular public good, with that value measured in terms of how much money they would be willing to pay, the most common tendency is to underestimate the contribution willing to be made.[96] As it goes for such commonly state institution-provided services and goods as national defence, metropolitan police presence, flood control systems, access to clean water, sanitation infrastructure, libraries and public broadcasting services, in a broader sense space activity could be considered a public good, referring to the open and non-colonised nature of space, so it is almost inevitable that this economic problem will surface and the main contributors will suffer the most, therefore decreasing the willingness to continue the deep cooperation and resource pooling and sharing.

## Small states in outer space

### Space interests of states

Space interests of states can be determined as willingness and initiative for participation in space-related activities such as space shuttle and satellite launches and utilisation, space exploration, space mining and extraction of resources, usage of the outer

[93]Baumol, William (1952). Welfare Economics and the Theory of the State. Cambridge, MA: Harvard University Press.
[94] Pasour, Jr., E. C. *"The Free Rider as a Basis for Government Intervention".* Libertarian Studies.
[95] Savigny, H. (2016) *Free riding. Social science. Encyclopedia Brittanica.* Available at: https://www.britannica.com/topic/free-riding
[96] Pettinger, T. (2011) Free Rider Problem. Available at: http://www.economicshelp.org/blog/1626/economics/free-rider-problem/

space for multiple functions such as photo-reconnaissance, observation and surveillance on a military scale, launched satellites that are looking toward Earth, provide information about environmental features like clouds, oceans, land and ice and monitoring the changes of their statuses in order to make accurate predictions. They also measure gases in the atmosphere, such as ozone and carbon dioxide, and the amount of energy that Earth absorbs and emits. And satellites monitor wildfires, volcanoes and their smoke. All this information helps scientists predict weather and climate. The information also helps public official health track of diseases and famine; it helps farmers know what crops to plant; and it helps emergency workers respond to natural disasters. has increasingly widened to more governments and commercial interests. Since the 1990s, space exploration and space-related technologies in the global sphere have been perceived as a commonplace for all humankind. So naturally states are seeking all the possible ways to become a part of the space environment and economics.

**The presence of small states in space – case of the satellites**

According to N2Y0.com (the web site which is dedicated to real time satellite tracking and satellite sighting predictions) currently Algeria, Egypt, Kazakhstan, Nigeria, own and operate 5 satellites, Azerbaijan, Bolivia, Ecuador, Estonia, Iraq, Iran, Laos, Peru, operate 1 satellite, Belarus, Chile, Greece, Republic of Philippines and Venezuelao wn and operate 2, Czech Republic, Luxembourg own and operate 4, Indonesia 15, Malaysia operates 7 satellites independently.[97]

The international space agencies, of which the majority of the aforementioned states are members of, however, own and operate much more satellites and show bigger space-related capacity, for example like ESA (and therefore the majority of all the EU member states) operates 73 satellites, European Telecommunications Satellite Organization (ETSO) operates 50, North Atlantic Treaty Organization (NATO) operates 8 satellites, Commonwealth Of Independent States (former USSR) (therefore non directly affecting most of the CIS states that were considered a small state in this study) operate a record breaking 1493 different satellites and many other organisations are advancing their common efforts towards space exploration and utilisation.[98]

Some of the rest currently active and operational satellites provide the grounds for discovery of interesting unusual partnerships, for example, China and Brazil together operate

[97] N2YO, Satellites by countries and organizations, available at: http://www.n2yo.com/satellites/?c=&t=country
[98] Ibid.

3 satellites that carries primary imaging cameras that help monitor and observe environmental changes, agriculture and water pollution etc.; the two great historical and contemporary powers of EU France and Germany operate 2 geostationary satellites SYMPHONIE 1 and SYMPHONIE 2 outside of the ESA framework; Singapore and Taiwan operates 2 satellites (ST 1 and ST 2) by ST 2 Satellite Ventures, which is a joint company formed by Singapore Telecommunications Ltd. and Chunghwa Telecom Co. of Taiwan. ST 2 was manufactured by Mitsubishi Electric Corp. of Japan, the first satellite built by Mitsubishi for the international commercial market;[99] USA and Brazil joined forces in order to operate one satellite ESTRELA DU SOL-TELSTAR14, which provides direct-to-home video and internet to Brazil and North America and last but not least, the most unusual pairing currently in space is Turkmenistan and Monaco who cooperated in launching and operating TURKMENALEM52E/MONACOSAT which is a communications satellite, the 1st satellite of Turkmenistan. The 52 degrees east slot is registered to Monaco by the International Telecommunications Union but because of cooperation and joint effort, the operating location and Monaco's role in the mission help give the satellite its unusual name. The satellite will reach users across Central Asia, Europe and Africa, with a coverage zone spanning more than 90 countries.[100]

**Europe and the European Union in space**

The European Union deserves special attention in this subject, not only because it includes 28 independent countries, therefore uniting and pooling resources together for the greater good of its citizens, but also it also helped forming the basis for a multinational space agency whose mission is to shape the development of Europe's space capability. The agency brings together the means and both financial and human capital to pursue space exploration and activities, therefore promoting advancement in technology and innovation, bringing the outer space closer to countries which otherwise would not be able to compete in the space economics as equal players.

The European Space Agency (hereinafter ESA) is an international organisation with 22 Member States (Official members are Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, The Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, the United

[99] N2YO, ST 2, available at: http://www.n2yo.com/satellite/?s=37606
[100] N2YO, TURKMENALEM52E/MONACOSAT, available at: http://www.n2yo.com/satellite/?s=40617

Kingdom; Slovenia is an Associate member, Bulgaria, Cyprus, Lithuania, Malta, Latvia and Slovakia have Cooperation Agreements with ESA and on their path to become full members in the future)[101] their own words is Europe's gateway to space.[102] ESA by coordinating the financial and intellectual resources of its members can undertake programmes and activities far beyond their own capabilities.[103]

Governmental spending on all of the space programs and space-related activities in the European Union comes from three sources: activities directed by the European Union (EU) and executed by the European Commission (EC); activities by the European Space Agency (ESA); and activities carried out by the European countries independent of both the EU and ESA. The EC focuses its resources on three primary areas: space research, security research and European satellite navigation programs. ESA is the primary space actor in Europe, with 19 member states obligated to contribute a set amount, based on the gross domestic product, for core programs. ESA has focused its efforts on upgrading and developing its launch vehicles, Earth observation activities and space science missions. Voluntary contributions from countries can also be made to other programs, such as human spaceflight, research or telecommunications.[104]

Some countries have decided to pursue their interests in a more specific and direct way, showing national initiative and willingness to achieve some level of greatness by doing so outside the general framework of the ESA, such as France, Germany, Italy, Luxembourg and United Kingdom.

The most intriguing and non-precedential example of the EU member state family could be Luxembourg which is currently the first European country to set out a formal legal framework ensuring that private operators working in space can be confident about their rights to keep the resources they extract, including valuable resources from asteroids. Such a legal framework will be worked out in full consideration of international law. The Grand-Duchy of Luxembourg aims to participate with other nations in all relevant forms of activity in order to agree on a mutually beneficial international framework.[105] Openness, experience sharing and availability of information for all interested nations are expected to be the main

[101]European Space Agency, official webpage, *About us. New member states*, available at: http://www.esa.int/About_Us/Welcome_to_ESA/New_Member_States
[102]European Space Agency, official webpage, *About us*, available at http://www.esa.int/About_Us/Welcome_to_ESA/What_is_ESA
[103] Ibid.
[104]European Space Agency, official webpage, *About us*, available at http://www.esa.int/About_Us/Welcome_to_ESA/What_is_ESA
[105]Space Resources official website. Luxembourg Iniative, available at: http://www.spaceresources.public.lu/en/index.html#initiative

idea behind the creation of the judicial framework, so that the world population could be the general beneficiary, but also to excel Luxembourg as one of the small states that are able to specialize and become able to make a substantial and, most importantly, independent name for themselves in the space environment, making way for future development.

The new law for the extraction of space resources will be based on the findings of a study on legal and regulatory aspects for the utilization of space resources conducted by the University of Luxembourg – in cooperation with renowned space law experts in the fields of international space law and policy. The comprehensive legislation is expected to be effective in 2017 and will guarantee operators the right to resources harvested in the outer space in accordance with the international law. Space resource-dedicated licenses will be issued under the new law, and government supervision of the activities of operators and regulating their rights and obligations will be ensured by Luxembourg in accordance with the Outer Space Treaty.[106]

**Other international agencies with space interest**

Based on the relative success of the ESA common space projects, other regions of the world have come forward with proposals of pooling resources and know-how, therefore deepening the internal cooperation within the regions, creating a welcoming environment for joint greatness in space activity.

Future common space agencies based on regionalism are either in the proposal stage or on the path to actual formation and development are the following:

- **Pan-Arab Space Agency (PASA);**

There is a diversity of satellite and space-related activity in the MENA region -several countries already have space agencies including Algeria, Egypt, Morocco and Tunisia, and neighbouring Iran. Yemen had plans for space exploration until a religious fatwa (i.e., a religious edict) nixed the Yemeni Space Agency (YASA).[107] Neighbouring Somalia put up a "Space Program" website but admitted they are too poor to establish it. Their website even states that "Somalia is one of the world's poorest countries, and its space program is not

[106]Space Resources official website. Luxembourg Iniative, Final Press release. http://www.spaceresources.public.lu/en/press-corner/press/2016_06_03-SpaceResources_lu_Press-Release_final.pdf

[107] Panarabian Enquirer (February 20, 2014) *Yemen forced to scrap space programme after religious edict*, available at: http://www.panarabiaenquirer.com/wordpress/yemen-forced-to-scrap-space-programme-after-religious-edict/

surprisingly, nonexistent. Not only does it not have an agency, but also no infrastructure in which one would arise."[108] In late 2013, Egypt, announced the proposal of a national space agency whose focus would be on sustainable development and the environment (as opposed to space exploration. In early 2014, Syria also announced its intention to establish a Syrian Space Agency as a "public body of a scientific research nature."[109]

The UAE, which is the country calling for the Pan-Arab Space Agency (as well as an Arab Space Research Agency), is also the country whose space-related investments and developments have been exponential. In 2006, the UAE established the Emirates Institution for Advanced Science and Technology (EIAST) as a Dubai government entity to promote scientific innovation, emphasizing space technology and sustainable development.[110] The possibility this agency becoming a real and successful thing is quite likely, if only UAE and Iran as the most promising and advanced countries take the lead of pursuing the development of a common agency. However, the grave differences between the countries in the region in economic development and other socio-economic and even political factors would not allow all of the countries to participate equally, thus opening the gates for a typical economic freeriding problem, which especially in the case of Somalia is inevitably bound to happen.

- **African Space Agency (AfriSpace);**

On September 12, 2012, the president of Sudan Omar al-Bashir Bashir in a ministerial conference announced a call for the need for and importance of a cooperative common African space agency: "I'm calling for the biggest project, an African space agency. AfriSpace would facilitate "cooperation among African states in space research and technology and their space applications."[111]As the idea behind it is quite noble and lucrative in itself, the needed steps for it to become substantial haven't yet been reached. African Space Policy (ASP) which includes the data from the feasibility study and the goals and objectives of the proposed Agency, has been created, however, the adoption of the ASP and development of a strategy although well received by those who understand the benefits of an African Space Programme has no significance in itself unless steps are taken to implement it.[112] While the ASP is ready, it may not necessarily be time to set up a structure such as a regional organization till the issue of funding and sustainability is addressed and dealt with by

[108]Space program of Somalia, official website, available at:http://www.hudsonfla.com/asomalia.htm
[109]Shaykhoun, S. (August 26, 2014) *Pan-Arab Space Agency: Pipe Dream or Real Possibility?* http://www.satellitetoday.com/publications/2014/08/26/pan-arab-space-agency-pipe-dream-or-real-possibility/
[110]Ibid.
[111] Fisher, M. Space safety magazine (September 12, 2012)*AfriSpace: "The Biggest Project",* available at: http://www.spacesafetymagazine.com/space-on-earth/national-space-programs/afrispace-the-biggest-project/
[112] Aganaba-Jeanty, T.(February 10, 2016) *Is An African Space Agency Viable?* http://www.iafrikan.com/2016/02/10/does-an-african-space-policy-make-an-african-space-agency-viable/

all of the stakeholders and potential member states working together for the ultimate goal. This international space agency is not yet viable and based on actual solid ground, although if this agency will become a full establishment in the future, it could be an important milestone for the small state presence in space, meaning that much more countries could obtain access to the space market, if not directly owning satellites or obtaining launch abilities, then at least doing so through the channels of international cooperation, which could open up new opportunities for technological and scientific research and innovation for these African Union members: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Sudan, Malawi, Mozambique, Uganda, Zimbabwe and many other countries. One of the main problems in this case could also be the financial factor and economic bandwagoning, because most of the African Union countries are in the last positions of the Monetary Funds' list of GDP sizes.

- **South American Space Agency;**

This effort of states joining forces to reach outer space relatively independently is currently only in the proposal stage of development. The South American region is still at the early stages of its space technology development, but has considerable potential to offer in terms of material, specialized personal, launch sites and energy. Scientists and governmental institutions are continuing and facilitating the regions' deeper internal integration such as the South American Space Agency proposal.[113] This potential regional space agency has good potential to achieve viability, however from all three of the mentioned possible future international space agencies, this particular one lacks strong leadership behind the main idea. Although Brazil has the most developed space program in the region, if Brazil will not take the leadership in the region, perhaps alongside Argentina and/or Chile, the space agency will remain only in utopian visions. Currently the top priority of the Brazilian space program is the use of satellites to monitor the Amazon rainforest in the global fight against climate change. Brazil's 2008 National Defense Strategy report discusses the use of space for its national security needs. This new strategy also indicates that more resources will be used for space exploration in the future. Brazil not only wants to develop greater launch capacity, but it also wants to build satellites for earth observation and enhanced communication capacity. These efforts reflect a broader geopolitical agenda to advance its role on the international stage.[114]

[113]Sarli, B., Cabero, M., Lopez, A., Cardoso, J. Jimenez, D. et al. (2015) *SOUTH AMERICAN SPACE ERA*. 66th International Astronautical Congress - IAC 2015, Oct 2015, Jerusalem, Israel. pp.11-12.
[114]Forman, J. M. (2009) *Toward the Heavens. Latin America's Emerging Space Programs. A Report of the CSIS Americas Program and Space Initiatives*, available at: https://isulibrary.isunet.edu/opac/doc_num.php?explnum_id=296

States in the region like Bolivia, Peru, Uruguay, Venezuela could be successful contributors to the agency, and the current presence of South American states in space, at least according to the operated satellites and state budgets, is a great and fruitful base for the origins of joint efforts, but in this particular situation the leaders and the powerful states will be the ones to call the shots, and will be the main decision-makers referring to whether or not give up sovereignty and the prestige of being an independent space explorer.

**Conclusions**

This study was aimed at the situation in current space economy, which is mainly dominated with 13 countries with launch capabilities, relatively large budgets and government spending on space related activities, only 3 of them having human flight launch capabilities, leaving the rest of the world prone to seek other ways how to utilise outer space as the economic platform of the future that is, in theory, available to everyone.

Most existing space agencies and the space programmes of the small and economically challenged states are designed to get satellites into Earth's orbit for the sake of better communications, mapping, weather observation or military capacity at home. The civilian aspect of the usage of satellites plays a significant role in everyday life for the whole population and therefore must be embraced and developed further, using every chance possible.

Most of the small states selected for this study with space interests have their own governmental organizations or associations including private tech companies and research centers with focus on space activity, hence the selection of the states where corresponding to the indicator which shows an actual interest and some practical activity in the space environment. The selected countries all have certain "space programs", but most of them have not built rockets that can reach the Earth's orbit yet, making their space programmes close to useless in a general sense.

Smaller states will seek out "bandwagoning" opportunities by developing niche specializations that enable direct collaboration with the space efforts of larger powers, while also serving broader domestic goals of economic development and national prestige. If the said small state is not capable of specializing or providing any kind of unique service, technology, support or know-how, then the small state is bound to adopt a bandwagoning and freeriding behaviour just because of the insufficient funds or lack of maintaining the space activities which even today is too expensive for most countries to actually keep up.

The European Space Agency with its 19 official members and various partners is by far the most successful model for small states to participate in space economics – it all comes down to national spending on space activity and scientific research. The best example is Luxembourg with its ground breaking initiative on space mining right legal framework, thus aspiring to become a space mining-related activity hub in the heart of Europe.

Future of the small space programmes is still relatively unknown – complete mergers, giving up sovereignty for the common good or adopting a more aggressive individualistic approach, also meaning finding new funding sources when it comes to space exploration and utilisation, current situation suggests joining forces and pooling and sharing resources is much more feasible for the small states.

Regarding the last research question, which was more philosophical: "Space programme for space programme's sake?" after the in-depth study it is apparent that this is really the case for some small states. Examples include states like Lithuania, which has a space agency, but doesn't own or operate any satellites. Fellow Baltic country Estonia, on the other hand, operates one satellite independently outside ESA). Middle Baltic state Latvia has not included space interests in a feasible space policy or programme format, but has become one of the ESA cooperative states, thus showing that the space interests and the bandwagoning effect in the sense of getting closer to outer space by any means necessary, thinking about prospects way too far in the future is taking place nowadays. The deviant case of Somalia, which started a space programme and an official website for it, just to announce that the government of Somalia is not capable of actually pursuing and maintaining space-related institutions or policies due to the poor state of their economy, which was not a surprise for the rest of the world, shows that having space interests or at least showing that the state might be a willing and supporting partner in an international agency is crucial to maintain (or even reinvent) the states' image, therefore securing their position for future challenges connected with space environment and economics.

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# 5. Leadership in Space: A Discussion of Space Development and Geopolitics

Byongho Lee

## Introduction

Geopolitics, the study of domestic and international politics with respect to the geography of a nation, is currently entering a new era with the incorporation of outer space.[115] In the past, a state would exercise geographical power by utilizing advantages such as high ground and sea power. In 1904, Sir Halford Mackinder used his Heartland Theory to place emphasis on the importance of the "Heartland" or Eastern Europe, stating that whoever controlled this area would control the world.[116] Another geopolitical theorist, Alexander Seversky, made the statement that air power would overtake land power.[117] Now, the world has entered two new areas of geopolitics: cyberspace and outer space. Both possess the ability to be militarized and used to create weapons of mass destruction, but also have the capacity to bring nations together into a global cosmopolitan environment. The countries that control these areas will have access to a plethora of invaluable resources. For this paper, we will focus solely on outer space.

As the discussion of space inhabitation and development continues to grow, the possibility of international conflict increases as well. James Clay Moltz defends this notion by detailing four schools of thought that countries adopt when faced with a geopolitical affair. First, Moltz defines Space Nationalism, a school of thought that possesses a militaristic drive and focuses on obtaining significant advantages for a country. This school of thought is inherently different than Global Institutionalism, which emphasizes cooperation as the more favorable outcome for the future as geographical borders and national identities begin to dissolve. The two other schools of thought, Social Interactionism and Technological Determinism complete Moltz's analysis of geopolitics. Each school contributes various strengths that could further the space movement, but also has distinct weaknesses. In order to avoid a massive conflict between countries with different viewpoints, a solution a needed to

[115] "Definition of Geopolitics." *Merriam-Webster*, Merriam-Webster, 2017. Web. 11 Jan 2017
[116]Kearns, Gerard. *Geopolitics and Empire: The Legacy of Halford Mackinder*. Oxford: Oxford UP, 2009. Print.
[117]Chapman, Bert. *Geopolitics: A Guide to the Issues*. Santa Barbara, CA: Praeger, 2011. Print.

promote international cooperation.[118]The solution I present is to establish a space leader or president that will be able to make executive decisions regarding space-related matters. The necessity for this position may not be extremely relevant in this moment in time, however, it will be crucial in the future to have a representative for the entire world. The three central topics that requires the establishment of this space president is with resource distribution, space defense and extra-terrestrial communication. By establishing a space president, the world will be able to pursue a more cooperative approach in regards to space.

**The Proposal**

Before we proceed with the theoretical and practical aspects of establishing an official space leader, we will need to clarify the logistics of the position. The space president will be elected either by the leaders of each country or an international organization such as the U.N. He or she should have an advanced education in the fields of physics, computer science, politics, and astronomy. This ensures that the individual will be competent in any matters regarding space and will be able to navigate the international political landscape. This position would have the power to make executive decisions through a modern constitution that addresses issues with space development. This constitution requires a unanimous agreement between the countries with space programs, which will be difficult to do in modern society considering not every country is a democracy. However, the only way to ensure that this leader possesses the power to implement space legislation and ethics is to receive support from all the countries at the forefront of space. Additionally, there will be an election held every decade or so to prevent terrible leaders from staying in office. Finally, if the individual abuses their power or declares war on Earth, he or she will be removed immediately after put on trial.

**Ideals**

The first question we must ask is: *Who deserves to have control over the minerals and resources found in space?* At this time, no country can confidently make the argument that all of the moon's ores or the orbits belong to them. This is due to the Outer Space Treaty of 1967, preventing any government from claiming space territories such as the moon. This

[118]Moltz, James Clay. *The Politics of Space Security: Strategic Restraint and the Pursuit of National Interests*. Stanford, CA: Stanford Security Studies, 2008. Print. pp. 24-41.

treaty also states that any exploration or use of outer space should be for the benefit of all countries and mankind. With the Outer Space Treaty, the argument can be made that nobody has a claim on the resources found in space and it should be equally distributed.[119] However, countries with superior space capabilities such as the United States, Russia, and China, are at a major advantage because they are able to obtain these resources due to their advanced technology and stable economies.If these countries manage to control or monopolize these celestial resources, it could significantly harm the economies of poorer countries. Instead of encouraging a competitive environment between both countries and private actors, we should aim towards a more cooperative solution of distributing resources.

Therefore, if we implement a space president, he or she would be able to properly distribute any space material to make sure every country has their equal stake in space. This power emphasizes international cooperation through the school of Global Intuitionalism. By equally distributing valuable resources, the entire world benefits equally. This is exponentially better than the alternative where developed countries try to control and monopolize these resources for themselves. The president would also be able to establish clear and distinct space laws regarding the commercialization of these resources. One of the biggest criticisms of the Outer Space Treaty is that it does not reference the commercialization of space material. In modern society, the mass commercialization of a product is extremely important for a country's economy.[120]With the rise of prominent private companies such as SpaceX and Blue Origin, it will be difficult for countries with relatively new space programs to gain access to space materials. The space president would be able to address this issue by updating the Treaty and either forbid the commercialization of space material by one country or private actor or allow the commercialization but impose appropriate restrictions and taxes. It is also important to note that although the Outer Space Treaty prohibits a country from claiming a planetary body, it does not reference individuals claiming these bodies. With the approval of the countries that recognize the global space president, the space president should be able to claim these bodies and once the leader has retired from the position, he or she should pass the rights onto the next leader.

Another issue the space president will address is space defense. *Who has the responsibility to protect the Earth from anything that comes from space?* I believe every

[119] Ali, Yasmin. "Who Owns Outer Space?" *BBC News*. BBC, 25 Sept. 2015. Web. 02 Jan. 2017.
[120]Robert.wickramatunga. "United NationsOffice for Outer Space Affairs." *The Outer Space Treaty*. United Nations Office of Outer Space Affairs, n.d. Web. 02 Jan. 2017.

country and individual has the responsibility of protecting Earth. However, without proper leadership and a centralization of resources, each country will be caught in a power struggle. Primarily focusing on planetary defense and orbital debris, it would be up to the president to monitor significant collision paths and coordinate defend mechanisms. Manmade junk and fragments from Earth have the potential to destroy anything in its path, including spaceships and satellites. As of now, there are more than 12,000 pieces of debris in space. Due to the number of space projects, such as the test of the Chinese 2007 anti-satellite weapon, the number of debris is only increasing. That event alone created over 2,000 piece of space debris and was considered to be the largest debris producing-incident to date. Additionally, the number of debris is expected to increase even without any new launches.[121] One initiative to clean up this debris is the ESA Clean Space Initiative. The ESA has developed disposal methods including the creation of a custom spacecraft to actively remove the debris. With the help of a space leader, the ESA will be able to receive more reliable funding for these types of initiatives because it will be one of the leader's top priorities.[122]

Asteroid deflection and militarization are another aspects of space defense that the leader can address. To prevent asteroids or celestial bodies from colliding with Earth, the world will need to develop more deflection capabilities. One example of the defense projects that the space leader can advocate for is the Asteroid Impact and Deflection Assessment, an international cooperation mission to test technologies that would defend Earth from planetary collisions. The main purpose of this assessment is to demonstrate and research the impact a hazardous object would have if it collided with Earth.[123] These types of simulations and experiments are extremely beneficial for the future of space defense and the space president would need to promote these benefits in order for these organizations to secure funding or be able to perform the simulations himself. If we are able to simulate the outcome of a planetary impact, we can better minimize the damage in the future.[124]

In regards to militarization, we have learned that countries have been testing space weapons such as military satellites and missiles before space programs even existed. In the future, it is likely that space weapons will be used for space warfare. If there is little to no

[121]Scudder, Jillian. "How Do We Clean Up All That Space Debris?" *Forbes*. Forbes Magazine, 06 Jan. 2016. Web. 02 Jan. 2017.
[122]Esa. "E.Deorbit." *European Space Agency*. ESA, 12 Apr. 2016. Web. 02 Jan. 2017.
[123] Gannon, Megan. "Space Scientists Rally Support for 2020 Asteroid-Deflection Mission." *Space.com*. Space.com, 15 Nov. 2016. Web. 02 Jan. 2017.
[124]National Aeronautics. "Asteroid Impact and Deflection Assessment." *NASA*. NASA, 7 July 2016. Web. 02 Jan. 2017.

monitoring of the development of these space weapons, it could result in another arms race or war, parallel to the Cold War. As discussed in class, leading countries such as the U.S., Russia, and China are all developing military space weapons. Russia's 2010 military doctrine emphasized space as an important aspect in their defense strategy. Similarly, China has been testing anti-satellite missiles and nuclear weapons that have the potential to immobilize satellites and cause massive havoc. Because of this, the United States has made it their priority to compete with these countries and "increase readiness across the arena of strategic capabilities: nuclear, space, and cyberspace."[125] In 2002, President George W. Bush created the Nation Missile Defense in order to intercept incoming warheads and protect the United States from a foreign space attack. As these superpowers continue to strengthen their military potential, the possibility of a space war increases. The space president will be able to address this issue by overseeing each country's technological advancements and take necessary action. For example, if one country becomes too competitive and hostile, the space leader can limit their weapon production. On the other hand, if a country's capabilities are not updated and is at risk of annihilation, the president must make sure all nations are protected from nuclear space weapons. Although individuals who believe in space nationalism will protest this level of power from one individual, it would push for more space cooperation instead of instilling a more militaristic drive in countries.

Finally, the last question we must ask is: *What will happen when we come into contact with extra-terrestrial beings? Who will represent not just one country, but the world?* As of now, humans are unaware if there is extra-terrestrial life in our galaxy due to extreme distances and differences in communication and technology. However, that does not guarantee that they won't appear in the future. The Drake equation is one method used to estimate the number of extraterrestrial civilizations that we can possibility communicate with by calculating factors such as the rate of inhabitable stars and the length of time civilizations release detectable signals into space. Despite having no concrete evidence of intelligence life, there is a high probability that they do exist based on this equation.[126] Additionally, space programs across the world are developing new techniques to supplement the Drake equation and determine extra-terrestrial life. One of these is a combination of high-resolution spectroscopy and the Doppler effect in order to create an image of a planet and examine the

[125]Majumdar, Dave, David A. Bell, Anthony Fensom, Dimitri K. Simes, and Paul J. Saunders. "Get Ready, America: Russia and China Have Space Weapons." *The National Interest*. National Interest, 26 Jan. 2016. Web. 02 Jan. 2017.
[126]Howell, Elizabeth. "Drake Equation: Estimating the Odds of Finding E.T." *Space.com*. Space.com, 26 Mar. 2016. Web. 02 Jan. 2017.

atmosphere for signs of life.[127] If these aliens approach Earth, we will need a representative that can communicate or negotiate with them, if necessary. If these aliens are hostile and invade us, we will need to defend ourselves using our nuclear capabilities, but still attempt to communicate with the aliens to find common ground. The space leader will need to balance these two objectives. This theoretical approach utilizes social interactionism because it considers realistic political and military conditions, but works toward cooperation with these extra-terrestrial beings. This is a better solution than a group of people such as the U.N. because one country might have their own separate agenda. If a country makes a private deal with extra-terrestrial beings so that their country would be spared, it could be consequential for the rest of the world. This representative power given to the space president makes it so one individual will have the ability to make a decision that has the common good in mind.

The establishment of a leader has historic precedence. The most well-known example is the United States of America. After colonizing America and declaring independence from Great Britain, the Founding Fathers knew that without strong leadership and a centralization of power, the government would be unable to fund itself and the colonies would be weak. This was largely due to the Articles of Confederation and its ineffectiveness to collect taxes and exercise governmental power. They decided to establish a presidency to strengthen the executive branch of government and bring the colonies together.[128] After his two-term tenure as President, George Washington was able to finance the national government, suppress rebellions, and create precedents such as the cabinet system and a two-term tradition.[129] Many would argue that George Washington and the presidents after him were a benefit to the United States. The dilemma that the United States faced in the late 1700s is similar to the one we currently face. The United States had to unify the colonies in order to create a sustainable and flourishing country. Currently, we have a multitude of developed and developing countries and having a strong leader is one way of unifying these countries. In theory, a system of checks-and-balances would also be appropriate as each country can assess if the space president is abusing his or her power.

[127]Chapman, Bert. *Geopolitics: A Guide to the Issues*. Santa Barbara, CA: Praeger, 2011. Print.
[128]History.com Staff. "Articles of Confederation." *History.com* A&E Television Networks, 2009. Web. 12 Jan.2017
[129]History.com Staff. "George Washing." *History.com* A&E Television Networks, 2009. Web. 12 Jan. 2017

**Criticisms & Counterarguments**

There are several counterarguments and criticisms for this proposal. *Isn't a group of leaders better than one?* Those against this proposal will point to the benefits of having a group of leaders such as the United Nations. The United Nations is a collaborative platform designed to discuss international affairs and to ensure that every country is represented. However, the United Nations is limited it its capabilities due to values of maintaining international peace, friendly relations, and promoting social progress.[130] These are values we hope to instill in the new president, but for the greater good of humanity, there must be someone who can take decisive action. The U.N. is currently unable to prevent or manage large conflicts such as the Bangladesh genocide in 1971, which resulted in the death of millions of Bengali citizens.[131] Additionally, Article 2 (7) of the United Nations Charter states that the United Nations has no authority to intervene in domestic matters.[132]

Therefore, giving one individual executive power will result in swift and utilitarian decisions that will benefit every country. If extra-terrestrials were to attack Earth, it would not be strategic to consult with every country, but instead, make definitive actions and countermeasures to protect ourselves. In some instances, such as resource distribution, the space leader would act similarly to a judge; listening to different arguments presented by each country, but ultimately making the final decision. Another example of the United Nations inability to enforce international law is the Moon Treaty of 1979. This treaty states that jurisdiction of celestial bodies, such as the Moon, belongs to the international community and that all space activities must conform to international law. However, this legislation failed in application because it was not ratified by countries with independent space exploration programs.[133] The United States, Russia, and other European countries ultimately ignored the treaty until recently. This proves that United Nations has difficulty enforcing laws that apply to the international community.

In addition to these issues, having one individual instead of a group allows space programs and expeditions to be a top priority in every country. In 2013, world governments spent less than 800 million than the previous year and since then, space programs have

[130]Robert.wickramatunga. "United Nations Office for Outer Space Affairs." *The Outer Space Treaty*. United Nations Office of Outer Space Affairs, n.d. Web. 02 Jan. 2017.
[131] "Bangladesh Genocide Archive." *Bangladesh Genocide Archive*. Bangladesh Genocide Archive, 2017. Web. 02 Jan. 2017.
[132]"Repertoire of the Practice of the Security Council." *United Nations*. United Nations, n.d. Web. 02 Jan. 2017.
[133]Robert.wickramatunge. "United Nations Office for Outer Space Affairs." *Moon Agreement*. UNOOSA, 2017. Web. 12. Jan. 2017.

continued to decline. Under the Obama administration, space programs and ventures was not as progressive as many would have hoped. Recently, the administration has announced a smaller NASA budget for 2017, specifically targeting deep space exploration.[134] In order to keep space funding consistent and a top priority for developed countries, having a leadership position regarding space is essential.

Another counterargument against establishing a space presidency is bias. Even though there would be no restriction based on ethnicity or background, it would be naïve to think that issues of nationalism or favoritism will be eliminated. If the new space president is elected from Russia, he or she will receive some form of political pressure to assist in Russia's agenda, but he or she will be responsible for making space policy or legislation as impartial as possible. This implies a great deal of trust and patience from the general public and an extreme selflessness and deontological thinking on the side of the leader. Plato, a classical philosopher, implied a similar notion of trust and service in his view of an ideal republic. He believed that political harmony is found when three groups of people, producers, auxiliaries, and guardians, all perform their appropriate functions and only that function. The Guardians, the wisest and morally superior individuals, were the most fit to govern the republic because they would be able to maintain peace and enforcelaws through their reasoning abilities. Plato's trusted the Guardians to never abuse their power or make the wrong decisions because they knew were the purest, most intelligent humans.[135] The same argument can be made when discussing the issue of bias. In order for this position to work, humanity needs to place its trust on a competent, moral individual.

**Potential Candidates**

Currently, there are several suitable candidates that would be able to succeed in this position. The first is Elon Musk, CEO of SpaceX. SpaceX was nationally recognized in 2008 when NASA awarded the private company with cargo transports for the International Space Station. Since then, Musk and SpaceX has had a series of accomplishments ranging from launching the Falcon 9 rocket into space to being the first private company to stage a water landing for an orbital rocket. In addition to his plan to inhabit Mars in the decades, Elon

[134]Malik, Tariq. "NASA's $19 Billion 2017 Budget Request: A Summary." *Space.com*. Space.com, Feb. 2016. Web. 11 Jan. 2017.
[135]Plato, and I. A. Richard. *Plato's Republic.* Cambridge: Cambridge U.P., 1966. Print.

Musk's vision and passion for space would be valuable as the space president.[136]Another candidate is Charles Bolden, administrator of NASA and a former astronaut. Under his leadership, NASA has developed a Space Launch System rocket and Orion spacecraft that will be able to carry astronauts into deep space. He has dealt with a multitude of space-related issues such as the launch of a spacecraft to Jupiter, enhancing America's Earth-observing satellites, and developing the James Webb Space telescope. Having traveled to outer space and managing a flight crew, Bolden is a natural leader that will be able to thrive in this position.[137] The final exemplar for this position is Xu Dazhe, current Governor for the Hunan Providence of China. Dazhe has held several notable space-focused positions such as director of the China National Space Administration and the State Administration for Science, Technology, and National Defense. His recent political success could indicate his potential as a global space leader.[138] All of these extraordinary individuals would find success based on their experiences and passion for the space movement. The biggest issue with all of the candidates is their nationalist thinking, but in order to establish credibility, the world must place its faith on the space president.

**Conclusion**

In conclusion, in order to prevent conflict between countries with different capabilities, resources, and weapons, we must establish a space president to promote international cooperation. If established, this leader would be able to address issues regarding resource allocation, space defense, and extra-terrestrial communication. Although this position may not be comprehensible in our current state, a space leader will be crucial to pursue global political harmony and cooperation.

[136] Wall, Mike. "SpaceX's Elon Musk Unveils Interplanetary Spaceship to Colonize Mars." *Space.com*. Space.com, 27 Sept. 2016. Web. 02 Jan. 2017
[137]"Administrator Charles Bolden." *NASA*. NASA, Mar. 2016. Web. 02 Jan. 2017.
[138]Vitae. China. "China Vitae." China Vitae: Biography of Xu Dazhe. China Vitae, 2017. Web. 11 Jan. 2017

# 6. What Is The Stance Of Main Religions On Space Travel And The Quest For Finding Extra-Terrestrial Life?

Liis Pets

## Introduction

There are many factors that determine whether and to what extent a sovereign state will get involved in space exploration. The first thing that comes to mind is the availability of money – studying the extra terrestrial sphere is one of the most expensive branches of science and not every country can afford something like this. Another one is the prestige that comes with sending your representatives to the orbit, to the Moon or even beyond. Well known is the legendary one-upmanship between the USSR and the USA during the Cold war that extended even into outer space. A state may hope to benefit from technologies that come from space exploration such as the GPS or satellite surveillance of the Earth's surface. There are many more factors, but in this essay I would like to focus on a factor that might seem negligible at first – religion.

States are still the key actors in matters concerning outer space despite the recent trend of private companies joining their ranks. In general it could be said that religion today plays a much smaller role in people's everyday lives and government policies than it used to some centuries or a millennium ago. Yet in some countries the state apparatus and religion are close-knit and the latter has great influence on politics. In others the two are strictly separated, but society is still comprised of people who may be religious and their preferences will be reflected in the policies chosen by the government representing them. Is space exploration considered justified or desirable? Religion among many other things can dictate what kind of knowledge one is allowed to pursue. Thus I imagine that in areas where religious study is emphasized over natural sciences, it is unlikely that extremely precise, costly and labor intensive space exploration or satellite development are about to become booming industries.

In the following pages I will introduce the stance of main world religions on science and space travel in particular. I will also cover their attitude towards the search for extra-terrestrial life. The religions discussed are Christianity, Islam, Hinduism and Buddhism. The 5$^{th}$ largest religion is folk-religion which is already a very vague term and has numerous sub-denominations that are very different to each other. For the purposes of this essay it will not make sense to lump them all together, so only the top four will be compared. What do they

have in common and where do they differ when it comes to space exploration and interplanetary aliens?

### History of Science in the Sphere of Influence of Christianity

Not only is Christianity the religion with the biggest number of followers, but it is the dominant religion in two of the currently most powerful players in space exploration and politics, the U.S. and Russia. This is rather interesting considering how unpopular natural sciences were in the eyes of the Catholic Church up until a few centuries ago. The following chapter will mainly focus on the development of the relationship between Catholicism and Science, because that is where the potential conflict lies. It is also the biggest denomination in Christianity. Protestantism that came about in the 16th century was always more liberal and did not put scriptures above science[139]. Orthodoxy that broke away from Catholicism in the 11th century also sees science and religion compatible, for they research completely different domains. Natural sciences is about the "how" whereas religion is about "who and why", so scientific errors in the Bible are not relevant, because it is meant to only provide theological answers[140].

It is important to note that learning as such and discovering things was not exactly forbidden in Catholicism either, in fact schools and universities were sponsored and studying encouraged by religious establishments. That was of course only until the findings started contradicting the Bible and the Catholic Church started losing ground and influence. The emergence of Protestantism fueled the fire. When the so called Scientific Revolution that brought experimentation and objective observations to the picture started to raise its head in the 16th century, the Catholic Church fought hard against it. Many early "scientists" lost their lives for questioning the religious dogmas and undermining the church's authority[141].

One of the more relevant and also famous cases is the (arguably) first ever real scientist Galileo Galilei who invented the telescope and provided evidence that the Earth orbits the Sun just like Copernicus had written before him. For this he was trialed, condemned and spent the rest of his years in imprisonment. But the cat was out of the box and the following development of the "scientific method" of study paved way to a lot of new knowledge - a lot of which contradicted the stories of the Bible. The Enlightenment period also brought change to the social situation: the ideas of democracy and church-state separation

[139] Donald H. Kobe. (na). Luhter and Science.
[140] George Metallinos et al. (2011). Orthodox Faith and Natural Sciences.

gained popularity and none of the denominations have really managed to regain their former importance since then. Darwin's theory of evolution delivered yet another significant blow that seemed to shatter the dogmas.[141]

### Catholic Stance on Science and Space Exploration Today

Some argue that in order to maintain any kind of influence at all the Catholic Church has slowly "sold out". It used to demand taking the words from the Holy Book literally, but has later renounced some of the main pillars the religion was founded upon. The Earth is not a couple of thousand years old, created in six days, centre of the universe and man created in God's image, but most likely evolved from apes – no mainstream branch of Christianity denies this any more. The texts of the Bible are no longer considered the word of God, but kind of "a human interpretation on divine inspiration" as Guy J. Consolmagno, the Vatican's official astronomer puts it[141]. In fact the Church now says to go with scientific data instead of scripture when both are available and not in agreement. "It is about parallel realities, not competing ones" is the new doctrine. The Vatican and the Italian Space Agency have even some joint programs since 2011. The aim of this cooperation is to show scientists that religious people are not the enemy and vice versa: for the sake of humanity[142].

This is not the first time the Church has wanted to tap into space exploration. Buzz Aldrin, one of the first people to land on the moon in 1969, gave himself a communion on the Moon under the instructions and blessings of the Webster Presbyterian Church. He was provided some wine and bread for this and the initial idea was to have a "pioneering Christopher Columbus-style ceremony" accompanied by a broadcast of prayers and a speech, but NASA advised against it. The Space Agency was at the time being sued by Madalyn Murray O'Hair, who had previously fought against compulsory religious activities in schools of the US. The lawsuit was eventually dropped, but Aldrin never got to go through with his planned Christian extravaganza on the Moon[143].

To find out more about how the Catholic Church would interpret potential encounters with extra-terrestrial life I decided to consult the website www.catholic.org. This online community claims to represent the views of the Vatican and have 100 000 visitors a day

[141] Colin Blakemore. Christianity - God and the Scientists. (2009; Pioneer Film & Television Productions Limited)
[142] Duncan Kennedy. (2011). Vatican's Space Mission.
[143] Matthew Cresswell. (2012). How Buzz Aldrin's communion on the moon was hushed up.

making it the largest Christian presence on the internet[144]. The site again quotes Consolmango, who leaves the answer extremely vague saying: "No matter what we learn, it doesn't invalidate what we already know"[145]. Leaving the issue undisclosed until the existence of extra-terrestrial life forms is proven seems to be the current Catholic policy. In an interview conducted with the current pope Francis in 2015 he follows the same pattern and when asked about life on other planets he says: „Honestly I wouldn't know how to answer", „But in every case I think that we should stick to what the scientists tell us, still aware that the Creator is infinitely greater than our knowledge[146]."

In the light of this it is not surprising that the Catholic Church today very much embraces NASA's aspirations and the technology that comes with it. The mentioned Catholic.org site emphasizes the importance of the spin-off products like enriched baby food, water purification, weather forecasting, environmental analysis, medical advances etc. all of which can and should be used for doing Christian service for others and spreading the word of God. Even if the connection between the mentioned goals and spending billions on investigating black holes and trying to send a manned mission to Mars is unclear at the moment, an article on the website assures us its for the greater good in the long run. Also the deeper one explores the universe, the more one will understand the mysteries of God and bring all of us closer to religion eventually.[147]

If the main branches of Christianity no longer oppose science or prefer not to take a stance on potential extra-terrestrial life, some denominations like the Creationists are, on the contrary, very firm in their belief that space exploration is man's rebellion against God. One of their thought leaders Ken Ham calls for NASA to stop wasting money, because their quest will no doubt be fruitless and if we do discover life forms off Earth – even worse. Adam's original sin would affect also the aliens of other planets, but since they are not human, they would not qualify for salvation and thus would go to hell and of course this is not suitable company for anyone[148].

[144] Catholic Online. About Us. http://www.catholic.org/about/. (09.12.2016)
[145] Carol Glatz. (2005). Do space aliens have souls? Inquiring minds can check Jesuit's book
[146] Elis Harris. (2015). Do aliens exist? Pope Francis tackles this (and other things) in new interview.
[147] Marshall Connolly. (2012). Should Christians care about space exploration?
[148] Ken Ham. (2014). We'll find a new earth within 20 years.

**History of Science in the Sphere of Influence of Islam**

The following paragraph is really more about history of science in the Middle East. There are other parts of the world that adopted Islam quite early on, but have not played much of a role in development of sciences. It would also be incorrect to claim that all scientists there were Muslim or Arab for little is known about their personal lives and the region was not overwhelmingly Islamic at the time the Middle East lead the world in scientific progress.

The Middle East experienced a „Golden Age of Science" between the 8$^{th}$ and 13$^{th}$ century during which Europe was experiencing the so called Dark Ages and relative scientific stagnation. Today, however, the Islamic nations are hardly known for much scientific achievement. The number of universities and researchers per capita is more than four times lower than in Europe, so it is no wonder that we don't hear much about their revolutionary advances in space exploration either.

The key to understanding the plateauing of science in the Islamic world is that it never really concerned itself with researching out of curiosity. Instead as Hillel Ofek puts it in his article "Why The Arab World Turned Away From Science": "[Islamic scientists] sought knowledge primarily in order to understand philosophical questions concerned with meaning". This indicates that religion was way more important than any science. The reason for studying for example astronomy or trigonometry was mainly to better determine the direction of Mecca, or prayer times or the start of Ramadan. The Quran also stresses that everything that happens is God's will which makes looking for causalities in the nature redundant. What could be considered science was also used for solving practical issues such as building aqueducts or better sewage systems, but there was little attempt to accumulate theoretical knowledge.

Another thing is that there were no autonomous institutions for study like universities. The research that was done was funded by and conducted under orders of rich patrons. Once their wealth ran out or they died, so did the research and the progress made was generally not passed on to anyone. There existed madrassas which were a sort of educational establishment, but the curriculum there excluded any subject not directly connected to religion, so mathematics, physics etc. were never taught. In these matters the two main denominations of Islam, Sunni and Shia, do not differ much from each other. The Sunni branch tilted slightly more towards mysticism as opposed to reason, but it mattered little to the outcome which was almost total stagnation. To sum up it could be said that the Islamic culture simply did not

support progress (no progress was needed since anything you ever need to know is already written in the Quran) and could not reconcile religion and science.

Science in the Middle East re-emerged only in the 19th century and almost against the will of the people. The advances made in the West brought great shame to the Islamic world and according to Ofek it was pride that finally pushed them to accept modern technologies and start taking part in scientific research again. For the first 1000 years Islam drew its legitimacy from its superiority over the Christian world. Proof was the better living conditions and technological preeminence. By the 1700s the situation had completely reversed. [149]

**Islamic Stance on Science and Space Exploration Today**

There is a strong voice in the Islamic world today that urges Muslims to return to the pristine and pious past which includes cutting ties with the non-Muslim world and technology, but the supporters of progress dominate the discourse. In order to make religion and science compatible scholars emphasize verses from the Quran that support studying such as ”Seeking knowledge is compulsory on every Muslim”; “wisdom is the lost property of the believer”; “whoever follows a path seeking knowledge, Allah will make his path to paradise easy” .

Many Muslim researchers believe that science and especially the study of the outer space will eventually bring mankind closer to accepting Allah not the opposite. This is very similar to the current Christian doctrine, yet both religions believe that further discoveries will validate their religion above the others. The website http://islam-science.net/ offers an array of articles by many Muslim scholars working on a project that aims to fill the gap between religion and reason in the Islamic world and get more Muslims to engage in high quality research and natural sciences. The majority of the articles conclude that engagement in science will support the Islamic faith. Concerning outer space related science in particular, the Quran is much less specific than the Bible. Instead of laying down very exact claims such as “the Earth stands in the centre of the universe” or “it was created in its entirety in six days”, the Quran keeps its statements ambiguous and thus creates less friction with new discoveries. Also the style of writing used in the Middle East at the time the Quran and its Sunnas were written down is different to European style. Larger numbers, but especially the number seven was often used to indicate “many” or “a lot” and do not necessary mean that exact amount. So if it is written that it took Allah seven days to create something – it means it took a long time

[149] Hillel Ofek. (2011). Why The Arab World Turned Away From Science.

which would not contradict the scientific proof we have today that proves for example that the Earth is billions of years old.[150]

According to Sheriff Alkassimi and numerous other Muslim academics, modern western ideas such as for example the Big Bang Theory were described in the Quran already 1400 years ago ("Have those who disbelieved not considered that the heavens and the earth were a joined entity, then We separated them, and made from water every living thing? Then will they not believe?" (Quran 21:30)). It is also written there that the universe is in fact expanding just like Western science has proven ("And the heaven We created with might, and indeed We are (its) expander." (Quran 51:47)). There are many examples like these, so it is believed that eventually science will not only prove the existence of God, but the superiority of the Quran and Islam[151].

In the Islamic Holy Book it is written that there are many skies and planets and that Allah is the creator and ruler of all worlds or universes. On top of this the Quran hints that there is life scattered all around the Universe – the very opposite to the claims of the Bible. Dr. Shabir Ally, President of the Islamic Information & Dawah Centre of Toronto, is even convinced that if there are other sentient creatures out there, then Allah would have already sent them a messenger or a prophet that would have conveyed his teachings to them. Even though it is said in the Quran that "Allah used the best of molds to create man", it does not mean he could not have used a mold equally as good for the habitants of other planets, which means that they could be on par with us and we should treat them as such if we ever come into contact[152].

This does not mean we should simply wait for the aliens to reach Earth and make contact with us. The verse "O assembly of Jinn and men! If you can pass beyond the zones of the heavens and the Earth, then pass! Not without authority shall you be able to pass!" is considered to allow if not even encourage space travel. Although we are reminded by some Muslim thinkers, that the aim of these missions should not be quenching thirst for abstract knowledge, but to better understand and admire the power of Allah[150]. Other Muslim scientists like the ones who have posted articles on http://islam-science.net, do not seem to think this clause is very important for research and I did not see it mentioned anywhere.

[150] Zahir Ahmed. Quran and Space Sciences. (2007;Islamic Video Productions)
[151] Sheriff Alkassimi. (2008). The Quran on the Expanding Universe and the Big Bang Theory.
[152] Let the Quran Speak TV Program – Canada. Ever Wonder What Islam Thinks of UFOs and Aliens- You Might Be Surprised. (2013; Quran Speaks)

Things are not quite as simple as they seem though. Even though space exploration is allowed, colonization of other planets is not. In fact clerics of the United Arab Emirates who are members of the General Authority on Islamic Affairs and Endowment (GAIAE), declared it unislamic in 2014 for there is no righteous reason to be there. It is also considered too dangerous which would make it equal to committing suicide and that is strictly forbidden in Islam. The Mars One team has asked the GAIAE to revoke their ruling (fatwa). Firstly there are about 500 Muslim applicants for the Mars colonization program. Secondly by the time the shuttle should be ready to launch in 2025 it would not be as dangerous any more. The robots that would be sent there before humans would have prepared a safe habitat for the astronauts and spending extended periods of time on Mars should not be comparable to suicide[153].

**Hinduism**

Hinduism is much older and very different to the two other religions discussed above. One could even say it is more a philosophy of life or a cultural tradition that overarches a number of smaller religions. Hinduism was the dominating belief system in Indochina and areas which today are the modern states of India and Indonesia. It is comprised of rituals and festivals and is aiming to provide spiritual guidance to people and societies; not so much explain why things are the way they are. Hinduism is and has always been decentralized: there is no one person or institution claiming to speak for all Hindus. Approaches to any issues or interpretations of the scriptures, the Vedas, can vary a lot regionally.

There has hardly ever been any confrontation or conflict between science or philosophy and religion. Noteworthy and publicly funded universities that taught not only scripture, but also languages, natural sciences, arts and many other disciplines existed already about 2500 years ago. Scripture students were often teachers of other fields and the approach to any problems could be described as holistic and solution based rather than dogmatic.[154] Gods in the Hindu tradition are somewhat similar to the ancient Greek gods in the sense that they resemble humans with their emotions, desires and behavior. Instead of being all-knowing or all-seeing like the Christian God or Allah, they can be irrational, bargained with, etc. Hindu gods have the ability to step in and out of our dimension and guide the lives of people and decide their faith. They did not, however, give people something like a Bible that provides do-

[153] Ted Tornhill. (2014). Muslim leaders issue a fatwa against anyone living on MARS as there is 'no righteous reason' to be there.
[154] Hinduism, History of Science and Religion." Encyclopedia of Science and Religion. . Encyclopedia.com. (December 27, 2016).

s and don't-s and a description of how things came to be and other eternal truths. The will and opinion of gods is ever-changing and this is partially why no permanent fundamental clash between what people do or study and religion can happen[155].

The religion has quite an array on thoughts on extra-terrestrial life. It has been theorized that the Hindu gods that came and went as they pleased, could have been astronauts of inter-planetary origin. Another theory, the Panspermia theory, has its roots in the Hindu tradition. It says that humans are in fact "aliens" themselves and we were put here on Earth by some other civilization a long time ago. Neither are really mainstream beliefs[156]. Some believe that people travel to other planets through the cycle of reincarnation. The same way a person might be reborn as an animal, he or she may be reborn as an alien.[157] Regardless of the truth, none of the scenarios contradict the Hindu scriptures.

As for astronomy in particular, the Hindus had made astonishingly accurate calculations on distances and revelations of different planets and the Moon already 4000 B.C.E. They were very well aware of not only the workings of the solar system, but thought that the universe went through periodic destruction and creation similar to what the Big Bang theory describes[154].

This era of progress ended and the downfall of the Hindu cultural sphere in general occurred between 12$^{th}$ -16$^{th}$ centuries when the Muslim invaders coming from the west disrupted the cultural, scientific and religious traditions. Among other influences they introduced the dogmatic approach to natural sciences. Some of Indochina and Indonesia converted to Islam. The anti-science attitude was reinforced when Great Britain made the region its colony in the 17$^{th}$ century. After decolonization what was then known as India was partitioned into three states: India and East and West Pakistan. A lot of the Muslims migrated to the latter two and India now hosts 95% of the Hindus of the world. [154]

Today India is back in the game and is a serious competition even to most developed countries. The state invests heavily into developing different technologies from agriculture to molecular biology and participates in a lot of international cooperation. India receives the third largest amount of investment money for technology development in the world. The country also ranks high for scientific research in general and is in top five for space

[155] Dipankar Gupta. (2010). Why Hinduism is Science Proof.
[156] N/A. (n/a). Hinduism & Creation of Life By Extra Terrestrial Aliens.
[157] Merrill Miller. (2014). Atheists and Aliens: Would the Existence of Extraterrestrials Mean the End of Religion?

exploration[158]. This should prove that the relative stagnation in scientific progress was due to invasions, occupations and state mismanagement and is not related to religion or any other cultural factor.

**Buddhism**

Buddhism was founded in the 5th century B.C.E in northern India from where it spread east. It has sometimes been called the most science-friendly religion. Much like Hinduism it can be better described as a philosophy or a cultural tradition rather than a religion. The main goal of Buddhism is to create harmony and reduce human suffering. It does not so much attempt to provide answers to existential questions, but encourages objective observation, because it considers nothing eternal. A book with fixed answers such as the Quran does not make sense in Buddhist world view.

None of the Buddhist countries or cultures has ever really resisted new ideas or technologies proven true or beneficial by science. It has never considered them either good or bad as long as they do not interrupt the balance and harmony in nature too much. This is why there was never anything like the Renaissance in Europe or any other science-religion conflict. As its aim has always been to improve people's lives, not too much emphasis was laid on the accumulation theoretical knowledge. Natural sciences like astronomy were somewhat neglected whereas for example medicine, which was a much more practical tool for improving the lives of other, was very advanced compared to other regions. There are three things to keep in mind when developing new technologies or doing research:

One should remain selfless and consider things from a universal point of view

Appreciate the value of new technologies, but not become dependant or greedy

One should take action rather than just talk about problems of the world[159]

The current Dalai Lama believes that all sciences are important. If not for anything else, then to be able to provide relevant and up-to-date guidance to all people. He believes a religion that refuses to keep with the times will eventually be sidelined and ridiculed. The Dalai Lama has especially emphasized the importance of neurosciences and psychology, because they help us understand the human psyche and thus help change the way people think

[158] N/A. (2016). Science and Technology in India
[159] Buddhism, History of Science and Religion. Encyclopedia of Science and Religion. Encyclopedia.com. (29.12.2016).

and perhaps "cultivate a compassionate heart". Space exploration is not a priority, but it is also by no means forbidden.[160] The existence of extra terrestrial life is possible, but dwelling over this question adds little value to the Buddhist paradigm. They remain quite indifferent for the emphasis should be on the internal not the external[157].

**Conclusion**

In my opinion it can be said that from the four main religions Hinduism has perhaps always been the most pro-science. Unfortunately outside invasions and being under colonial rule for centuries have hindered the pace of the progress. Buddhism, although sometimes called the most science-friendly religion is also quite accommodating, but not so much interested in accumulating theoretical knowledge, but puts more emphasis on practicality. The extremely costly space exploration is thus not one of the priorities. Although Christianity has a long history of executing and imprisoning scientists, especially astronomers, it has now turned around 180 degrees and in fact participates in the Italian Space Program. Islam is still the least enthusiastic about science in general although the Holy Scriptures as such set no limitations to space travel. The number of universities and students per capita remains very low compared to Europe.

As for extra-terrestrial life the attitude of all four religions at the moment seems to be to wait and see and not to speculate when nothing has been conformed yet. Hinduism has played with the thought of aliens or Gods visiting Earth for millennia. Buddhism does not find this question very important, but does not oppose the possibility of life on other planets. Islam believes if there is anyone else out there, then they are Allah's creation like us. The least excited about the issue seems to be the Catholic Church, who has openly said that they do not know if aliens exist, but remain vague when asked what it would mean for us or the religion itself if they did.

[160] Ed Halliwell. (2009). Buddhism and the Brain.

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# 7. The Propaganda Use of the Outer Space Exploration on the examples of Mirosław Hermaszewski and Sigmund Jähn

Przemyslaw Sopocko

## Introduction

The last decade of the 20th century brought the new situation in the global geopolitics. Both, the dissolution of the Soviet Union as well as appearance of new actors as the important figures affected the Outer Space policy. The removal of the bipolarity did not prevent superpowers from rivalry, but the alliances changed utterly. Today, everybody knows about American-Soviet space race and new actors such as Japan and China. But, in the past the smaller states, grouped in the bipolar blocks put some efforts in the Outer Space exploration as well. People do not remember about Poland and East Germany, due to political importance of their participation in the confrontation of powers in the field of Astropolitics.

The main aim of this essay is to present the usage of two astronauts in political propaganda in their countries and to make a reminder about these figures. They both came from the former Soviet bloc that had been confronting the USA and their allies in the Outer Space race for over four decades [Rendleman, Taverney, 2011: 119]. Apart from giving the basic facts about the travel only, the *post factum* fates of these two cosmonauts are also presented in order to keep them in the memory. The propaganda made Mirosław Hermaszewski and Sigmund Jähn *personae non gratae* in the public life after the fall of the communism in Poland and East Germany. Nowadays, many young people do not associate them with the Outer Space Exploring, because of the policy of pushing former regime "heroes" [Pop, 2013: 83] at the margin of the state's history.

The approach used in the whole text is based on the thought of *Astropolitik* by Everett Dolman [Dolman, 1999: 84]. This researcher states that conflict gives power in order to create new technologies [Sheldon, 2002: 235]. Rivalry becomes the force for constant improvement. In the content below, realistic point of view not only does drive development of achievement, but it also leads to the tensions between partners in one bloc. Especially, after Joseph Stalin's death in 1953, the subordination of every single member went in less strict way [Nardon, 2007: 36]. Communist states under domination of the Soviet Union started to conduct own and a little bit independent policy [Graham, Huskisson, 2009: 116]. However, this policy still needed to be approved by the Kremlin. Both cosmonauts mentioned in the following text were employed by their non-democratic leaders to present national ambitions. Hermaszewski and

Jähn developed careers thanks to the unique experience, paying the price of oblivion nowadays.

In order to fully understand what occurred in the late 1970s, the previous developments should be recalled in the Introduction. Historically, the Space Race was based on Cold-War bipolar order, shaped at the end of World War II [Johnson, 1989: 503]. Americans used the German engineer Werner von Braun and Russians only seized his designs of V2 missiles [Brzezinski, 2007: 5]. The Third Reich (German *Drittes Reich*) left superpowers behind in the field of technology, so hunting down particular scientists and collecting all data that survived the war, became the main purpose of American and Soviet intelligence [Nardon, 2007: 36]. Military goals dominated the post-war world, because anti-Nazi alliance broke down. The mutual hostility replaced the unlikely "marriage" of fully democratic states and the USSR.[161]

It is clearly visible that realistic approach dominated the conquest of the Outer Space. Initial wartime alliance after defeating Hitler divided a world into two blocs. The Western one with hegemony of the US and the Eastern one fully dominated by the Soviet Union. As mentioned previously, conflict is the key element here. Even inside of each of the alliances, this conflict appears due to internal propaganda purposes [Aronson, Pratkanis, 2001: 51]. Materials collected by both key players in the bipolar reality, at the end of 1950s were used to develop missiles capable of carrying nuclear weapons [Klein, 2006: 35]. However, the American and Soviet leaders found out the importance of the Space Race. Sputnik launched from the Soviet territory opened a new era [Nardon, 2007: 35], that can be divided into three periods.[162] The following essay concentrates on the post-lunar landing times (1972-1991) when both superpowers were sending people to the Outer Space, mainly in prestige building purposes [Klein, 2006: 39]. Poland and East Germany wanted to participate in this great project, as well. The only option they had was to send a national cosmonaut to the Outer Space. Communist rulers from both states started a prestigious race that results are analyzed below.

[161]USSR - *Union of Soviet Socialist Republics (Russian Союз Советских Социалистических Республик), commonly referred as the Soviet Union (Russian Сове́тский Сою́з).*

[162]The first period covers years from 1950s till 1972. It starts along with the first tests of launching, including successful one with Sputnik (1957). The period ends in 1972 with the last landing on the Moon (Apollo 17). The second one lasts from 1972 to 1991 when the Soviet Union was dissolved. The third and the last period starts in 1991 when bipolarity was replaced with the multipolarity [Wang, 2009: 436].

## Polish cosmonaut – Mirosław Hermaszewski

### Prior to the Outer Space Journey

The only Pole in the Outer Space, born in 1941, Mirosław Hermaszewski, the general of the Polish Army and the retired Air Force pilot, found his place in the world's history. Chosen between two candidates from Poland, he had to prepare for flight to the Outer Space in the Soviet Union's centre named after Yuri Gagarin.[163] Athletic body helped him to live up to the set strict standards. Prior to the mere idea of going to the Outer Space, Hermaszewski graduated from the famous school for pilots in Dęblin – The Polish Air Force Academy (*Wyższa Szkoła Oficerska Sił Powietrznych* in Polish, commonly known as "*Szkoła Orląt*"[164]), existing since pre-war times (est. 1927). Before selection for the Outer Space journey, he had been serving in the Polish Air Forces (*Siły Powietrzne* in Polish) as the pilot of the fighters and the flight instructor, receiving the rank of a major, by the time of his departure [Roszkowski, 2003: 347].

As a result of the tensions, described above, between the Soviet bloc leaders, Polish cosmonaut was about to fly aboard Soyuz 30 before his East German counterpart (Sigmund Jähn). Mirosław Hermaszewski, chosen from the other Polish candidates to participate in the following mission in 1978, passed all the required medical and physical tests and flew away to the Outer Space aboard Soviet rocket in as a part of the program Interkosmos[165] [Science News, 1978: 39].

### The Outer Space Journey

On the day 27/06/1978, major Mirosław Hermaszewski along with Russian Pyotr Klimuk aboard the Soviet space vehicle took off from Baikonour launch site [Furniss, Shayler, 2007: 216]. Cosmonaut from the Soviet Union had been on missions twice before. At that moment, Hermaszewski became the first and so far the only Polish who has ever left Earth. Communist government used his popularity to underline its success as well as a fruitful cooperation with Soviet the comrades. The time he departed was really hard for Poland [Biskupski, 2000: 152]. The shortages of many grocery products in the stores, lasting for two years since violent pacification of Ursus and Radom protests (1976), led the decade

[163]Yuri Gagarin (Russian *Юрий Алексеевич Гагарин*) (1934-1968) – the first person in the Outer Space (1961) [Taverney, Rendleman, 2011: 126].
[164]„Szkoła Orląt" means literally „The School for Eaglets" where "the Eaglet" refers to well-skilled pilot [Burgess, Vis, 2016: 53].
[165] For more information, look at Table 1 containing some basic facts from the journey.

of Edward Gierek´s rule (the 1st Secretary of the Polish United Workers Party[166]), the actual ruler of the state, to end sooner or later. The Polish top communists needed a success to cover the economic situation a little bit [Biskupski, 2000: 158]. The improvement of public recognition, especially during crisis, would have given more splendour to the government amongst people angry at their elites for supply shortages.

Opportunity to send a Polish astronaut to the Outer space was a huge propaganda opportunity, meaning mainly to underline Polish-Soviet eternal friendship, put into the constitution officially (1976). Edward Gierek negotiated with Leonid Brezhnev (*Леони́д Ильи́ч Бре́жнев* in Russian) over the upcoming space mission. He wanted to convince the Soviet leader to accept Polish candidate to be sent aboard Soyuz mission and he succeeded. Gierek beat Erich Honecker from East Germany in the race for sending own astronaut [Furniss, Shayler, 2007: 216].

In the Outer Space, the crew consisting of Hermaszewski and Klimuk conducted some experiments concerning oxygen tension in the extra-terrestrial conditions [Baranski, S., Bloszczynski R., Hermaszewski M. et al., 1982 : 2]. Scientifically, Soyuz 30 brought additional benefits for the exploration. Many people still underestimate the Soviet missions, assessing them as only promoting communism, nevertheless they brought some positive results. From examined conditions of living creatures, including Laika and human being Yuri Gagarin (Russian ) to the development of the rocket propulsion [Sadeh, Vallance, 2009: 125]. Condemning these efforts seems to be really unfair.

**Further fates**

When Mirosław Hermaszewski came back from the Outer Space, Polish society did not react very eagerly. The more communists promoted this achievement, the less people appreciated it [Roszkowski, 2003: 347]. Later in 1978, Poles celebrated choice Karol Wojtyła as the next Pope [Roszkowski, 2003: 347] ignoring the new "hero". Propaganda of success failed again. In Poland, after year 1976, the economic crisis started very violently. From June 1976 till December 1981 Polish society suffered a lot, because of the market shortages. The "Solidarity" ("*Solidarność*" in Polish) movement triggered off in 1980, pushing the flight of Mirosław Hermaszewski aside [Czubiński, 2006: 311]. That was very sad that huge

[166]The 1st Secretary (Polish *Pierwszy Sekretarz*) of the Polish United Workers Party under the communist regime in Poland (1944-1989) was the real ruler of the state, dominating the constitutional bodies such as the Government (Polish *Rada Ministrów*) and the Council of the State (Polish *Rada Państwa*, being the collective head of the state), as well as the Sejm, unicameral parliament (1945-1989) [Roszkowski, 2005: pp. 209-210].

achievement of Polish man, the only person from the country in the Outer space, occurred in that particular time and not later when the reception might have been better.

As the result of spreading Solidarity movement in 1980-1981, the communist government decided to act radically to ease the social unrest. The Martial Law in Poland (1981-1983) was introduced on the 13th December 1981 as the answer to situation. The Military Council of the National Salvation (*Wojskowa Rada Ocalenia Narodowego*, in Polish known as the infamous "WRON") was constituted as the highest and real political power [Roszkowki, 1997: 306].

Colonel Mirosław Hermaszewski was without personal consent appointed to the WRON, along with other high military officials in Poland including general Wojciech Jaruzelski, the Prime Minister and Minister of the National Defence. Actually, Jaruzelski became the real ruler of the state, bearing the whole power in Poland [Paczkowski, 2000: 314]. This episode from the only Polish cosmonaut's life turned out against him politically many years later. Hermaszewski still admits he did not personally agree with the membership[167] [Paczkowski, 2000: 314]. On the other hand, he could not just refuse the military *coup d'etat* that seized all the power in Poland without personal dramatic consequences.

Coming back to military career after the Soyuz 30 Mission, Hermaszewski remained in the Polish Air Forces. Due to successful work as the military pilot, an ace who could fly the supersonic Mig-21 and the commanding officer of the squadron in Słupsk and regiment in Strachowice near Wrocław, he was promoted to the rank of the general in 1988 [Burgess, Vis, 2016: 53]. Unfortunately, the popularity after Soyuz 30 flight made the politicians interested in him again.

In 1989, appointed by Polish United Workers Party (*Polska Zjednoczona Partia Robotnicza* in Polish – "PZPR") along with the other popular figures as the official candidate, he failed to receive enough support in partially free elections held on the 4th of June [Dudek, 2007: 35]. Probably the fact of being on the PZPR list made him unpopular among citizens entitled to vote. He did not resign from the politics, discouraged by the defeat at the turn of 1980s.

[167] At the time, he was in Moscow and learnt about his membership in WRON from the television news [Burgess, Vis, 2016: 53].

At the beginning of 21st century Mirosław Hermaszewski ran a successful campaign for the regional assembly in the Mazovian Voivodeship (*Sejmik Województwa Mazowieckiego* in Polish). He became a deputy from the Alliance of the Democratic Left (*Sojusz Lewicy Demokratycznej* in Polish – "SLD") based on the will of voters from the region. Hermaszewski served there for four years of full term of office, from 2002 till 2006 [National Electoral Commission in Poland, 2002]. But it was not the end of his political efforts.

In 2014 Hermaszewski decided to enter the nationwide Polish politics again, as the SLD candidate for the Member of the European Parliament ("MEP"). He promised to support Poland's position in the ESA (European Space Agency), however his personal life involvement did not allow him to run a campaign. A couple of months prior to the European elections, Hermaszewski changed mind and ultimately resigned from race for MEP seat[168] [Wirtualna Polska, 2014]. The unsuccessful political career might seem to be a warning that involvement with the regime before 1989 turns out to determine fates of such personalities.

On the other hand, very unlikely to Mirosław Hermaszewski, Vladimír Remek, first and the only Czech in the Outer Space, currently the Ambassador to Moscow [Novinky, 2013] and former MEP for two terms [Volby, 2009], was able to succeed in politics with the communist burden. The example of Remek shows that the past should not determine present life, utterly. Being criticized for remaining in the current mainstream in Czech Republic, he does not pay so much attention to disputes over him. However, Remek should step aside from the politics, focusing on promoting the Outer Space Exploration, in order to avoid possible mistakes which might negate the life achievement. He had better not to search for additional profits, because history will judge him very severely, if he does something unwise.

Coming back to Mirosław Hermaszewski, in 2007, Polish far right government led by Law and Justice (Polish *Prawo i Sprawiedliwość,* "PiS"*)* conducted the populist campaign. The cabinet wanted to deprive Hermaszewski of both, his military rank and retirement [Gazeta Wyborcza, 2007]. The reason for this decision was his involvement in WRON during the Martial Law (1981-1983). This illegal committee, considered as the criminal organization, made all of its members participants in crime [Burnetko, 2015]. The efforts of that cabinet went down, due to change of the political power in charge as the result of the general elections in 2007. When a decade ago the contemporary Polish Prime Minister Jarosław

[168]His son-in-law Ryszard Czarnecki had been Polish MEP from Law and Justice (PiS) that stood in opposition to SLD and Mirosław Hermaszewski as the WRON's member. In order not to disturb Czarnecki's campaign, he resigned [Wirtualna Polska, 2014].

Kaczyński announced his idea, NASA (*National Aeronautics and Space Administration*), ESA and Roscosmos State Corporation for Space Activities (*Государственная корпорация по космической деятельности* in Russian) intervened to protect Hermaszewski as the only Pole in space who should be treated as the national treasure, a one of his kind [NASA, 1995].

NASA still appreciates him, posting on its Twitter account Birthday wishes (recently in 2015) [NASA History Office, 2015] and also issued the forecast of the upcoming anniversaries associated with the Outer Space. They put there an information about Hermaszewski's flight that would be celebrated on 27/06/2018, exactly fourty years after the launch. It is evident that Americans appreciate every man who has done even a small thing in order to go boldly in the unknown world [NASA, 2017: 1].

In 2016, under the new government led again by Law and Justice, the idea of punishing old military, police and other security services officers came back. Unfortunately, Hermaszewski faces the threat of being deprived of rank and retirement, for the second time as the member of WRON [Kalisz, 2016]. Unfortunately, NASA intervention might not prevent cabinet from this step. No-one so far has done anything, but it might be only a matter of time.

Apart from political controversies concerning Hermaszewski, he appears annually on television or other mass media because of other significant events he experienced, completely separated from the Outer Space flight. The first one is the personal witnessing the plane crash in the Kabaty forest that occurred on 9/05/1987. Hermaszewski piloted military jet and spotted the whole situation from the distance, reporting on the drama to the traffic control [Polska The Times, 2012]. For the second time, he visits media in July when the anniversary of the Wołyń massacre from 1943 comes [Kaczorowska, 2009]. Mirosław Hermaszewski was born in Lipniki, the village located in the former Wołyń Voivodeship. It used to belong to Poland, but in 1939 the Soviet Union incorporated that territory. After 22/06/1941, it passed under the German occupation (German *Reichskommissariat Ukraine*). Encouraged by Nazis, local nationalists organized genocide. In March 1943, the unit of the Ukrainian Insurgent Army ( Українська повстанська армія in Ukrainian, УПА, - "UPA") attacked the village and Hermaszewski as child survived the genocide of Polish people by a chance [Kowalski, 2015]. After World War 2, when Wołyń became part of the Soviet Ukraine, Hermaszewski with his family as one of millions of Poles, moved out and in 1945 settled down in the Lower Silesia [Kaczorowska, 2009].

This fact remains unknown to the Western world, but also shows how hard enough life Hermaszewski has passed through. Not only, political involvement in WRON, but also experiencing genocide where he lost his father, influenced him. He can be considered as the still living witness of the dramatic history, having many occurrences to share with next generations. Luckily, some commercial televisions do not allow Hermaszewski to be forgotten and invite him to comment on the special events as the expert, including the jump of Felix Baumgartner, the asteroid strike in Chelabinsk or the new discoveries of NASA. Still, for the younger people born after 1989, he generally remains anonymous person. Even at schools nowadays, nobody teaches about the only Pole in the Outer Space. On the other hand, Hermaszewski can relax after long life, full of dramas on his well-deserved retirement, staying away from the public activity.

## German cosmonaut - Sigmund Jähn

### Prior to the Outer Space Journey

Born in 1937, Sigmund Jähn whose fate intertwined with the former German Democratic Republic (*Deutsche Demokratische Republik* in German – „DDR")[169], has secured his place in the world's history. Similarly to Mirosław Hermaszewski, he served as a pilot in the East German Air Forces (*Luftstreitkräfte der Volksarmee der DDR* in German). Two months after Soyuz 30, Honecker was given chance to send a fellow man into the Outer Space. The selection covered three possible candidates and Sigmund Jähn, passed all the required tests as the best one [Burgess, Vis, 2016: 76]. Now, he had to wait for his turn to depart from Earth.

### The Outer Space Journey

Sigmund Jähn was aboard Soyuz 31 that departed from Baikonur on 26/08/1978, two months after Mirosław Hermaszewski [Furniss, Shayler, 2007: 218]. He travelled with Russian Valery Fyodorovich Bykovsky, also a military pilot who had participated in the Outer Space missions twice before. Similarly to Mirosław Hermaszewski, Jähn shared his journey with well-experienced partner [Furniss, Shayler, 2007: 216]. As the future physicist, he conducted some experiments compatible with his professional occupation. He focused on high temperature furnace and the Kristall kiln functioning [New Scientist, 1978: 420].

[169]The East German state, existing in years 1949-1990. It remained under the control of the Soviet Union as the former Germany's area occupied by Red Army since 1945 [Kowalska, 2009: 101].

The Soyuz 31 mission lasted only one week[170] but placed Jähn in the history, of course adding new scientific data to the manned flights experience, too.

**Further fates**

In GDR at the turn of 1970s, unlikely to Poland, there was no economic crisis pushing people to stand against their communist rulers [Czubiński, 2006: 611]. Dependent on Moscow and obeying all of its orders, Erich Honecker wanted to create the national hero in his state. Within past, only Karl Marx and Friedrich Engels were figures that people in East Germany could be proud of. The aim of GDR's government became clear. They had to find a new person, especially a living one, who would bring a glory to the whole nation [New Scientist, 1978: 465]. The first astronaut from Germany seemed to be the best choice they had. This acting became part of unifying the nation policy introduced by Honecker [Czubiński, 2006: 611].

Sigmund Jähn was welcomed in GDR as a hero (*Nationalheld* in German) that the state needed but not the one it deserved. The euphoria spread very quickly, both in the Soviet Union and East Germany. Berlin (eastern part) and Karl-Marx-Stadt (now Chemnitz) made him honorary citizen. Jähn received many honours, including Orders of Karl Marx, Lenin and the Golden Star of GDR's Hero, as well as the title of the Hero of the Soviet Union [New Scientist, 1978: 465]. In 1990, one cargo ship was named after him [Burgess, Vis, 2016: 73]. Even, the domestic state-owned film industry made a documentary feature in 1979 titled "*Himmelsstürmer*" (*Heavenly Striker*) [Burgess, Vis, 2016: 73] for the propaganda purposes.

In a couple of years after his Journey to the Outer Space, Jähn was appointed to State's Council (German *Staatsrat der DDR*)[171] as one of its members. The communist rulers of East Germany used his achievement to reach their political goals. Such an acting marked further fates of the first German in the Outer space.[172] Jähn was even described as the *Bilderbuch-Kommunisten* [Süddeutsche Zeitung, 2010] that under-appreciates the weight of the Space flight. After the unification of Germany (*Vereinigung des Deutschalnds* in German), many

[170] Look at Table 1 for more details.
[171]The highest body of the executive power in German Democratic Republic. The collective body functioning as the head of the state [Kowalska, 2009: 119].
[172]The second German cosmonaut was Ulf Merbold from the German Federal Republic (German *Bundesrepublik Deutschland*) who visited the Outer Space as the member of American mission in 1983 [Süddeutsche Zeitung, 2010]

people forgot about him because of his political involvement with SED (*Sozialistiche Einhaitspartei Deutschlands* in German) [Burgess, Vis, 2016: 73].

In year 1983, Sigmund Jähn completed his PhD degree at the Central Institute of Earth's Physics in Potsdam (*Zentralinstitut für Physik der Erde in Potsdam* in German) based on the Thesis titled *The Remote Sensing of the Earth* [ESA, 2017]. This fact is unknown either to common public, but it has to be recalled here. Very likely to Mirosław Hermaszewski, Sigmund Jähn could not oppose the greater politics. Probably refusing to the "offer" from SED central committee, he would have gone to prison and been punished publicly. Being member of the State's Council of the GDR marked his further fate. Having no other choice, Jähn agreed on his fate. While sitting in the political body, he had not done anything wrong against other people. On the other hand, belonging to the regime determined his public recognition as the one of the oppressors. Personally, Jähn did not like the popularity around [Burgess, Vis, 2016: 76]. As the unit in a totalitarian regime, he had to agree without right to protest.

As written above, Erich Honecker conducted very strict policy, making GDR even more socialistic state than the Soviet Union itself [Czubiński, 2006: 674]. This effort had been lasting till 1990 when the democratic People's Chamber (*Volkskammer* in German) passed the laws allowing the unification process with the western neighbour [Roszkowski, 2005: 430]. At that time, situation changed completely. The old regime people had to face new reality where they found themselves as useless or suspicious [Czubiński, 2006: 675].

Since 1990, Jähn has been becoming forgotten or even put aside by the unified Germany. As a symbol of communist success, newly created political elite felt ashamed with him. However, he stilled worked as the consultant to the German Aerospace Agency (*Deutsches Zentrum für Luft- und Raumfahrt* in German) and ESA [Süddeutsche Zeitung, 2010]. The burden of being the national hero from the pre-1990 period did not help him. In 2002, Bundespräsident Johannes Rau commemorated Jähn on his 65$^{th}$ birthday but nobody else from the top of the political hierarchy in Germany has done the same later [Süddeutsche Zeitung, 2010]. Sigmund Jähn's figure faded away along with the decay of time. That was one of the reasons that made him decide to move out from the unified Germany to Russia and teach future astronauts coming from the former Soviet Union at Yuriy Gagarin Cosmonaut Training Centre in Star City [Brittanica, 2015]. For a decade he disappeared.

The renaissance of Sigmund Jähn came in 2003, along with the release of the black comedy that is set in the reality of freshly united Germany titled "*Goodbye, Lenin!*". In that motion picture directed by Wolfgang Becker [IMDB, 2003], Jähn's character played by Stefan Walz is portrayed as a taxi driver in Berlin. Unlikely to the film's fiction, the real fates went differently, but filmmakers presented sad and bitter truth about throwing away some key figures in the new German state, because they were associated somehow with the communist past. Thanks to the success of the film, many Germans searched for the history of the Soyuz 31 finding themselves confused because Ulf Merbold, as taught behind the western part of Berlin's Wall (*Berliner Mauer* in Germsn), was not the first cosmonaut from the nation. Nevertheless, the whole situation looked really sad that people had to see fiction film actually mentioning Sigmund Jähn in the couple of scenes.

Since 2002, when he decided to retire after decades of work, he has been living calmly in Strausberg, close to Berlin. Jähn does not involve publicly as Hermaszewski or Remek after 1990. Soon after returning from Soyuz 31 he even wanted to hide from the people in GDR [Burgess, Vis, 2016: 76]. He does it, but not in the appreciated way but as *persona non grata*.

**Conclusions**

Concluding, in both cases presented above the flight to the Outer space was used in the purposes of the political propaganda. Communist governments in Poland and GDR boasted the gravity of such an achievement as unique. The Cold War's reality demanded internal as well as external successes in general. But it is not fair to forget about the role of Hermaszewski and Jähn played in the physics and the astronomy either. Their experience and world-wide recognition both exceeded the communist propaganda. The dark episodes in career of each astronaut should not be the ground for excluding any of them.

Mirosław Hermaszewski and Sigmund Jähn remain the symbols of the Outer Space exploration, worldwide-recognized, unfortunately not in their own countries. Currently in Poland, the upcoming plans to degrade the only Polish cosmonaut and take from him military retirement might worry external observers. In the past he had no other choice if he wanted to participate in the space program. Belonging to non-democratic regime's institutions was compulsory for such a figure. The same situation Jähn has experienced as well. Being treated unfairly after the unification of Germany, he left old country and taught future Russian cosmonauts instead of German people. Even NASA and ESA appreciate both astronauts

as the members of the international space exploration family along with Apollo 11 crew who landed at the Moon as well as Yuri Gagarin. From this point of view, recent ideas of depriving Hermaszewski of all his honours look really badly. He participated in the old system but he did not hurt anyone. With the dramatic life full of unpredicted turns, Hermaszewski is the witness of the 20th century's history. Jähn's rejection because of his GDR past, brings bad feelings as well. These cosmonauts cannot be judged on the propaganda involvement because they could not choose the times to live in.

In the present situation, when the Soviet Union ceased to exist but with the world still facing the realistic approach to the Outer Space exploration, every single participator or minor actor should join one of the biggest communities like ESA or NASA. Hermaszewski and Jähn experiences might turn out to be profitable for European programmes even in case of settling the Moon [Doboš 2015: 79]. Common achievement, important for the whole humankind should be rewarded with special honours. Not with orders, medal or special commendations, nor financial gratitude, but with respectful and fair treatment only. Both cosmonauts should not be forgotten or put aside by their own nations because of some dark elements in their biography. As the first people from their state in the Outer Space, all citizens have to remember them. The governments underestimating Hermaszewski and Jähn as the shameful characters from the bad times will pass away but their names remain in the history of the world and are fairly appreciated by the others.

Table 1. Mirosław Hermaszewski and Sigmund Jähn – Space Flight Comparison

| | Mirosław Hermaszewski | Sigmund Jähn |
|---|---|---|
| Date of birth | 15/09/1941 | 13/02/1937 |
| Country of origin | Poland | German Democratic Republic (Germany) |
| Launch site | Baikonur | Baikonur |
| Date of Flight | 27/06/1978 – 5/07/1978 | 26/08/1978 – 3/09/1978 |
| Mission | Soyuz 30 | Soyuz 31 |
| Vehicle | R7 (11A511U); spacecraft serial number (7K-T) #67 | R7 (11A511U); spacecraft serial number (7K-T) #67 |
| Time spent in the Outer Space | 7 days 22 hours 2 min 59 s | 7 days 20 hours 49 min 4 s |
| Other crew members | Pyotr Ilyich Klimuk | Valery Fyodorovich Bykovsky |

Information derived from [Furniss, Shayler, 2007: 216, 218]

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# 8. French Space Policy and Gaullism

Vincent Chevalier

## Introduction

On 17th of November 2016, Thomas Pesquet, French astronaut, left the Earth in order to join the International Space Station. He is the tenth French astronaut to go to the outer space. This event made the headlines in the news in France. Still today, it is possible to follow the trip of Thomas Pesquet thanks to many websites which make a live broadcast like the website of the French National Centre for Space Studies.[173] In the French perception, Thomas Pesquet appears as the national pride of France. He is the French ambassador in space and the proof that France can be a powerful and innovative country.

Nowadays, the participation of France in the space domain is huge. France represents 40% of the commercial spatial market of the world, according to Yannick d'Escatha,[174] former president of the National Centre for Space Studies. The reason for this important involvement is due to the attractive aspect of the spatial market. There is a strong return on investment to the spatial domain. We can observe four levers in this domain. The first lever is economic. The economic benefits after an investment in space correspond to a multiplication by twenty of the investment. There is also a lever on the industry because the space innovations increase competitiveness of France. Moreover, the lever on the scientific domain is major. The French spatial research is among the best in Europe and the innovations engendered create a progression in the other sectors like the industrial or the technological domain. The last lever concerns the societal aspect. Indeed, the space investments of France offer the possibility to create a European identity because they take part to the European Spatial program, and to attract the general public and the young people.

However, the involvement of France in space is not something which is natural. The current place of France in the space domain comes from a long history. In the French common opinion, Charles de Gaulle, by his principles and his will, established the French space policy and gave France this important role. However, the creation of the French space policy is also a consequence of the work of scientists and is the result of an military inheritance from the end of the Second World War.

[173] https://proxima.cnes.fr/fr

[174] D'Escatha Yannick, « La politique spatiale de la France », *Annales des Mines - Réalités industrielles*, 2/2012 (Mai 2012), p. 16-24.

The notion of Gaullism represents a political thinking based on the ideas and actions of the General de Gaulle. It is more a state of mind than a doctrine. Jacques Chirac, former French president describes the Gaullism as a « pragmatic thinking, non doctrinal » (Le Monde, 15th of January 1983). During World War Two, Charles de Gaulle (1890 - 1970) fought for the liberation of the French territory against the nazis forces. He directed, from London, the main forces of the French resistance. At the beginning, the term « Gaullist » designed the member of the resistance, the person who withstands during the Occupation.[175] After World War Two, de Gaulle possessed an important place in the political life of France. He became president of the French Republic in 1958. That's why, the meaning of the term Gaullism shifted. It became the term for describing the ideas and politics of de Gaulle and his supporters. Since 1970, and after the death of de Gaulle, the term Gaullism became a reference for those who claim to be the successors of this state of mind. The Gaullism is based on many principles. The central theme of this state of mind is that France is a great country with a great history and a radiant culture. France has done great things in the past like the Great Century of Louis XIV, the Renaissance and the French Revolution. That's why, the French country needs to keep a certain independence and to promote a third way, a specific way where France would not be vassal of a much more powerful country. Moreover, in order to succeed, France has to be directed by a strong leader who is able to unify the country. The link between the people and this « chief » has to be large. Hence, Charles de Gaulle used many referendums during his mandate at the head of the French Republic.

From this presentation of the Gaullism and the French space policy, could we say that the French spatial policy is the child of the principles of Charles de Gaulle ? To answer this question, we need to study the establishment of a space policy in France. Moreover, it is crucial to examine the pregnancy of the gaullist principles for the birth of the European cooperation and the French space policy nowadays.

## The will of Charles de Gaulle to develop the space capacities of France after World War Two

### French space capacities before the arrival of Charles de Gaulle

During World War Two, German scientists and physicists developed many arms with great potential. One of them was the ballistic missile V2. That's why, after the War, Americans, Soviets and British tried to obtain documents and technologies related to this

[175] Bernstein Serge, *Histoire du Gaullisme*, Perrin, Paris, 2001.

weapon. In 1946, France decided to recruit around a hundred of German specialists. They were gathered in the Laboratory of Ballistic and Aerodynamic Studies.

Many programs were developed like the Super V2, the Eole rocket by the physicist Jean-Jacques Barré or the probe-rocket Véronique. Most of these projects were not totally successful. The research and the projects were mainly decided and financed by the scientific community. The political power was not really involved in the program. After World War Two, the priority for the political power was to reconstitute a traditional armed forces which was faster operational and less costly. Moreover, at the end of the 1950s, most of the German specialists went back home because West Germany came through an economic boom.

However, it would be biased to forget the improvements and progress obtained during this period.[176] Under the Fourth Republic, many committees were created to develop the French capacities in specific domains, like the spatial domain. That's why this Fourth Republic is called in France the « Republic of Committees ». The projects and the innovations under the rule of Charles de Gaulle, without the will to remove his merit, benefited from the momentum created during this period. Henri Moureu, director of the Paris Laboratory, argued for the construction of a rocket inside a military strategy. In December 1946, he published a report about this idea. This report would later be used by de Gaulle and Pierre Gallois, the architect of the French nuclear deterrence theory. Indeed, in his report, Henri Moureu created the first outlines of a doctrine, which would be used by the French military force : the deterrence of the weak against the strong. It means that with nuclear and space capacities, France, considered a weak country in comparison to the United States and the Soviet Union, could deter the powerful countries from aggression.

In 1947, with the beginning of the war in Indochina, the report of Henri Moureu faded from memory. The rocket-development projects were abandoned or stayed at a level of research. From 1950 to 1954, a change in the world dynamic would change this situation. There was a wish, in the powerful countries, to have a better knowledge about Earth and especially to have a vertical knowledge of Earth. That's why the International Geophysical Year took place in 1957 and 1958 during a period of a strong solar activity. The aim was to obtain better understanding about the physical properties of the Earth and about the relations between the Earth and the Sun. In France, this event inspired Etienne Vassy, a geophysicist,

[176] Varnoteaux Philippe, « La naissance de la politique spatiale française », *Vingtième Siècle. Revue d'histoire*, 1/2003 (n° 77), p. 59-68.

and General Guérin, director of the Scientific Action Committee for the National Defense. The goal for these two actors and for the French country was to surprise the international opinion during the International Geophysical Year. However, the project of a rocket development was not implemented because this kind of project seemed as utopian. All the works were focused on Véronique, the French sounding rocket. On the 4th of October 1957, three months after the opening of the International Geophysical Year, Sputnik I was launched by the Soviets. On the 3th of November, the Soviets launched Laika, a dog, the first animal in space. The wish of France to surprise the international community was surpassed by the advances of the Soviets. In the international and French terminology, we can observe a change following these events. The expression « exploration of Earth » is replaced by the expression « conquest of space ». This change introduced the following developments in the French spatial policy.[177]

**Charles de Gaulle and the independence**

General de Gaulle came to the power in France in May 1958 during the crisis in Algeria, a French colony at that time. In an administrative communication delivered to Khrushchev, leader of the Soviet Union, de Gaulle declared : « we are at a century of planes and rockets, the humankind must not deprive herself of it ».[178] At the summer of 1961, de Gaulle met Pierre Auger, French scientific, who asked for a space agency that would comprise all the actors and projects. This agency could also be the French interlocutor in case of a European cooperation. One of the ministers of de Gaulle's cabinet said during this meeting that this project is useless and it would be easier to ask for the help of the United States. Charles de Gaulle, reluctant about a submission to the United States, asked the Minister of Finances if the project could be achieved. This Minister brought a positive answer and de Gaulle approved the project of Pierre Auger.[179]

Charles de Gaulle wanted France to achieve independence from the powerful countries of the United States and the Soviet Union. In the mind of de Gaulle, the equation was : atomic bomb + nuclear submarine + ballistic missile = power for France. That's why de Gaulle decided to develop a French ballistic missile supporting a nuclear bomb, despite the threat and the warning by the United States. Toward this end, institutions like the Society for the Studies and the Realization of Ballistics Machines in 1959 were created. This Society is the first

[177] *Ibid*
[178] Note du 28 juin 1960, Charles de Gaulle, *Lettres, notes et carnets (1958-1960)*, Paris, Plon, 1985, p. 371.
[179] Propos de Pierre Auger lors d'une interview, 6 juin 1991

example of the involvement of the French political powers in the space research.[180] The choice of ballistics missiles was influenced by the evolutions of the United States and the Soviet Union as both countries possessed this kind of weapons. A ballistic missile is also the only weapon from this era capable of passing through the outer space and destroying the enemy target by the nuclear warheads. We can notice a link with the report of Henri Moureu. The pairs rocket with atomic bomb and rocket with artificial satellite strengthen the national power and independence.

The space race launched by the Soviet Union and the USA had a consequence in a creation of the Spatial Studies Committee the 7th of January 1959. This Committee had to evaluate the role that France could play in the space domain. The success in the launches of Véronique I and II, French sounding rockets, on 9th and 10th of March 1959 created an enthusiasm in the perception of de Gaulle and Michel Debré, his Prime Minister. This event showed to the French politicians that the country could participate in the conquest of space. After the validation of the Diamond Project, a French missile and launcher, de Gaulle and the Government of Michel Debré decided to transform the Spatial Studies Committee in the National Centre for Space Studies the 19th of December 1961. This institution, which is still today the main actor of the French space policy, is a French governmental space agency and is composed of scientists, engineers and politicians.

On the 26th of November 1965, the first Diamond Rocket was launched from Hammaguir, a little city in Algeria, a former French colony.[181] This launch was one of the first achievements of France in the space domain and stemmed from the military program called « Precious Stone » started by de Gaulle in 1959. This rocket was capable of putting the first French satellite Astérix on orbit. We can notice that the name of this satellite refers to a French comic strip: Astérix the Gallic. In this comic strip, Astérix and his village fight against the invasion of the Roman Empire of Jules Caesar. The village is the last one which is not conquered. Here, we can see the reference to the great French history with the invasion of the Gaul by the Roman Empire and the exaltation of the value of resistance. The parallel with the Gaullism is quite evident. With this success, France became the third most powerful country in the space domain with the United States and the Soviet Union. This project was also a tool for the presidential elections. In 1965, the Ministry of Defense urged the managers of the

[180] Moulin Hervé, *La France dans l'Espace 1959-1979 : contribution à l'effort spatial européen*, ESA, 2006
[181] Varnoteaux Philippe, « 1965 : la France en orbite », *L'Histoire*, 11/2015 (N° 417), p. 24-25.

Diamond project to finish the project before the end of the year. The achievement would help de Gaulle in the campaign for his reelection.

In 1966, de Gaulle decided to remove France from the NATO in order to obtain independence and to launch nuclear programs without a previous approval of other countries. These nuclear programs would be achieved in 1968 with the first trial of a Hydrogen Bomb. France became a country with the nuclear weapon.

**The necessary cooperation in the European Continent and the bilateral agreements : a curb for the independence aims of France ?**

**The start of the European cooperation**

From the start of the 1960s, the European scientific community called for a European cooperation in the space domain. In January 1961, de Gaulle gave his consent for the development of a European Rocket, called Europa, despite the reluctance of his advisers.[182] In 1962, the European Launcher Development Organization was created and comprised of six European countries (the United Kingdom, France, Germany, Belgium, Italy and the Netherlands). The aim was to develop a launcher - Europa. This project was a proposition of the United Kingdom. Each stage of the rocket would be realized by one country included in the project. Thus, the first stage of the rocket would be developed by the United Kingdom who decided to use their former ballistic missile called Blue Streak. The second and the third stage were to be developed, respectively, by France and Germany. Finally, the nose would be produced by Italy. Even though this project was a failure, due to some technical issues related to the construction of Europa, it manifested a will of cooperation.

The European cooperation would be ultimately successful with the development of the Ariane Project. It was a compromise between the French project, the British project and the German project. This compromise was reached on 31st of July 1973 at Brussels. That's why on 15th of April 1975, the European Space Agency was founded with eleven original member states. Each State has to give a financial contribution for the common project and can also finance its own national program. On the 24th of December 1979, after two previous failed

[182] Varnoteaux Philippe, « La naissance de la politique spatiale française », *Vingtième Siècle. Revue d'histoire*, 1/2003 (n° 77), p. 59-68.

attempts, the Ariane rocket was successfully launched and Europe became a major actor of spatial domain.[183]

This idea of cooperation, with its decreased focus on sovereignty, seems to be incompatible with the principles of de Gaulle about the independence and the Great power of France. However, this assumption has to be modified slightly because de Gaulle was not against every form of cooperation.

**de Gaulle's opinion on European cooperation**

As mentioned before, de Gaulle accepted the idea of cooperation in the process of the development of the launcher Europa, despite the fact that many of his advisers were against this idea of cooperation and said that this choice would distort the credits allocated to the French space research. That's why, at the same time, the Diamond project was launched in order to keep France certain independence. Moreover, this European cooperation is specific because France can be considered the leader of the cooperation. Since the beginning of the common European space program, France was involved as one of the main players. For instance, from January to May 1960, Pierre Auger, as a member, was at the cornerstone of the European Studies Group for Spatial Research, one of the first European institutions dealing with the outer space. The first achievement of the European space program, the Ariane launcher, was financed at 60% by France and the launcher base was situated at Kourou, in other words at the French launcher base.

The aim of the European Project Ariane was to achieve independence on the United States and the Soviet Union. This process is a continuity of the Gaullist principles which aimed at a development of a « third way », different from the tensions between the two blocs. There is also a technical aspect in this cooperation. The control and the utilization of space require technological and industrial capacities. In Europe, a single nation-State alone cannot develop these capacities, hence there is a need for a European cooperation. Europe is not a tool of the French foreign policy, nor a simple mean to affirm the power of France. It is a realistic vision of the space future and a means for challenging the space leadership of the United States and the Soviet Union.

At the same time France decided to sign agreements with the United States and the Soviet Union.[184] At the beginning of the French space program, the cooperation with the

[183] Moulin Hervé, *La France dans l'Espace 1959-1979 : contribution à l'effort spatial européen*, ESA, 2006

United States was crucial. As Jacques Blamont, French astrophysicist and first scientific director of the National Centre for Space Studies, said : « In France, at this era, everything has to be learn from Americans ». On the 18th February 1963, an agreement was signed between the NASA and the NCSS regarding the construction of a scientific satellite. This satellite was launched by an American rocket, called Scout, on 6th December 1965. Along the same line, France signed agreements with the Soviet Union. These agreements are part of the Gaullist stream of thought. General de Gaulle wanted to create a « Third Way » distinct from the two blocs. The principle of independence was the main pillar of the foreign policy of de Gaulle. That's the reason why France would be the first Occidental country to cooperate with the Soviet Union in the space domain. An agreement of cooperation was signed on the 30th June 1966. This agreement enabled reaching many achievements. For instance, in 1972 a French satellite was launched by a Soviet rocket. Furthermore, at the beginning of the 1970s, France was associated with the Soviet lunar program. That's why, several samples of moonstone retrieved by the Soviets would be given to the French scientists.

## France and the European Space policy today : heritage of Gaullism or not ?

### The key role of France in the European Space policy

France is placed at the core of the European Space policy. That means that the country have to cooperate and participate in the common projects. France also has to contribute to the European Space Agency budget. Each country has a vote in the decisions of the Council of the Agency, but most of the decisions is taken by a simple majority. Thus if France is against a project but the majority of the other members agree with the project the proposal is accepted. It also means that France has to apply the principle of the European preference. There is a political wish to give a priority to the European projects and to preserve the European advantages in opposition to the wider space programs or investments.

Nevertheless, France plays a key role in the European Space Agency.[185] France is one of the major member states of the Agency, is not the most important together with Germany. Indeed, in 2016, the participation of France in the European Space Agency's budget was 22.6% which equals 718 million Euros. It was the second highest contribution after Germany that provided 23.3% of the budget. The revenue of the French space industry equals the half of the European space industry. 12,000 people are employed in this domain in France, not

[184] *Ibid*
[185] D'Escatha Yannick, « La place du CNES dans le paysage spatial international », *Géoéconomie*, 2/2012 (n° 61), p. 31-38.

considering the indirectly connected jobs that represents 35% of the employment in this domain in Europe. Moreover, the headquarters of the European Space Agency is situated in Paris. The French base of Kourou is the most important launch site of the Agency. It is from this base that the most of the rockets and satellites are launched. Also, the French language, along with the English, is one of the basic languages of the European Space Agency documents and information.

It is also crucial to know that the European Space Agency works on the basis of the principle of the geographical return on investment.[186] This principle states that the proportion of the funds provided by a member state is allocatedto the research centers and the industries inside the same state for the provision of concepts and the building of the space technologies for the given mission. That's why the European cooperation is not a problem for France because the investments and the projects made within the framework of this cooperation are in the same time a benefit for the country thanks to this principle. According to Yannick d'Escatha, there is no competition between the European Space Agency and the National Center for Space Studies.[187]

**The upholding of a certain independence**

Despite the participation in the European Space policy France continues to develop a national program. This national program is mainly militarily oriented. Indeed, since the beginning of the European space cooperation, and especially after launching of the Strategic Defense Initiative by Reagan's administrative, France seeks a military space European cooperation. Like the project of a European Defense, this project is, for the moment, a failure. That's why France decided to launch its own satellites with military purposes in order to retain a space power and independence in space technologies in order to show that the country can use the outer space for defense purposes. This idea is inheritance heritage of Gaullism. For example, the three Syracuse satellites launched between 1984 and 2015, permit military communications between the French military staff and the troops on the battlefield.[188]

[186] Paolini. Politique spatiale militaire française et coopération européenne. In: *Politique étrangère*, n°2 - 1987 - 52ᵉannée. pp. 435-449.
[187] D'Escatha Yannick, « La politique spatiale de la France », *Annales des Mines - Réalités industrielles*, 2/2012 (Mai 2012), p. 16-24.
[188] Lieutenant-colonel Fabre Caroline, *Communiquer : quels satellites ?* DIRISI, 26th of March 2012

## Conclusion

According to Yannick d'Escatha,[189] the French space policy is facing up to four main challenges nowadays in order to keep his influence in the worldwide spatial domain. Two of them are much more about economic and industrial issues. The aim is to promote the innovations and to yield profit from the investments into the space domain, du to their levers. The last two are regarding the political and social aspects. Here, the goal is to build genuinely European space governance and to develop the international cooperation. The European space program appears to be behind the US one. The United States are annually contributing six-time as much into the space domain than all of Europe combined. Moreover, many new rivals to the European space program like China, that witnessed a major growth in the past fifteen years, or the private actors like Space X and Virgin Galatic are on a rise. The great advantage for Europe is that the outer space is, for the moment, a domain of cooperation and peace.

The role of Charles de Gaulle was crucial for the French space policy. However, we have to point out that de Gaulle backed the work of military men and scientists. He provided the means to establish the French capacities in the space domain. Charles de Gaulle did not create a French space program from a scratch. There is no father of the French space program, but important actors like de Gaulle who played a crucial role in the political domain. From all these aspects, it is possible to say that the French space policy is an illustration of the pregnancy of the principles of Gaullism inside the French society. Nevertheless, Gaullism in the French space policy appears to be much more a « modern » Gaullism with the huge participation of France in the European and international cooperation.

*« We have to realize, you on the sport and France with you, a great French work in Guyana to whom all regions of this world would know where this department is on the map. We need to show it and that everybody knows it everywhere. We started and we will continue »*
(Charles de Gaulle, 21 of March 1956 in Guyana).

[189] D'Escatha Yannick, « La politique spatiale de la France », *Annales des Mines - Réalités industrielles*, 2/2012 (Mai 2012), p. 16-24.

# 9. Space Piracy: A Condition of the Coming Age of Space Mercantilism

Matthew Schneider

## Introduction

The following paper discusses the inevitability of space piracy development in the coming space economy, and what is to be expected as a result. The paper begins by drawing the similarities between the oceans on earth, and the "oceans of space", which, along with other necessary conditions, will provide the ingredients for the development of space piracy.

Next, the consequences of the space piracy are discussed, ranging from the increase of space debris, to the subject of space piracy serving as inspiration for the upcoming generations of arts and entertainment (much like the Pirates of the Caribbean film series, or "Treasure Island", by Robert Lewis Stevenson).

Lastly, the paper offers several potential solutions pertinent for all types of actors in the space community to protect themselves, and combat threats from space piracy. Starting with the ability to protect oneself, as well as their fellow crew and property, and progressing to the possibilities of multi-lateral national cooperation in anti-piracy operations, the paper offers several options that could be used in compliment of each other, or simply as stand alone measures.

As this paper points out, space piracy has the potential to be extremely harmful in economic, developmental, and environmental terms, and is a subject that is best breached in preventative, rather than reactionary terms.

## Space Mercantilism Vs. Terrestrial Mercantilism

### Mercantilism; Part Deux

The ideas of mercantilism have been present on Earth since the genesis of human trade, and the systems that employed its principles grew, and shrunk with the passage of time, with the rise and fall of ruling and opposing empires.

The drive to satisfy the economic needs and wants at home catapulted men into out into the "New World". In terrestrial terminology, this meant North and South America, Africa, and parts of Asia. The major powers of Europe all sought to control the resources of the "New World", as these nations needed fuel for their industrializing economies and

growing populations. The economic benefits for those in control of the system were immense; they worked each day to concentrate the wealth of vast colonial lands into cities, palaces, and families. The continent of Europe flaunts the extravagance of life under the terrestrial mercantilist system.

In space mercantilism, the "New World", will most literally be a new planet, solar system, or galaxy. Much like in the middle of the first millennia, "colonists", will set out for the "New World", in search of better lives, or to escape famine or persecution because of their beliefs, for economic speculation, or perhaps will go involuntarily (as was the case with debtors colonies).

Unlike terrestrial mercantilism, the beginning stages of space trade will not be characterized by the destruction of existing civilizations to make way for the new. This aspect of advanced, competing life in our solar system is conveniently not present. It will actually be focused on importing life from Earth into a man made environment suitable for terrestrial life processes to occur. This isn't to say, however, that we will not be confronted with the opposing life scenario at a further point, but at this point, we enjoy the lonely position of being the only intelligent life form.

In its infancy, space mercantilism will be uni-polar, or bipolar, dominated by a sole super power, or the area demarcated in an act similar to the Treaty of Tordesillas of 1494, which split the "New World", into two, giving Portugal and Spain each half. As countries develop, the political dynamics of space become more complicated, leading to a more multi-polar arrangement of power, something like the developments contained within the Treaty of Westphalia of 1648. As rival nations carve out there spheres of influence, the vastness of the "New World", and technical constraints will be create of situation of dominant, but not hegemonic powers, leading to the potential for a situation of cooperation, or competition.

The maturation of terrestrial diplomacy was characterized by the development of the MAD doctrine, and the realization that relative peace was more beneficial than war. There is a view present in astropolitics that the development of a platform for which international conflicts could be resolved was the chosen method of institutional design to carry out the task as dispute mediator, encompassing the opinion of every single international player. It would be logical that such an interplanetary congress will be the site of interplanetary dialogue, as more and more players demand representation in the way that decisions are made regarding relations between the different civilizations. Lewis agrees with this opinion, coming to the

conclusion that " all activities carried on in outer space are multifaceted and require one to possess the knowledge of all types of information – scientific, political, economic, and technological – in order to formulate the needed legal regulations". (1987)

**"Oceans of Space"**

The physical spaces of each respective time period are comparable. The Earth possesses oceans comprised of water, dotted with islands, and space has huge swaths of nothing, what I call "oceans of space", dotted with planets. Both are similar in their concepts, and consequences for humans.

Nations of Earth will happily send out those citizens to explore for newfound riches, in hopes of reaping some of the profit, and in turn, gaining ever more territory under their national flag. Space mercantilism will work the same way, with nations encouraging, even subsidizing the colonization of areas best suited to meet the needs of the nation of origin.

In the same fashion as in terrestrial mercantilism, raw materials will flow from the "New World" to the old, where the hubs of engineering, manufacturing, and technology turn basic materials into finished products for domestic and colonial consumption.

The shear size, and undiscovered nature of things in space, rivals what the Caribbean, Atlantic, and other bodies of uncharted water offered the first European settlers to the "New World". Space piracy will take advantage of these physical traits to hide operations, and evade capture even if detected.

**Ebb, and Flow of Power**

The value of the raw materials that the universe holds is immeasurable. This creates obvious envy and desire among other terrestrial interests keen on expanding their own nation's power and wealth. The wars of colonial terrestrial dominance will mostly be replayed in the environs of space. Every nation will have a different style to their governance, each having their own nuances of enforcement that create the needed niche for piracy to take root.

The existence of such interplanetary power struggles, like the rise and fall of hegemonic powers and empires of earth, will inevitably result in an ebb and flow of authority, and a declining ability to enforce that authority over the far reaches of space. This type of political atmosphere, a power vacuum coupled with an enforcement gap, is the perfect environment for space piracy to manifest itself and flourish.

## Institution of Space Piracy

### Power Projection Problems

It seems that the institution of space piracy will come into existence for the very same reasons that piracy existed in previously mercantilist systems. Given the newness, and vastness of the "New World", participating powers will not be able to exert their control over every solar system, or every galaxy that could be potentially giving modern pirates safe harbor.

In the realm of space, pirates act as a lion attacking a herd of antelope. There are many antelope, and just one lion, meaning the whole herd does not need to be captured, only one. Another real life comparison would be German U-boats sinking Allied supply ships in WWII. To be fed, or to be successful in engagement, one not need destroy the whole herd, or shipping group, anything is better than nothing in life, war, or piracy.

Pirates operate in a touch and go manner, sometimes known as gorilla tactics, which presents the opposing side the difficulty in fighting an asymmetric war is that the costs of war are split between the two opposing sides, rather, one side has a much higher cost to continue to fight.

Not just those enforcing the rule of law are affected by the their ability, or rather inability, to project power into every corner of space. Pirates, much more so than governments, will be limited to very small areas of operation, as they lack the resources of that governments possess to project power over wider areas. This may simply create "no-go zones", or a cat and mouse type situation where trade routes are constantly changing, and pirates are always chasing.

### Information, Technology, & Capital Needs

While it is much easier to construct a boat than a space going vehicle, in reality, all one needs to complete this the task is the correct information, the proper level of technology, and capital available at their disposal. As knowledge spread of how to construct more agile, faster, and heavier armed sea going vessels, the prizes that pirates could capture grew, as well as their ability to defend themselves from attack. The same progression would apply to space pirates, first possessing very limited capabilities to interfere with and hijack commercial trade

traffic, but as the dissemination of both information and technology continues, the potential capability of pirates expands as well.

It would also be plausible to pose to a shipbuilder that one has legitimate commercial cargo transporting needs, and very quickly be utilizing the defensive, anti-piracy weaponry, as offensive assets for the act of piracy.

It is also safe to assume that there will be costs associated with piracy, the ship, the crew, maintenance, etc., and all of this requires capital. As the potential gains from piracy grow, so do the available sources of funding. Running a pirate ship is indeed much like running a business, and requires the knowledge of bookkeeping and fund-raising if continued ventures are to be sustained.

**Third Party Collusion-Privateering**

An interesting aspect about the institution of piracy is that it can be government sanctioned. When competing with another party for economic dominance, any occurrence that negatively affects your competitor's performance is a benefit to you. Piracy has definitely has its negative effects, and therefore can be a useful tool in the policy playbook of governments looking for a competitive edge, or to satisfy the need for raw materials themselves.

*"The enemy of my enemy is my friend".* The biggest threat to a nation's interests in space would be the encroachment of another nation on its claim, not a pirates stealing cargo. Yes, there is a cost of piracy, as we've discussed, but it is certainly not as large as a breach/loss of a territorial possession.

Moreover, it also takes an element of criminal activity to not only carry out the act of piracy, but then also to liquidate the proceeds. Criminal channels for the sale of goods must be established in order for the piracy industry to exist, the sales of which happen in the black market, outside of government structures, but not beyond government control, or without consent.

**Risk vs. Reward**

To steal another man's treasure is no easy feat, especially when it is traveling through space, and that individual is actively preventing you from taking it from them. Simply put, there are safer professions. However, the potential for making large sums of money is huge.

Why would someone choose this lifestyle knowing the risks? Simple; the reward exceeds to risk. Who would embark on such a life? Perhaps the scenario arises that after the large celestial war, the members of the now defunct rival military will resort to piracy, using their skill sets for private profit instead of national glory.

The successful existence of a piracy hinges on the risk/reward aspects of those participating in its manifestations. For any number of reasons, one may resort to piracy, but generally they all lead back to economic gain in relation to the cost of being caught.

## Consequences of Space Piracy

### Increased Militarization/Weaponization of Space

The most obvious consequence of space piracy will be the response of increased militarization/weaponization of space, both by public and private entities. Governments will need to protect their citizens, and channels of trade, private companies will protect goods to ensure profits. In response, the pirates will weaponize themselves and an arms race starts, with each side looking to dominate the other with superior armament.

In a cycle of one-upmanship, pirates and governments/ legitimate business spend more and more of their fortunes on more dominant assets of war. As tensions escalate into inevitable confrontation, a "space police state", emerges, with the freedom of movement of people and goods somehow restricted in an effort to combat piracy.

This consequence is not all negative, however, as technology developed for the fight against piracy will surely have economic value to the public sector, something that NASA already details in their yearly "spinoff report". (2008)

### Economic Distortion

Like on Earth, where, according to CNN journalist Kermeliotis, pirates accounted for some $18B in losses in the year 2013 alone. Pirates in space will cause equally alarming sums of damage. These losses will be inevitably passed to the consumer as goods become scarcer, or the cost to ship the goods grows due to increased protection/insurance costs.

If the cost of piracy grows to capture to large a portion of the investments being made, capital will stop flowing until investors are confident it can be secure. This will hamper both economic growth, and space progress.

Moreover, the costs of this problem are very unevenly split, due to the total black market nature of piracy. While a pirate spacecraft may face damage from space debris it played a part in creating, the pirate would have neither the care, nor the ability to meaningfully change the space debris situation. The burden would then fall on the governments (taxpayers) to rid space of such dangers. Funds that would have been used for a different purpose in the budget will have to be earmarked for anti-piracy missions, meaning tax-payers will get less of some service, or have to pay more in taxes.

**Presence of Ancillary Crime**

Pirated goods need somewhere to go, and the proceeds from the sales need to be used in some fashion. This creates the need for an economy based solely around the act of piracy. Economic channels are formed to move, and sell goods stolen in acts of piracy, and then for the income from these sales to be utilized for legitimate economic transactions in the real economy. In another way to increase the reward factor from such nefarious activities, individuals operating these channels often utilize them to trade other illicit, illegal, or otherwise, unwanted goods. What occurs over time is that the black economy expands, and the criminal layer becomes so imbedded, that it is very, very difficult, almost impossible to clear an economy and society of this type of negative externality. The presence of the mafia in Italy serves as a prime example of such a situation.

**Better, or Worse Terrestrial and Interplanetary Relations**

The presence of space piracy, much like piracy on Earth, will provide the opportunity for governments a subject that could bring further cooperation, or competition between rival parties, something. Eventually, once the institution of piracy becomes so ingrained into the economy, and has grown autonomous because of its strength, governments will be forced to cooperation to “deal with the problem”, if there is no hegemonic space power to take the role of “space policeman”, much like the role the United States has played on Earth during the second half of the 20$^{th}$ century.

However, if the existence of piracy is contingent upon the implicit, or explicit support of a legitimate government, and is used as a political, or economic tool, then the potential for deteriorating relations exists. Support for third party groups to do the political bidding of others to cowardly to act themselves will always be uncovered, see Ukraine and Syria.

Looking at the possible interaction between different civilizations on multiple planets, the same diplomatic options present themselves. As piracy is non-discriminatory, it is obvious to assume that pirates of different civilizations will prey on cargo, regardless of where it is from and going to. If these civilizations have larger political disputes, cooperation against the problem is unlikely, but, given that the economic benefits of trading channels that are free of piracy is mutual beneficial, it is plausible that is would be the first area of inter-species/planetary cooperation.

**Increase in Space Debris**

Inevitably, the lawless and destructive, even violent nature of piracy lends itself to the creation of more space debris. This will create more obstacles for humans in space, jeopardizing out ability to utilize the space around earth in the first place. The damaging of ships during hijacking, the novice/ hasty repairs, and the lawless lifestyle contribute to an already messy environment that is sure to demand attention.

This again is just another additional cost added to the equation of space travel, and goods delivery in these times, and the burden implementing a solution to the problem with lie solely in the shoulders of taxpayers.

The problem of growing amounts of space debris will most likely be a major reason why the problem of space piracy is ultimately addressed. Even in the pre-space piracy era, Lt.Col. Imburgia notes “95% of all man-made objects in space are pieces of space debris”. (2011). Humans are generally not a preventative species, but rather a reactionary species. Only until a problem truly confronts us, do we actually have the consensus to address it, but up until that point of manifestation, we still argue even the possibility of future problems. Even still, knowing this means that eventually we will be driven to address the problem, and there is a real possibility that the technology developed to combat space debris can be adapted to be used on Earth.

**Inspiration for the Arts**

The Sun, the Moon, and stars, have served as inspiration for terrestrial writers, poets, and film markers, for millennia. Every civilization has taken to describe the story behind the show that is every earthly night. Space, for humans, is the ultimate muse. Containing within it, the never-ending possibility to discover something more beautiful, more ugly, or more interesting that what was found before. Space is the fountain of inspiration, the

place of original creation, and ultimate demise. The stories written about the exploits of explorers abroad will once again fill the bookshelves, hearts, and minds, of earth dwellers, but this time they will not be looking north, south, east, or west for their source of adventure, but upwards towards the sky.

## Solutions to Space Piracy

### Increased Self-Reliance

In our lives, there are very few things that can give us instant gratification, relief, or pleasure. The same can be said for protection, and the vulnerability one creates for themselves when they count on another party to provide them with protection. Even if that third party has every intention on intervening on your behalf, what are the chances that the protection will be immediately available?

Pirates will take the path of least resistance to reach their ultimate destination. When confronted with an armed, prepared, determined defense, it is much easier to disengage and find an easier target, than to fight a hardened target. It is of the utmost importance that those traversing the vast distances of space take their and their cargo's security very seriously, as their own vigilance can put a stop to the problem. Ultimately, it could be individuals' unwillingness to defend themselves that's pirates capitalize on, as they understand that they face no resistance in the capturing of other ships and their goods.

Self-reliance is even more necessary in a place like space, where the boundaries are practically undefined, whereas with Earth, while not tiny, offers only so many places for engagement, and hiding.

### Multi-National Cooperation

Moltz introduces the idea *Space nationalism*, and therefore space individualism, is not the only possibility for the future structure of space relations. The possibility for *social interactionism* is real, where long-term cooperative links between nations define the structure of space relations. (2011)

As space piracy is not the first instance of piracy to strike human supply chains, it would be extremely pertinent to look at how the issue was dealt with in a maritime context here on earth.

Nations applied the idea of "universality" to the crime of piracy on the high seas, meaning that because this was a crime against humanity, all nations had the legal capacity to arrest, and persecute those committing the acts of piracy. Blount notes that no matter the nationality of those guilty in the commission of the crime, any nation had the jurisdiction to initiate legal proceedings against the accused. (2007)

The old adage goes, "there is power in numbers", and the amount of space needed to be patrolled would be far to much more one nation to police, meaning effective anti-piracy efforts must include as many state actors as possible. In an interesting way, this "universal" need combat space piracy may in fact lead to multilateral outer space cooperation between pertinent actors. Even actors representing the leading space exploring nation agree, in a 2014 United States Senate hearing, Deputy Assistant Secretary of Defense for Space Policy Douglas Loverro stated that "The space environment is too big and too complex for a single nation to bear the entire cost of monitoring it."

The ability for a multi-national force to combat space piracy grows with the increasing amount of space traffic. Much like the space pirates themselves, nations face a risk/reward calculation when crafting extra-terrestrial anti-piracy operations. The idea is simple; why should a nation whom receives no direct benefit from the space economy invest resources into its security? As the benefit that a nation receives from the space economy grows, so does the reward for maintaining secure shipping lanes.

It is plausible that the terrestrial economy of earth will one day become indistinguishable from the space economy, or that they are so intricately connected that one cannot function without the other. It would be at this point that no matter a nation's position in regard to space, i.e. one that is or isn't active in space transport, they would contribute to anti-piracy measures, as everyone would be effected by pirate infected markets.

**Increased Piracy Penalties**

Striking right at the heart of the institution of piracy, if governments were to introduce severely harsh penalties for piracy, this would impact the risk/reward ratio in such a way that it no longer made economic, or rational sense to partake in such criminal activities. In "Space Law", published as some of the first academic work published about astropolitics, Jenks's proposal is that acts of space piracy would be the exact same as on the earth's oceans. (1965)

Why this types of action works in this instance, and not in say current drug prohibition is because the pirates are not the only supplier of these goods to the market, as are drug dealers. As pirates lack the monopoly of supply of whatever good they are stealing, increasing the penalties does not increase the reward in proportionality to the risk; therefore, at a certain point of heightened risk, the reward is not high enough to entice participation.

**Cut the Supply of Pirates**

History shows us that the supply of mercenaries mostly come from area's of conflict in which the side they were fighting for lost, and their was no place in the newly created state for them other than jail, or death, a great example of this would be former Rhodesian, South African, USSR, or American soldiers. These individuals have the skills necessary to conduct such activities, and generally possess no other marketable skills, thus leading them to piracy as their only means of personal survival, as reported by *The Guardian's* African correspondent, David Smith. (2015)

Contrary to popular belief, the skills one must possess to be a pirate are not commonplace, and become even less so when dealing with highly complex space traveling vehicles. This means that there is a relatively small percentage of the population that has the skills necessary to be a pirate, or train others to become a pirate. In the aforementioned scenario where the collapse of a state creates many unemployed, singularly skilled individuals, all the winning government would have to do to take away a major catalyst for the development of piracy is to offer these former officers, soldiers, commercial captains and crew positions, therefore taking away the economic incentive of the only group of people capable of piracy.

**Conclusions**

It is without question that the institution of space piracy will manifest itself in the future space economy, following the same structure as terrestrial piracy. Exploiting the vastness of the shipping lanes, individuals will seek economic gain from the nefarious activity of goods hijacking. What happens next is the true question of space piracy.

Will it be so that one "superpower" is entrusted with the protection of space's economic highways? Or, will the shear magnitude of space require something special from Earth's nation states, something akin to *social interactionism*? These are questions that father time has the answer to. If Ratner had her way, we would "take the next step on Earth before

astronauts take the next steps in space, and establish an international supervisory space agency with the legal knowledge and power to build on prior jurisdictional accomplishments and write the basic code for the centuries ahead." (1999)

What we have the answer to do, provided by this paper, is, while not exhaustive, a list of the potential consequences of, and solutions to the inevitable manifestation of space piracy. With the knowledge contained within this paper, there is the possibility that space actors will be better prepared to combat space piracy, lessen its consequences, and ultimately put an end to the disease.

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