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Proposal of Establishing a New International Space Agency for Mining the Natural Resources in the Moon, Mars and Other Celestial Bodies

Doo-Hwan Kim*

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* Honorary President, Korea Society of Air &Space Law and Policy in Seoul, Visiting Prof., School of Law, Beijing Institute of Technology and Tianjin University Law School, China. (E-Mail : doohwank7@naver.com).

Ⅰ. Introduction

The idea of creating a new International Space Agency (tentative title: hereinafter referred to ISA) is only my academic and practical opinion. It is necessary for us to establish ISA as an international organization for the efficient and rapid exploitation of natural resources in the moon, Mars and other celestial bodies. The establishment of ISA as a new international regime is based on the Article 11, 5 and Article 18 of the 1979 Moon Agreement. In order to establish as a preliminary procedure, it needs to make a *" Draft for the Convention on the Establishment of an International Space Agency"* among the space-faring countries. In this paper, I was examined the domestic space legislation in the United States, Luxembourg, European Space Agency, China, Japan, the Republic of Korea and the North Korea, as well as space exploration and planning of the moons, Mars, Asteroids, Venus, Jupiter, Saturn, Titan and Other Celestial Bodies.

The creation of an ISA would lead to a strengthening of the cooperation needed essentially by the developed countries towards joint and cooperative undertakings in space and would act as a catalyst for the space exploration and exploitation of the moon, Mars and other celestial bodies.

It will be managed effectively and centrally the exploitation of space the natural resources, technology, manpower and finances as an independent organization in order to get the benefit of the space developed countries by ISA.

It is desirable and necessary for us to establish ISA in order to promote cooperation in space policy, law, science technology and industry among the space developed countries in the near future. The establishment of the ISA will be promoted the international cooperation among the space-faring countries in exploitations and developments of the natural resources in the moon and other celestial bodies.

The continuous development and application of space technology has become an important role in the modernization drive of the world community. The emergence of aerospace technology in the global countries has brought huge contributions to economic and social progress.

Nevertheless, in order to allow such an development to start a major obstacle must be solved, namely the absence within the space law regime of specific rules establishing how this exploitation has to take place and what are the rights and duties of the parties involved in it.

As it will be explained in the following paragraphs, space law does not contain any dedicated rule, dealing with the exploitation of extraterrestrial resources such as the moon, Mars, Venus, Jupiter, which has received the general acceptance of States.[1)]

Since the 1967 Space Treaty and the 1979 Moon Agreement did not provided any provisions on the following three items such as procedure of getting mining license, essence of mining right, right and duty of miners, so the United Nations Committee on the Peaceful Use of Outer Space (UNCOPUOUS) must revise the 1967 Space Treaty and the 1979 Moon Agreement so as to include the following three items in the near future.

(1) Procedures and registration for the permits of mining right on the natural resources in the moon, Mars, Venus, Asteroids, Jupiter, Saturn and Other Celestial Bodies

(2) Essence of mining right, the duration of the mining license, the rights and obligations of the mining license holder,

(3) Cooperation among the ISA member states each other for mining natural resources on the moon, Mars, Venus, asteroids, Jupiter, Saturn and Other Celestial Bodies.

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1)) Fabio Tronchetti, *A legal regime to govern the exploitation of the natural resources of the Moon and other celestial bodies*, The Korean Journal of Air and Space Law (Vol.23, No.1, 2008), p.168.

II. Exploitation of the Natural Resources in the moon, Mars, Venus, asteroids, Jupiter, Saturn and Other Celestial Bodies

1. Development of the Natural Resources such as Helium-3 on the Moon

The moon, Mars,[2] Venus, asteroids,[3] Saturn,[4] Jupiter,[5] Titan[6] and Other Celestial Bodies of our solar system contained large quantity of natural resources. The development of the natural resources on the moon and other celestial bodies represents one of the most existing future developments in the field of space law as well as a unique occasion for the economic and social growth of mankind as a whole.

As it is well-known, mankind is currently facing an energetic crisis.

The large number of benefits that are expected to be generated from the development of these natural resources, indeed, not only will contribute to the betterment of conditions of peoples on earth but also will allow mankind to face and likely solve one of the biggest problems currently affecting our planet, namely the exhaustion of the stocks of raw materials and other natural source of energy, such as fossil fuels.

There is no doubt that one of the most difficult problems that a peaceful world will face in the 21st century will be to secure an adequate, safe, clean, and economical source of energy. Existence of lunar Helium-3, to be used as fuel for fusion reactors, is well documented; verified from numerous Apollo and Luna mission samples, current analyses indicate that there are at least 1 million tones embedded in the lunar surface.

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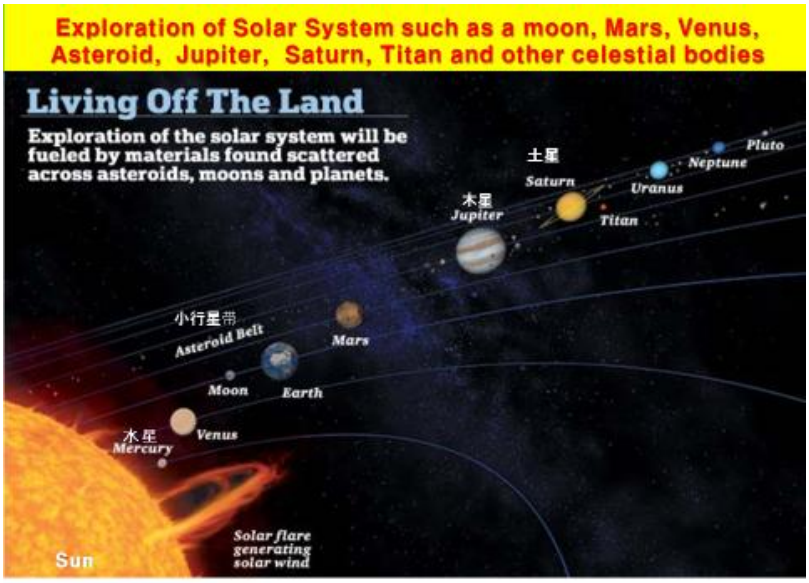
2) https://en.wikipedia.org/wiki/Mars
3) https://en.wikipedia.org/wiki/Asteroid
4) https://en.wikipedia.org/wiki/Saturn
5) Jupiter is the fifth planet from the Sun and the largest in the Solar System.
6) https://en.wikipedia.org/wiki/Titan_(moon)



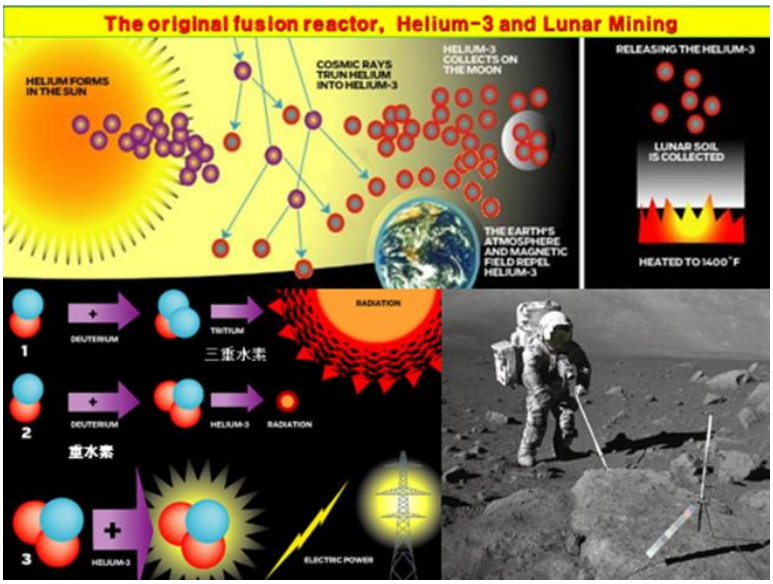
Source:https://www.nasa.gov/sites/default/files/thumbnails/image/pia12114_0.jpg

The Helium-3 would be used as fuel for fusion reactors. Moon gas may solve earth's energy crisis. If the current trends of energy on earth, scientists anticipate that the energy resources oil after 50 years, natural gas after 60 years, and uranium after 65 years will be dried up. So the research of the nuclear fusion for electric generator is progressed for long time. The solar energy is similar to creating the *'artificial sun'*. A scientist warns of the exhaustion of fossil fuels such as coal, oil and natural gas on earth. By 2060 the whole world will have a major problem. We need to be thinking ahead. Right now we are not thinking ahead enough.

Scientists estimate there is about 1 million tons of Helium-3 on the moon, enough to power the world for thousands of years. The equivalent of a single space shuttle load or roughly 25 tons could supply the entire United States' energy needs for a year, according to Apollo 17 astronaut and researcher Mr. Harrison Schmitt of the Fusion Technology Institute (FTI).[7] It has been estimated

7) http://fti.neep.wisc.edu/fti?rm=gallery

that 25 tons of Helium-3 can provide all the power that the United States needs in a year. The stocks of raw materials are running out and experts estimate that fossil fuels will be finished by 40~50 years. Helium-3, indeed, has the potential to solve this crisis thanks to its capacity to replace fossil fuels and other substances as primary source of energy on earth.



Source: https://missiontothegrey.weebly.com/helium-3.html

As to the moon, it presents vast amount of mineral resources distributed uniformly across its surface and subsurface. Manned and unmanned explorations have demonstrated that the moon is rich of ① aluminum, ② iron, ③ silicon, ④ oxygen, ⑤ hydrogen, ⑥ chromium, ⑦ manganese, ⑧ potassium, etc. These minerals can be utilized in their original form or refined into structural and electrical materials. They can be brought back to earth or used for life support of a permanent lunar basis or as rocket propellant.[8] For instance, oxygen and hydrogen are contained in the lunar regolith at all latitudes. There is also evidence

8) See Sci./Tech. Moon map aids discovery at http://news.bbc.co.uk/1/hsci/tech/2260

that the lunar poles contain amounts of water and ice. Lunar water is water that is present on the Moon. Liquid water cannot persist at the Moon's surface, and water vapor is decomposed by sunlight, with hydrogen quickly lost to outer space.

However, scientists have since the 1960s conjectured that water ice could survive in cold, permanently shadowed craters at the Moon's poles. Water molecules are also detected in the thin layer of gases above the lunar surface.[9] It is still not well-known how vast this amount is.

However, in case of a large presence of water, this could have an enormous impact as rocket propellant and life-support materials for astronauts.

A potential gas source found on the moon's surface could hold the key to meeting future energy demands as the earth's fossil fuels dry up in the coming decades. When compared to the earth the moon has a tremendous amount of Helium-3," when Helium-3 combines with deuterium (an isotope of hydrogen) the fusion reaction proceeds at a very high temperature and it can produce awesome amounts of energy.

The most valuable resource contained on the moon, however, is Helium-3. The Helium-3 represents, indeed, the main reason behind the attention of States and private operators for exploiting extraterrestrial resources. The raw material Helium-3 for the Nuclear Fusion Reactor is not embedded in the earth, but it is estimated to be embedded 1 million tonnes~500 million tons in the lunar surface.

Approximately one million tons of Helium-3 is a quantity to use and create the energy for 500 years in the global community. Helium-3 is an isotope, rare on earth but abundant on the moon, which combined with other materials, such as deuterium, can be used as a fuel in fusion power reactors. The value of Helium-3 is that it can generate nuclear power and, as a consequence, energy in a clean way, namely through a process of nuclear fusion which

9) https://en.wikipedia.org/wiki/Lunar_water

does not produce toxic waste. Thanks to these special characteristics, the extraction of Helium-3 is likely to have a huge impact on the way energy is produced and distributed on earth. Helium-3 is deposited on the lunar surface by solar winds and would have to be extracted from moon soil and rocks.

To extract Helium-3 gas the rocks have to be heated above 800 degrees Celsius.

The 200 million tons of lunar soil would produce one tone of Helium-3. Only 10 kilograms of Helium-3 are available on earth.[10] As space superpowers such as the United States, Russia, European Union, China, Japan and India has interested in Helium-3 that it is more expensive 300 times than gold, so it may be become a supremacy country in the future resources war from mining Helium-3 in the moon to bring it to earth for the purpose of getting it in advance. The Helium-3 fusion energy may be the key to future space exploration and settlement.

As we must promote the development of the moon's natural resources including Helium-3 in order to resolve in advance the depletion of energy resources in the global community after 50-60 years, so it is absolutely necessary the active and reciprocal cooperation of space science and technology in the first place among the space superpowers.

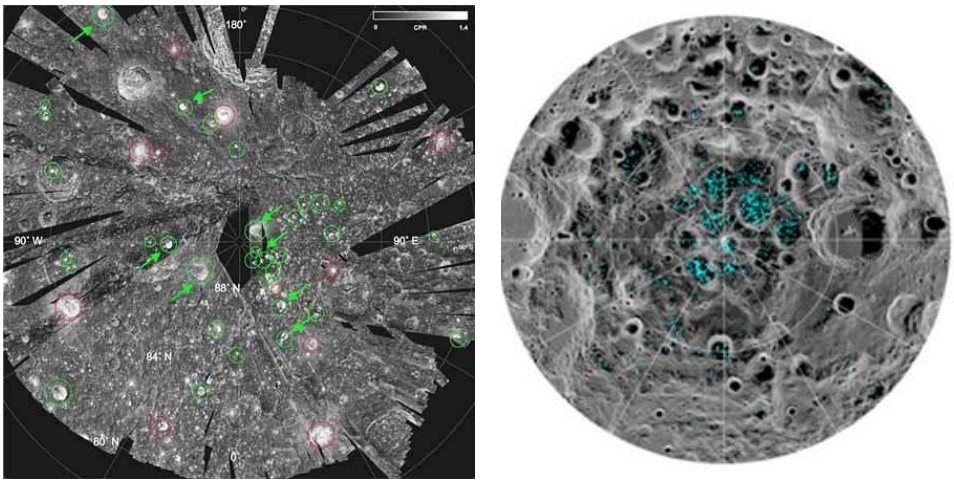
2. The moon has a lot of ice.

NASA of the United States has confirmed the ice on the moon for the first time and hopes that manned exploration will resume. Administrator Jim Bridenstine, Secretary of the National Aeronautics and Space Administration (NASA), said on August 21, 2018, that the presence of ice on the surface of the moon confirmed his vision of resuming lunar exploration in a "sustainable" form. Using data from a NASA radar that flew aboard India's

10) http://www.abc.net.au/news/newsitems/200411/s1252715.htm

Chandrayaan-1 spacecraft, scientists have detected ice deposits near the moon's north pole. NASA's Mini-SAR instrument, a lightweight, synthetic aperture radar, found more than 40 small craters with water ice. The craters range in size from 1 to 9 miles (2 to15 km) in diameter. Although the total amount of ice depends on its thickness in each crater, it's estimated there could be at least 1.3 trillion pounds (600 million metric tons) of water ice.[11)]

Ice confirmed moon's pole **Ice confirmed moon's pole**



Source : https://missiontothegrey.weebly.com/helium-3.html

The Mini-SAR has imaged many of the permanently shadowed regions that exist at both poles of the Moons. These dark areas are extremely cold and it has been hypothesized that volatile material, including water ice, could be present in quantity here. NASA Administrator Jim Bridenstine announced October 25, 1999 that the agency would send a robotic rover to the moon in 2022 to look for water ice, confirming plans that had been taking shape for months.

In a speech at the 70th International Astronautical Congress, Bridenstine said

11) https://www.space.com/25305-water-moon-earth-common-origin.html

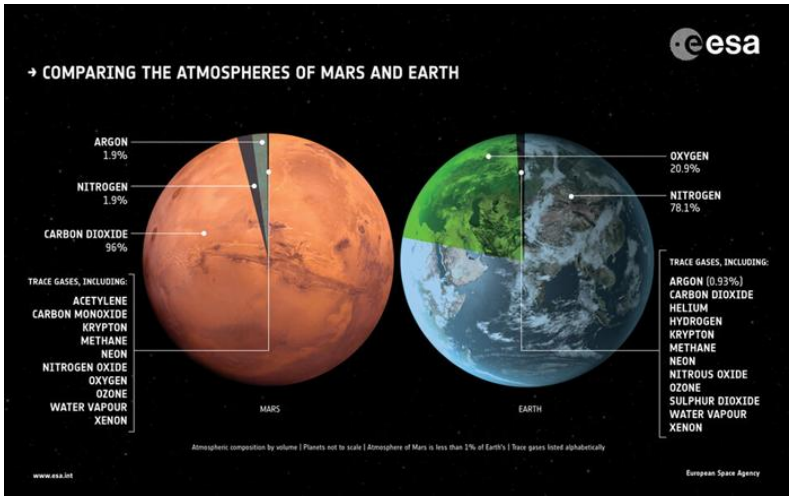
the Volatiles Investigating Polar Exploration Rover (VIPER) mission would look for ice on or below the surface of the moon at its south pole, a key resource for future human missions.[12)]

3. Huge ice on Mars' natural resources and crater, ESA processes data and releases images

Mars looks red because there is no sea of water like earth on its surface, and the earth's surface contains a large amount of iron oxide (red rust). The composition of Mars' atmosphere is 95% carbon dioxide, 3% nitrogen, 1.6% argon, and contains minor components such as oxygen and water vapor. Mars also has a methane gas source. The surface of Mars is mainly composed of basalt and andesite rocks. Both are rocks on the earth where magma forms by solidifying near the surface of the earth and are distinguished by the amount of silicon dioxide (SiO2) contained. Many places on Mars are covered with fine dust such as talc powder a few meters or more in thickness. Small spherical hematite (hematite) was discovered in rocks collected on the Meridian Plain on Mars.

The sphere is only a few millimeters in diameter and is thought to have been formed billions of years ago as a sedimentary rock in a wet environment. Other minerals containing sulfur, iron, and bromine have been discovered in the Mars.[13)]An image of Mars' crater with lots of ice and snow left was captured and released. A large amount of snow and water ice were captured on the "Korolev crater" near the North Pole of Mars. This image was taken by the Mars Express, a Mars spacecraft from the European Space Agency (ESA).[14)]

12) https://spacenews.com/nasa-confirms-plans-to-send-prospecting-rover-to-the-moon/
13) https://ja.wikipedia.org/wiki/%E7%81%AB%E6%98%9F
14) https://www.axismag.jp/posts/2018/12/111229.html



Sources : https://www.esa.int/Science_Exploration/Human_and Robotic Exploration/Exploration/Why_go_to_Mars

It has been in orbit over Mars since 2003, and the image was taken in April 2018 by its onboard high-resolution stereo camera (HRSC). Pathfinder's Sojourner Rover measured elements in Mars rocks with NASA's Alpha Proton X-ray spectrometer. Many spacecraft explorations of Mars have shown that the red planet has natural resources essential to sustain human life. Important life support compounds CO2, Ar, N2 and H2O are available on Mars. Solar energy, and possibly wind power, is practical as it is available on Mars. Mars may contain ores that would be very useful to potential colonist.[15)]

The abundance of volcanic features together with widespread cratering are strong evidence for a variety of ores.

While nothing may be found on Mars that would justify the high cost of transport to Earth, the more necessary ores future colonists can obtain from Mars, the easier it would be to build colonies on the Red Planet.[16)] Ore

15) Cordell, B. 1984. A Preliminary Assessment of Martian Natural Resource Potential. The Case for Mars II.

16) Larry O'Hanlon (February 22, 2010). "*Mining Mars? Where's the Ore?*". Discovery News.

deposits are produced with the help of large amounts of heat.

On Mars, heat can come from molten rock moving under the ground and from crater impacts. Liquid rock under the ground is called magma. When magma sits in underground chambers, slowly cooling over thousands of years, heavier elements sink. These elements, including copper, chromium, iron, and nickel become concentrated at the bottom.[17] When magma is hot, many elements are free to move. As cooling proceeds, the elements bind with each other to form chemical compounds or minerals. Because some elements do not bond easily to form minerals, they exist freely after nearly all the other elements have bonded into compounds or minerals.

The remaining elements are called incompatible elements. Some of them are quite useful to humans. Some examples include niobium a metal used in producing superconductors specialty steels, lanthanum and neodymium and europium for television monitors and energy-efficient LED light bulbs.[18]After the mass of magma has cooled and has mostly frozen or crystallized into a solid, a small amount of liquid rock remains.

This liquid bears important substances such as lead, silver, tin, bismuth and antimony.[19] Sometimes minerals in the magma chamber are so hot that they occupy a gaseous state. Others are mixed with water and sulfur in aqueous solutions. The gases and mineral-rich solutions eventually work their way into cracks and become useful mineral.

Ore minerals, including the incompatible elements, remain dissolved in the hot solution, then crystallize out when the solution cools. Deposits created by means of these hot solutions are called hydrothermal deposits. Some of the world's most significant deposits of gold, silver, lead, mercury, zinc, and tungsten started out this way.[20]

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17) Namowitx, S. and D. Stone. 1975. Earth Science: The World We Live In. American Book Company. NY, NY.
18) http://www.livescience.com/technology/Rare-Earth-Elements-100614.html
19) Sorrell, C. 1973. Rocks and Minerals. Golden Press. NY, NY.
20) http://link.springer.com/article/10.1007%2FBF02837988

It is desirable for us the establishment of the ISA in order to be efficient and rapid development among the abovementioned countries so as to manage, allotment and the adjustment for the development and exploration of moon natural resources including Helium-3.

The creation of ISA is possible to promote the unification of the window for negotiations in cooperating of the space science and technology among the United Nations Committee on the Peaceful Use of Outer Space (UNCOPUOS), the United States (National Aeronautics and Space Administration: NASA), European Union (European Space Agency: ESA), China (China National Space Administration: CNSA), Japan (Japan Aerospace Exploration Agency: JAXA) and India (Indian Space Research Organization; ISRO) including Korea (Korea Aerospace Research Institute: KARI) etc. for exploiting of the moon and other celestial bodies' natural resources.

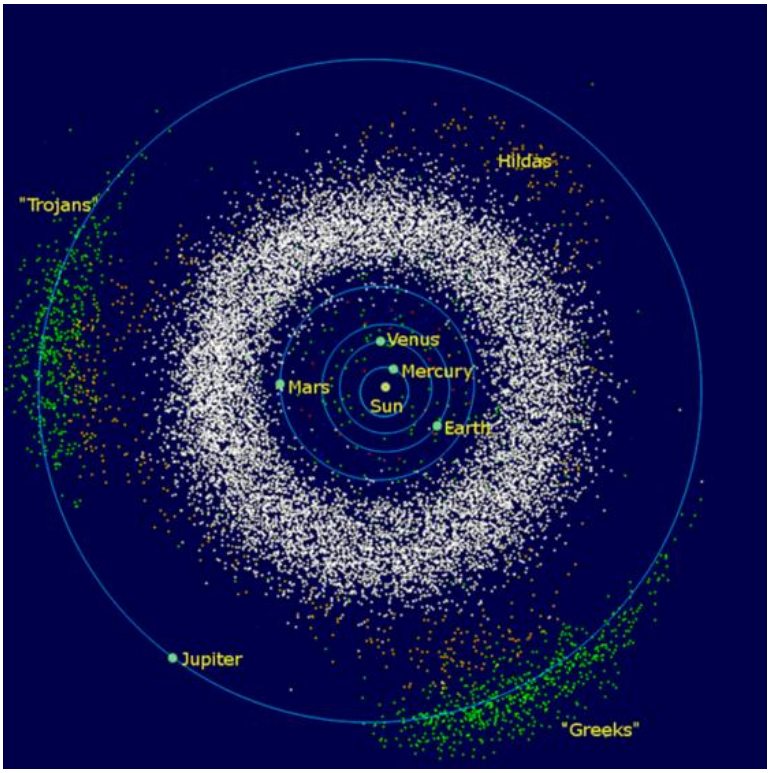
Moreover it is necessary and fruitful for mankind to establish the new ISA as soon as possible. If it is established the ISA in the near future, the ISA will be developed many the natural resources of the moon in cooperation with the developed countries and is able to create a fund to collect 10 percent commission for the authorization of mining right them in the moon due to the mankind's common heritage for the moon's natural resources based on the Article 11 of the 1979 Moon Agreement. The ISA will be used these funds for the economic aid and support for space exploration and research in developing countries.

4. Asteroids and natural resources

Asteroids can be classified as consisting of carbon, silicon, metal, gold or diamond by astronomical telescope observations were taken along with an analysis of meteorites (asteroid fragments that fell on Earth). And astronomical data suggests that a small percentage of asteroids contain high concentrations of valuable metals, such as platinum and gold. First of all, we need to find

the right asteroid mining target. To date, more than 750,000 asteroids have been identified. They are found in major asteroid belts and orbit between Mars and Jupiter, but that's too much and potential mining targets should be considered. We should focus on asteroids near earth. According to the astrophysicist Professor Martin Elvis (Havard University)[21], a mining-worthy asteroid has a market value of $ 1 billion.[22] A trillion dollars worth of resources may be asleep on an asteroid."

White Coloure Stars are many Asteroids Belt



Source : https://sciencesprings.wordpress.com/tag/nasa-lucy

21) https://www.google.com/search?source=hp&ei=CqJRXZfAOYqymAWsqJKgCg&q=Havard
22) https://courrier.jp/news/archives/57948/?ate_cookie=1566819646

5. Saturn and natural resources

Saturn is the sixth planet from the Sun and the second largest planet in our solar system. Adorned with thousands of beautiful ringlets, Saturn is unique among the planets. It is not the only planet to have rings－made of chunks of ice and rock－but none are as spectacular or as complicated as Saturn's. Like fellow gas giant Jupiter, Saturn is a massive ball made mostly of hydrogen and helium.[23]The little dark spot on Saturn is the shadow from Saturn's moon Enceladus.[24]

Saturn has a central nucleus made of rock, a compound of iron, nickel and silicon and oxygen, which is thought to be covered by metallic hydrogen thickly. The middle layer contains liquid hydrogen and helium. The outside is surrounded by gas.[25]

According to observations by NASA's Saturn observation satellite “Casini”, Saturn's satellite “Titan”" has liquefied hydrocarbons that exceed the reserves of the earth's petroleum resources.

According to a paper published in the specialist journal “Geophysical Research Letters”, it became clear that Hydrocarbons are sometimes the main components of oil and natural gas, and the Titan satellite is a treasure trove of energy resources that surpass the earth. The scientist who conducted the study was Dr. Ralph Lorenz of the Institute of Applied Physics at John Hopkins University in the United States. According to Dr. Lorentz, liquefied hydrocarbons are methane on the surface of the satellite “Titan”. It is said to have dozens of lakes as ethane and ethane, and that this one lake alone is equivalent to about 130 billion tons of natural gas reserves on Earth.[26]

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23) https://solarsystem.nasa.gov/planets/saturn/overview
24) https://www.spacetelescope.org/images/opo9828c
25) https://ja.wikipedia.org/wiki/%E5%9C%9F%E6%98%9F
26) https://ameblo.jp/yukikaze99j/entry-10075351005.html

6. Joint Exploitation of natural resources in the moon and legal basis on the establishment of ISA

In the near future, if the ISA is established in accordance with Article 11, paragraphs 5 to 6 of the 1979 Moon Agreement, the ISA will be able to develop and exploit many natural resources such as aluminum, iron, silicon, oxygen, hydrogen, chromium, manganese and Helium-3 etc. in the moon, Mars, Venus, asteroids, Jupiter, Saturn, Titan and Other Celestial Bodies.

Article 11, paragraphs 1 to 2 of the Moon Agreement stipulates as follows.

(1) The moon and its natural resources are the common heritage for mankind,

(2) The moon is not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means.

7. Cooperative exploitation of the natural resources in the moon and establishment of ISA

As the ISA will work with developed countries to exploite a lot of natural resources in the moon and other celstial bodies, so when granting mining rights, it is necessary to collect 10% commission and accmulate this amount as a fund. The ISA can use the fund to provide financial assistance and space exploration and research in developing countries including African countries. The establishment of the ISA requires discussions to establish a space for science and technology cooperation between the United Nations Commission on Space and Peace (UNCOPUOS) and the United States (National Aeronautics and Space Administration: NASA).

In Europe, the European Space Agency (ESA), China National Space Administration (CNSA), Japan Aerospace Exploration Agency (JAXA), Indian Space Research Organization (JAXA) ISRO) and Korea Aerospace Research Institute (KARI) in Asia should also discuss the matter in preparation for the

establishment of the ISA. The establishment of an ISA is essentially for efficient and rapid exploitation among the abovemetioned developed countries to manage, allocate and coordinate the development and exploration of lunar natural resources, including Helium-3.

8. International trends on the recent space mining

On March 18, 2016, the European Center for Space Law (ECSL) held a forum in Paris under the title "*Development of Natural Resources in Space from a Scientific, Technical and Legal Perspective*". The issue of space resource attribution has again sparked heated debate.

The 56th Legal Subcommittee of the UN Committee on the Peaceful Use of Outer Space (UNCOPUOS), was held in Vienna, Austria from March 27 to April 7, 2017.[27] During the first official meeting on the topic *"General exchange of ideas on potential legal models for operations in the exploration, development and use of peace and use of space resources*", the International Space Law Institute (IISL) and Europe A space law symposium jointly hosted by the Space Center was held.

The theme was "View of the legal model for exploring the use and utilization of space resources for 50 years after the adoption of the Space Treaty." The 57th session of the Legal Subcommittee of the United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS) was taken place April 9-20, 2018 in in Vienna, Austria. At the 57th Legal Subcommittee of the UNCOPUOS, a Dutch delegation introduced the progress of the Hague Working Group of 18 countries.

During the session, the Hague Working Group held a side meeting with the University of Vienna to discuss topics from the Legal Subcommittee of the

27) https://onu-vienne.delegfrance.org/56th-session-of-the-Legal-Subcommittee-of-the-COPUOS-March-_2017.

UNCOPUOS on the exploration, development, and use of space resources. They exchanged opinions on the legal model and introduced the "*Draft Module for the Development of an International Framework for Space Resources Activities*".[28]The Legal Subcommittee of the UNCOPUOS was held in Vienna, Austria from 1 April to 12 April, 2019. The discussions on the legal norms related to the exploration, development and use of space resources require the involvement of not only governments but also the private sector.It is necessary for us to promote the development and exploiutationn of space resources related industries. We welcomed discussions in The Hague Space Resource Governance Working Group. Japan Aerospace Exploration Agency (JAXA) will join the Working Group as an observer from 2019.[29]

Ⅲ. Activities of the Space Exploitation in the Developed Countries

3.1. The United States

The U.S. space law is codified in several laws beginning with the 1958 National Aeronautics and Space Act (NASA Act), signed into law on July 29, 1958. The NASA Act created the National Aeronautics and Space Administration (NASA) to conduct a U.S. civilian space program, with military space activities assigned to the Department of Defense (DOD). The Act has been amended several times over the decades.

NASA recently opened a new chapter on understanding the moon.

28) https://search.yahoo.co.jp/search;_ylt=A7dPCy4yo1Fdl1YA9z6JBtF7?pat=&aa=&ai=ds0EqEPwTvyDaEdkCvZ.xA&ts=1809

29) https://www.mofa.go.jp/mofaj/press/release/press4_007290.html

Preliminary data from the Lunar Crater Observation and Observation Satellite (LCROSS) indicate that the mission has successfully discovered water. On October 9, 2009, the LCROSS satellite collided with a shaded area near the Cabeus catering (Antarctica of the Moon) and observed that it contained water. Water is very important to the moon, just like the Earth, and it is very necessary to find out how much water is needed on the moon.

The lunar crater observation and sensing satellite (LCROSS) mission has been exploring water. The US space agency NASA aims to send humans to Mars in the 2030.

● Commercial Space Launch Competitiveness Act of 2015.

Title 4, Commercial Exploration and Utilization of Space Resources,

Article 51303. Asteroid resource and space resource rights

"A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained,

including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.'

A report submitted by the US government in 2016 stated that the Federal Aviation Administration (FAA) should oversee lunar exploration and asteroid resource extraction activities.[30)]

The 2017 NASA Transition Authorization Act (P.L. 115-10), which focuses on continuity at NASA as a presidential transition takes place. Another important space-related law is the FY2020 National Defense Authorization Act (P.L. 115-92), which creates a sixth military service, the Space Force, as part of the U.S. Air Force.[31)]

The Lunar Gateway is an in-development space station in lunar orbit intended to serve as a solar-powered communication hub, science laboratory, short-term

30) https://congress.gov/114/plaws/publ90/PLAW-114publ90.pdf
31) https://spacepolicyonline.com/topics/space-law/

habitation module, and holding area for rovers and other robots.[32]

It is expected to play a major role in NASA's Atemis Programme. While the project is led by NASA, the Gateway is meant to be developed, serviced, and utilized in collaboration with commercial and international partners. It will serve as the staging point for both robotic and crewed exploration of the lunar south pole, and is the proposed staging point for NASA's Deep Space Transport concept for transport to Mars.[33]

NASA will lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and to bring back to Earth new knowledge and opportunities. “ President Donald Trump has asked NASA to accelerate our plans to return to the Moon and to land humans on the surface again by 2024.[34]

3.2. Luxembourg

Luxembourg enacted the Act on the Exploration and Utilization of Space Resources on July 20, 2017, which came into effect on August 1, 2017. Luxembourg affirmed possession of space resources and introduced a permission system. Article 2.1 of this Act states that it is not possible to explore or use space resources without obtaining written approval from the Minister of Economy and Space Activities. In July 2017, Luxembourg became the second country in the world to enact a special law on space exploration through the Space Exploration Resources Utilization Act, which guarantees the rights and interests of private companies in space exploration.[35]

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32) Jackson, Shanessa (11 September 2018). "Competition Seeks University Concepts for Gateway and Deep Space Exploration Capabilities". nasa.gov. NASA. Retrieved 19 September 2018.

33) Gebhardt, Chris (6 April 2017). "NASA finally sets goals, missions for SLS – eyes multi-step plan to Mars". NASASpaceflight.com. NASA Spaceflight. Retrieved 19 September 2018.

34) https://www.theverge.com/2019/6/7/18656839/trump-nasa-moon-mars-tweet-artemis-lunar-exploration

The *Law on the Exploration and Use of Space Resources* (the Space Resources Law) adopted by the Luxembourg Parliament on 13 July 2017, as promogulated by Government on July 20, 2017 and then entered into force from 1 August 2017, [36]creates a licensing and supervisory regime in Luxembourg addressing the ownership of natural resources acquired in space. This Law composed of 18 Articles. Similar to the 2015 US Commercial Space Launch and Competitiveness Act, the Space Law provides that commercial companies operating within its regulatory framework may legally appropriate natural resources acquired in space from celestial bodies known as Near Earth Objects (NEOs). Luxembourg is the first European country to adopt legislation regulating the ownership of natural resources acquired in space by commercial companies, providing legal certainty for commercial projects in the space sector.

The 1967 Outer Space Treaty (OST) ratified by 109 countries including Luxembourg and the 1979 Moon Agreement (MA) ratified and accessed by 18 countries, established principles for the peaceful and free exploration of space by nation states. However, OST and MA does not address the ownership by private organisations of the resources harvested from NEOs by, for example, asteroid mining, including metals, minerals, and gases. [37]

The Law on the Exploration and Use of Space Resources states that “space resources are capable of being appropriated,” thus giving private companies ownership of space resources that they extract (Loi, Art. 1).

Under this Law, Luxembourger corporations or European companies that have their registered office in Luxembourg may extract space resources for commercial use after obtaining approval from the Government of Luxembourg (Art. 2-4). Anyone who explores and uses space resources without government authorization is subject to between eight days and five years of

35) https://space-law.keio.ac.jp/event/pdf/symposium_0412_06.pdf#search=27
36) https://spacenews.com/luxembourg-adopts-space-resources-law/
37) https://www.ogier.com/news/the-luxembourg-space-law

imprisonment and/or a fine of €5,000 to €1,250,000 (about US$ 5,900 – US$ 1,480,000). (Art. 18)

3. European Space Agency

The European Space Agency (ESA) plans to create a space station on the surface of the moon. ESA's historic Rosetta mission[38] concluded as planned, on 30 September 2016, with a controlled impact onto the comet it had been investigating for more than two years. The mission was launched on 2 March 2004, on a 10-year journey towards comet 67P/Churyumov-Gerasimenko.

En route, it passed by two asteroids, 2867 Steins (in 2008) and 21 Lutetia (in 2010), before entering deep-space hibernation mode in June 2011.

On 20 January 2014, it 'woke up' and prepared for arrival at the comet in August that year.

On 12 November, the mission deployed its Philae probe to the comet, the first time in history that such an extraordinary feat was achieved. During the next phase of the mission, Rosetta accompanied the comet through perihelion (13 August 2015) until the end of the mission.

On November 12, 2014, the lander "Philae" mounted on the European Space Agency (ESA) comet explorer "Rosetta" landed on Comet Churymov-Gerasimenko.

This is the first time a spacecraft has landed on a comet. ESA's Philae was the first spacecraft to land on a comet at the historic moment of space exploration. The European Space Agency is planning for a lunar resource exploration by 2025. ESA director Jan Wörner hopes that the "moon village" will function properly for 20 years.

The ESA further stated that building a permanent base on the moon is a "stepladder" and "testbed" for a visit to Mars. ESA is planning to install a

38) https://sci.esa.int/web/rosetta

permanent human outpost on the moon.This imagined "moon village" is the product of international cooperation between countries far from the earth, and how to build a lunar colony in the future, space science, space business, and space mining. And it will be the base for space tourism. Although a lunar sediment called "regolith" covers the surface of the moon and has been deposited at least 12 feet (3 m 65 cm) deep underground, ESA has a plan to mine this lunar sediment in the future.

European Space Ageny made in the Moon Village

Source: http://blogs.esa.int/janwoerner/2016/11/23/moon-village

These sedimentary layers are a mixture of compounds such as clay, glass fragments, minerals, and iron oxide, and it is considered that oxygen, water, and fuel can be extracted from iron oxide. Moon Village will be made available by ESA member states and other countries around the world, Dr. Johann-Dietrich Woerner (Director General of ESA) said.[39)]

39) https://www.theguardian.com/science/2016/sep/23/is-a-moon-village-the-next-step-for-space-exploration-esas-chief-thinks-so

He added that the ESA should make the moon the next destination for humans in low-Earth orbit, use the moon close to Earth, and pave the way for Mars. Although a lunar sediment called "regolith" covers the surface of the moon and has been deposited at least 12 feet (3 m 65 cm) deep underground, ESA has a plan to mine this lunar sediment in the future. These sedimentary layers are a mixture of compounds such as clay, glass fragments, minerals, and iron oxide, and it is considered that oxygen, water, and fuel can be extracted from iron oxide.

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The Moon Village Association (MVA) was established in 2017, as a non-governmental organisation based in Vienna, whose goal is the creation of a permanent global informal forum for stakeholders like governments, industry, academia and the public interested in the development of the Moon Village.

40) https://www.theguardian.com/science/2016/sep/23/is-a-moon-village-the-next-step-for-space-exploration-esas-chief-thinks-so

The MVA fosters cooperation for existing or planned global moon exploration programs, be they public or private initiatives. It comprises approximately 220 members from more than 39 countries and 26 Institutional members around the globe, representing a diverse array of technical, scientific, cultural and interdisciplinary fields.

4. China

4.1. Chinese Space Law

Chinese space law consists of the 2001Measures for the Administration of Registration of Objects Launched into Outer Space (hereinafter the Registration Measures)[1] and the 2002 Interim Measures on the Administration of Licensing the Project of Launching Civil Space (hereinafter the Licensing Measures). The purpose of the 2001 Registration Measures is to ensure the implementation of the requirements set in the 1975 Registration Convention, which demands states parties to register their space objects in a national register as well as to transfer relevant information to the U.N. Secretary-General for inclusion in an international registry.

The Registration Measures contain 16 articles addressing several aspects related to the registration of space objects. They begin by defining a space object as “an artificial satellite, crewed spacecraft, space probe, space station, launch vehicle and parts thereof, and other human-made objects launched into outer space.”

The purpose of the 2002 Licensing Measures is to set forth the legal regime for the licensing

of launches of civil, non-military, objects into outer space. The Measures include five chapters and 26 articles that lay down detailed procedures on how to apply for a license, on one side, and describe the rights and duties of the licensee, the supervisory mechanisms and the penalties to be imposed in case of violation of the license’s terms, on the other side. The Licensing Measures are

applicable to the launching of space objects from Chinese territory as well as to the launching of space objects from foreign territory if the space object is owned by China or if its ownership is transferred to Chinese natural or juridical persons or organizations. There is no space activity law in China meaning the law is disproportionally under-developed in comparison with China's space capabilities and legislation in other nations.

Mr. Xu Dazhe (许达哲),, Director of the China National Space Administration (CNSA: 中国国家航天局)[41] said that China has already made policies and regulations in the administration of civil space launch, registration of space objects and reduction and prevention of space debris. "National space law has been listed in the national legislation plan, and the CNSA is drafting the law," said Mr. Tian Yulong, Secretary-General of the CNSA. China expects to introduce space law around 2020.

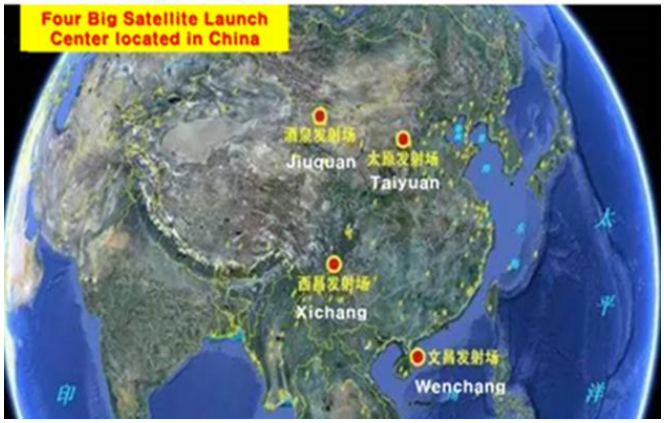
4.2. China leads the world in “behind the moon” landing exploration

The China National Aeronautics and Space Administration (CNSA: 中国国家航天局) unmanned luna-explorer "Chang'e-4 (嫦娥4号) " successfully landed behind the moon on January 3, 2019 at 10:26 am for the first time. On the same night, the probe "Yutu-2 (玉兎2号)” descended on the moon and started running. CNSA also sent a picture of the other side of the moon. Chang'e-4 is a spacecraft launched on December 8, 2018. The spacecraft will fly to the moon and land on the moon. The lander weighs approximately 1200kg and is equipped with cameras, lunar dust measurement equipment, seismometers, and fast neutron, gamma and cosmic ray measurement equipment provided by Germany.

The "Yutu-2 (玉兎2号)” weighs about 140kg, and is equipped with a camera, underground radar, and a high-speed neutral particle analyzer provided by Sweden that examines the interaction between the solar wind and the moon

41) http://www.cnsa.gov.cn/english/n6465668/n6465670/c6478978/content.html

and the water in the moon. Chang'e-4 was launched by the "Long March 3B (長征3号B) " rocket from the Xichang Satellite Launch Center (西昌卫星发射中心) in Sichuan Province.[42] Chang'e-4, it traveled several meters while checking.[43] The route while communicating with the relay satellite.



Sources : https://www.sohu.com/a/155445477_249601

After detaching the vehicle mounted on the Chinese lunar lander and the lunar rover "Yutu-2 (玉兎2号)" conducted lunar geological surveys, ice search, radiation surveys, and silkworm growth experiments. The mission of Chang'e 4 goes beyond just bringing back a sample of the moon. It looks forward to manned flights to the moon and even the construction of a permanent lunar base.

Exploration missions will be in full swing, but China's ultimate goal is to build a lunar base for future manned exploration. China has begun to lead the world in exploring the back of the moon, yet unknown. China has set its sights on launching the lunar space shuttle Chang'e-5 by 2020, following its landing on the Moon's underside via its unique Lunar Exploration Program (CLEP).

42) https://ja.wikipedia.org/wiki/%E5
43) https://news.livedoor.com/article/detail/15831968

China, Deep Space Exploration Roadmap (中國,深空探測路線圖)

Source: https://www.unoosa.org/documents/pdf/copuos/2018/copuos2018tech19E.pdf

4.3. Launch of China's Third Space Station (中國第三空間站)

The Chinese Space Station (CSS) will be launched in 2022. CSS is a manned space station that China aims to complete around 2022. Consisting of a residential facility where an astronaut stays, a space laboratory, a manned round-trip aircraft and a cargo transport aircraft, Long March 2 (長征2号 CZ-2F), Long March 5 (長征5号: CZ-5 B), Long March 7 (長征7号: CZ-7) will be launched a CSS module, astronaut and cargo with a rocket. The three facilities, Core Module (CM), Experiment Module 1 (EM I), and Experiment Module 2 (EM II), are to be combined and operated in orbit for 10 years. Three to up to six astronauts can stay.

On June 12, 2019, China announced that it would accept nine space experiments recruited from 17 nations, including the University of Tokyo, Japan, on its own Chinese Space Station. Accepting the participation of emerging nations such as Kenya, Mexico and Peru, as well as nations that already have space

technology, such as Russia and Japan, and space physics, astronomy, life science, microgravity experiments, earth science, space technology, etc. CNSA are conducting experiments using stations. The Chinese large modular space station is a planned to be placed in Low Earth Orbit. The planned Chinese Space Station will be roughly one-fifth the mass of the International Space Station and about the size of the decommissioned Russian *Mir* space station. The Chinese space station is expected to have a mass 100 tonnes (220,000 lb). Operations will be controlled from the Beijing Aerospace Command and Control Center in China.[44)]

The planned launch date of the core module, the *Tianhe-1* ("Harmony of the Heavens" 天和-1号), is 2020. China aims to complete the construction of the space station around 2022. The Tiangong space station will be T-shaped with the Tianhe core module at the center and the Wentian and Mengtian experiment capsules on each side.

The station, which will orbit 340 to 450 km above the Earth's surface, could be enlarged to 180 tonnes if required and accommodate three to six astronauts. It is designed to last at least 10 years and could be prolonged through in-orbit maintenance.[45)]Long March 5 will be used for the launch. If the International Space Station (ISS), which has been operating since 1998 with 16 countries including the United States and Russia, retires in 2024, China will be the only country in the world to own a space station. China is spurring space technology development.

5. Japan

5.1. Japanese Space Law

The Japanese Basic Space Law(宇宙基本法) was enacted on May 21, 2008

44) https://en.wikipedia.org/wiki/Chinese_large_modular_space_station
45) http://www.xinhuanet.com/english/2019-10/17/c_138479514.htm

and then promulgated by the government on May 28, 2008. The Basic Space Law effected into force on August 27, 2008. This Law composed of 35 Articles and five Chapters. On May 21, 2008, the Basic Space Law (Basic Law) was enacted when it was passed by the Lower House of the Diet following its earlier ratification by the Upper House. This law is Japan's first basic law relating to space activities since 1970 when Japan initiated its space development with the launch of Ohsumi, a satellite for testing technology. The Basic Law consists of the main body comprised of a total of 35 articles and four supplementary provisions.

The fundamental principles of the legislation are detailed below.

The objectives of the law are to improve the lives of the people, develop the economy and society, and contribute to world peace and human welfare by establishing the basis of Japan's space development and use of space as well as its responsibility in these areas and by formulating a basic plan (Article 1).

Furthermore, Japan will engage in space activities that will contribute to the formation of a safe and secure society Japan, the peace and security of international society, and the security of Japan (Article 3).

"The Basic Plan on Space Policy" is formulated to propel policies regarding Japan's space development and use, comprehensibly and systematically based on Article 24 of the Basic Space Law (enacted in 2008, Law No. 43), and is considered to be the most fundamental plan of space exploitation. National Space Policy Secretariat plans and designs policies to be incorporated in the Basic Plan, including those discussed in the Committee on National Space Policy.[46)]

The Space Development Strategy Headquarters (宇宙開発戦略本部) was established in the Cabinet to formulate the basic policies for promoting space development and the measures to be implemented comprehensively and systematically in space development as the Basic Space Plan (Article 24-25).

The head of the Space Development Strategy Headquarters is the Prime

46) https://www8.cao.go.jp/space/english/index-e.html

Minister, and the Deputy Head will be the Secretary-General of the Cabinet Secretariat and the Minister of Space Development (Article 28-29). After the enactment of Basic Space Law in 2008, the Strategic Headquarters for Space Development (SHSD) was set up in the Cabinet, led by the Prime Minister himself.

Two outer space-related laws were promulgated in Japan's official gazette on November 16, 2016: the Act on Launching Artificial Satellites and Managing Satellites(人工衛星等の打ち上げ及び衛星管理に関する法律：Space Activity Act, Act No. 76 of 2016) and the Act on Securing Proper Handling of Satellite Remote Sensing Records (衛星リモートセンシング記録の適正な取扱いの確保に関する法律：Remote Sensing Records Act, Act No.77 of 2016). (Texts of both laws, KANPO 官報), extra edition No. 252 (Nov. 16, 2016), at 3, KANPO website in Japanese. The Space Activity Act composed of sixty five Act and eight Chapters.

Most of the provisions of these laws will become effective within two years of the promulgation date (Space Activity Act, Supp. Provisions, Article 1; Remote Sensing Records Act, Supp. Provisions, Article 1). The Space Activities Actis concerned with the launch and management of satellites, and it consists of 3 parts–① launch approval for satellites, ② management approval for satellites, and most importantly, ③ third party liability in the case of a launch failure or a de-orbit of a satellite.

One of the biggest obstacles in promoting commercial space activities is the launch liability issue, where the cost of a launch failure poses a great risk for any private entity to undertake. With the advent of new, commercial space enterprises such as *SpaceX*, the Japanese government hopes to alleviate the financial concerns and make it easier for companies to launch satellites and participate in various space activities.

5.2. The Japan Aerospace Exploration Agency

The Japan Aerospace Exploration Agency (JAXA: 国立研究開発法人宇宙航空研究開発機構) is the Japanese national aerospace and space Agency. JAXA was formed on 1 October 2003.[47] JAXA is responsible for research, technology development and launch of satellites into satllites into orbit, and is involved in many more advanced missions such as asteroid exploration and possible human ecploration of the Moon.[48]

SELENE (Selenological and Engineering Explorer), better known in Japan by its nickname Kaguya, was the second Japanese lunar orbiter spacecraft. After successfully orbiting the moon for 1 year and 8 months, the main Orbiter was intentionally crashed onto the lunar surface near Gill lunar crater at 18:25 (UTC)_ on June 10, 2009.

On May 18, 2010, the Venus Climate Orbiter “AKATSUKI" satellite and the the Small Solar Power Sail Demonstrator "IKAROS“ launched at Tangashima Space Center in Japan by the H-IIA Launch Vehicle No. 17. AKATSUKI[49] is the world's first planetary probe that deserves to be calleda meteorological satellite.

Hayabusa-2 is an astroid sample-return mission operated by the Japanese space agency, JAXA. It follows on from the Hayabusa mission which returned asteroid samples in 2010. Hayabusa-2 was launched on 3 December 2014 and rendezvused with near-earth asteroid 162173 Ryugu on 27 June 2018. It surveyed the asteroid for a year and a half and took samples. It left the asteroid in November 2019 and is expected to return to Earth in late 2020.

Hayabusa-2 carries multiple science payloads for remote sensing, sampling, and four small rovers that investigated the asteroid surface to inform the environmental and geological context of the samples collected. BepiColombo

47) https://en.wikipedia.org/wiki/JAXA#Organisation
48) McCurry, Justin (15 September 2007). "*Japan launches biggest moon mission since Apollo landings*". guardian.co.uk/science. London. Retrieved 16 September 2007.
49) https://en.wikipedia.org/wiki/JAXA

is a joint mission of the European Space Agency (ESA) and the JAXA) to the planet Mercury. The mission comprises two satellites launched together: the Mercury Planetary Orbiter (MPO) and Mio (Mercury Magnetospheric Orbiter, MMO).

The mission will perform a comprehensive study of Mercury, including characterization of its magneric field, magnetosphere, and both interior and surface structure. It was launched on an Arian 5 rocket on 20 October 2018 at 01:45 UTC, with an arrival at Mercury planned for December 2025, after a flyby of Earth, two flybys of Venus, and six flybys of Mercury. The mission was approved in November 2009, after years in proposal and planning as part of the European Space Agency's Horizon 2000+ program; it is the last mission of the program to be launched.

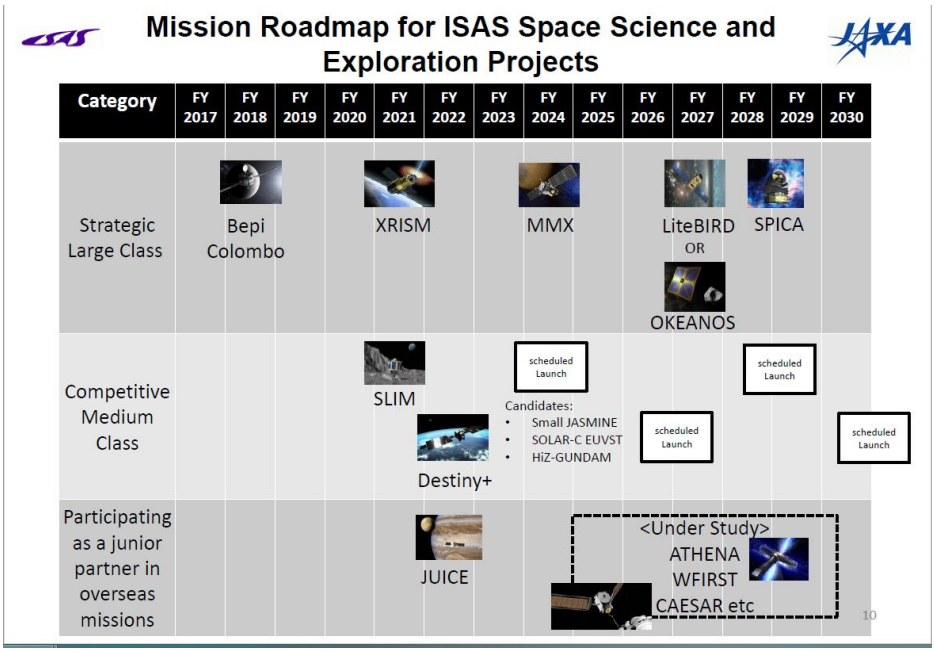
Japan will collaborate with a US-led project to build a new space station, which will be orbiting the moon. The project, which also has Russia as one of the collaborators, is expected to be completed in the 2020s. The collaboration will give Japan a chance to send its own astronauts for the first time to the lunar surface.[50)]

The JAXA and Toyota team as Japanese automaker, two companies have partnered up to create and ultimately launch the pressurized moon vehicle until 2029. Toyota vehicles driving in space. and the Japan Aerospace Exploration Agency (JAXA) have teamed up to launch their Moon Rover. The Moon Rover will be a pressurized vehicle to assist Japanese astronauts to navigate up in space, and more specifically, the moon. The three-year agreement will see the two companies working closely together to create pressurized lunar rover.

In a statement on July 16, Toyota representatives said, "Over the course of the three-year joint research period, JAXA and Toyota will manufacture, test and

50) https://www.techtimes.com/articles/217037/20171214/japan-join-building-space-station-will- orbit-moon.htm

evaluate prototypes, with the goal of developing a manned, pressurized lunar rover and exploring the surface of the moon as part of an international project."



Source : https://www.essc.esf.org/fileadmin/user_upload/essc/Toukaku_JAXA_Space_Science_Program_and_International_Collaboration.pdf

Ahead of the start of the agreement, which began in June this year and runs until the end of the fiscal year in 2021, Toyota created its Lunar Exploration Mobility Works department.

6. India

6.1. The Space Activities Bill

The Space Activities Bill of 2017 has been drafted and is pending approval in the Parliament. This bill would promote, support, and regulate space activities in

India by allowing private and non-governmental agencies to involve themselves in space exploration. Space activities in India, which started in early 1960s, are hitherto pursued by Department of Space (DOS), as nodal agency for space activities in India. As per 'Government of India (Allocation of Business) Rules 1961(as amended from time to time) DOS has been responsible for the space activities in India, for more than five decades, with the major objective of bringing the benefits of space technology and its applications to societal needs and national development.

Pursuance of Space activities were focused on three major areas namely, ① Space Infrastructure which includes realization of spacecraft for various applications and associated ground infrastructure, ② Space Transportation systems, which include through realization of various types/class of launch vehicles and associated ground infrastructure including launch facilities, and ③ Space applications for various national requirements through establishment of necessary ground infrastructure and coordination mechanisms. The Department of Space, through Indian Space Research Organization (ISRO) and its R&D centers has been executing various satellite and launch vehicle projects and conceptualized & implemented a number of application program for national development and governance.[51)]

6.2. The Indian Space Research Organization

The Indian Space Research Organisation (ISRO) is the space agency of the Governmebt of India and has its headquarters in the city of Bengaluru. Its vision is to "harness space technology for national development while pursuing space science research & planetary exploration" The Indian National Committeefor Dpace Research (INCOSPAR) was established in the tenure of Jawaharlala Nehru under the Department of Atomic Energy in 1962. ISRO sent a lunar orbiter, Chandrayaan -1, on 22 October 2008, which discovered lunar watder in the form

51) https://www.prsindia.org/sites/default/files/bill_files/Draft%20Space%20Activities%20Bill%202017.pdf

of ice and the Mars Orbiter Mission, on 5 November 2013, which entered Mars orbit on 24 September 2014, making India the first nation to succeed on its maiden attempt to Mars, as well as the first space agency in Asia to reach Mars orbit.

On 18 June 2016, ISRO launched twenty satellites in a single vehicle, and on 15 February 2017, ISRO launched one hundred and four satellites in a single rocket (PSLV-37) a world record. ISRO launched its heaviest rocket, Geosynchronous Satellite Launch Vehicle-Mark III (GSLV-Mk III), on 5 June 2017 and placed a communications satellite GSAT-19 in orbit.

Source : https://www.vssc.gov.in/VSSC/index.php/isro-centres

With this launch, ISRO became capable of launching 4-ton heavy satellites into GTO. On 22 July 2019, ISRO launched its second lunar mission Chandrayaan -2 to study the lunar geology and the distribution of lunar water.

7. The Republic of Korea

7.1. Space Laws in the Republic of Korea

The space industry has become an important sector in Asia, which will develop with greater rapidity in the 21st century. Thanks to the development and application of artificial intelligence, mobile communication industry, increase of space exploration and exploitation activities, the space industry will grow continuously and the market size of the global space industry is likely to see an annual. The growth rate of the space industry is expected to grow by about 10% globally, making it a popular industry in the future.

For this reason the Korean Government decided to actively foster the aerospace industry. The Korean space policy is based on the national space program as well as the space relating law in Korea which is divided into three branches: ① the Aerospace Industry Development Promotion Act of 1987, ② the Space Development Promotion Act of 2005 and the ③ Space Damage Compensation Act of 2007. It deals with the development and the promotion of the aerospace industry and pursues the objective of controlling accident mitigation and the regulation of compensation in case of damage.

I would like to introduce briefly the Korean three space atcts as the following.

The Aerospace Industry Development Promotion Act was passed by the majority of the Korean National Assembly and was proclaimed with Law No. 8852 by the Government on December 4, 1987. [52]This abovementioned Act has been amended 22 times during the more 33 years until on March 30, 2020 and it composed of 22 Articles.

It is the purpose of this Act to contribute to the sound development of the national economy and the improvement of national life by rationally supporting and promoting the aerospace industry as well as research and effective

52) http://elaw.klri.re.kr/kor_service/lawView.do?hseq=46909&lang=ENG

development with regard to aerospace science and technology. The Korean Government was enacted a new "*Space Development Promotion Act"* on May 2005 in order to control the systematic promotion of space development, to manage the launch of space objects and to produce guidelines for handling potential compensation claims for damage caused by space accidents.[53)]

As space development involves great expenses and a high risk as a national strategic and public industry, the Korean Government had recognized the need to establish the legal basis for this undertaking as well as the establishment of the promotion plan every five years.

In 2004 it proposed a **"***Draft for the Korean Space Development Promotion Act"* which was then passed by the State Council of the Korean Government on December 21, 2004 and it was submitted to the National Assembly where it was passed by majority resolution on May 3, 2005.

The Space Development Promotion Act (Hereinafter referred to as Korean Space Act) was then transferred to the Government on May 17, 2005 where it was proclaimed with Law No. 7538 on May 31, 2005. It came into force six months later, on December 1, 2005.

But this Act was amended 12 times for 15 years for by the revision of the Government Organization Act etc. until on March 30, 2020 and this Act composed of 29 Article.[54)] The Korean Space Act was in accordance with Korea's international obligations under the UN foure space treaties such as the Space Treaty of 1967, the Rescue Agreement of 1968, the Liability Convention of 1972 and the Registration Convention of 1975.

The main features of the Korean Space Act which was comprised by 29 articles. The *Act on the Compensation for Damage Caused by Space Objects* was passed by majority resolution of the Korean National Assembly and then

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53) Doo Hwan Kim, *"Necessity for Enacting the Space Law in Korea.* Japanese Academic Journal Kiyo; 4(1), Proceedings of the Research Institute of Social Systems of Chuogakuin University, Chiba-ken, Japan, at 39-52.

54) http://elaw.klri.re.kr/kor_service/lawView.do?hseq=46397&lang=ENG

proclaimed with Law no. 8714 by the Government on December 21 2007.[55] But this Act was amended five times for ten years by the revision of the Government Organization Act etc. until on March 30, 2020.[56]This Act was enacted by the method of congressman's legislature. This Act was composed of nine articles.

7.2. The Korean National Space Development and Promotion Plan

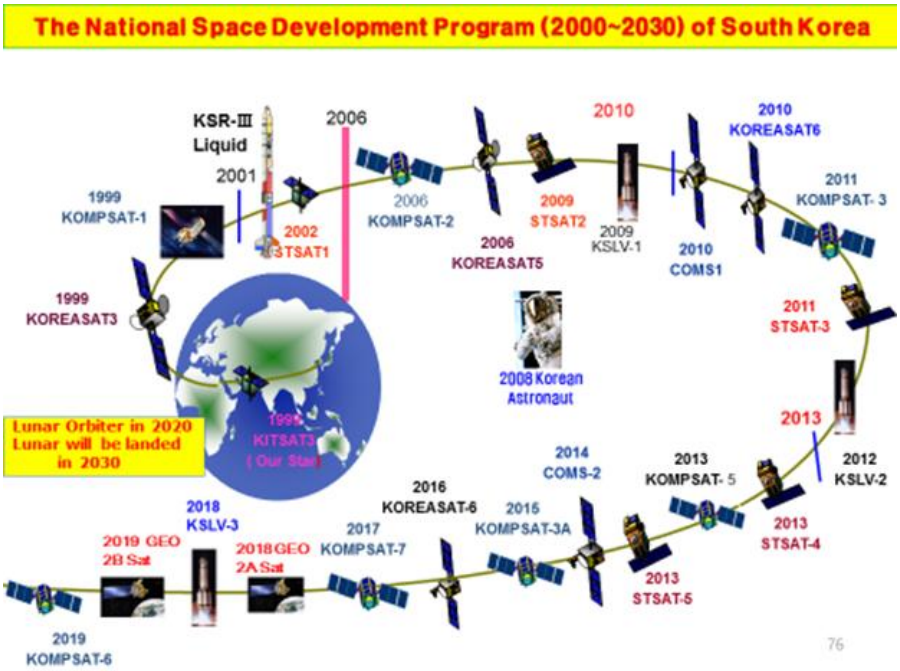
The 14th Korean National Space Committee was announced to have decided “the 3rd Space Development Promotion Plan (2018~2022)” and “the Review and Schedule of the Korean Launch Vehicle Development Project (2018~2022)” on February 5th, 2018. The South Korea's government will inject 604.2 billion (US$566 million) to develop technology for space exploration in 2018, down 9.3 percent from a year earlier, the government said 28 March 2018. The Ministry of Science and ICT announced 2018 year's budget after adjusting its long-term roadmap, including plans to send an unmanned spaceship to the moon.

Under the new plan, the government will postpone the production of a nuclear-powered battery cell necessary for the lunar project from 2020 to 2022.[57]I would like to introduce the National Space Development Program (2000~2030) by the following diagram. Recently Korean space scientist made a lunar robert so as to walk and mine the natural resources such as many Heliumn-3, as aluminum, iron, silicon in the moon.

55) 金斗煥、「韓国に於ける新しい宇宙宇宙開發振興法と宇宙損害賠償法試案の主な内容及び將來の課題」、(紀要第6巻第2号、2006年3月10日)、日本中央学院大学社会システム研究所発行、124 - 126頁.

56) http://elaw.klri.re.kr/kor_service/lawView.do?hseq=46485&lang=ENG

57) https://www.globalsecurity.org/space/world/rok/intro.htm



Source : https://shindonga.donga.com/3/all/13/111457/1

A lunar base could be built from waterless concrete composed entirely of moon dust, according to the Korean space science professor. As Prof. Dr. Tai Sik Lee Park (Hanyang Univ.) has received the research grants from the Korean government and NASA (USA), he made moon concrete in order to construct moon base and village in future.[58] The lunar exploration consists of a test lunar orbiter-lunar orbiter-lunar lander.

The Korea Aerospace Research Institute (KARI : 한국항공우주연구원) is currently working with NASA in the United States on a lunar orbiter project for testing. The target is 2020, with a total budget of 197.8 billion Won (about 20 billion yen). The Korea Institute of Aeronautics and Space is planning to build a “lunar village” in 2030 using 3D printers.[59] Until now,

58) https://www.edaily.co.kr/news/read?newsId=01754806589850952&mediaCodeNo=257

for the construction of a lunar base, we had devised a method of sending prefabricated modules from the earth to the moon and then assembling them on the moon. However, the idea is now that a 3D printer can be used to build a lunar base using topsoil, a powdery substance of stone scattered on the surface of the moon. The Korean government and KARI has a plan to launch a lunar orbiter in 2025 and a lunar lander in 2030 according to the space exploration and development plan.

Ⅳ. Legal Problems and Solution for Exploitation of the Natural Resources in the moon, Mars, Jupiter and Other Celestial Bodies

Recently it is most severe competition among the space superpowers in order to mine and exploit the natural resources including Helium-3 from the moon so as to solve the serious problems of the earth's energy. As it is un-ratified by any major space-faring powers and unsigned the Moon Agreement by most of them, it is of no direct relevance to current space activities.

The space superpowers and private operators have not started to exploit the resources of the Moon and other celestial bodies yet is the absence of rules setting out how this exploitation shall be carried out.

The space law system, indeed, does not provide any specific rule, relating to the exploitation of extraterrestrial resources, which have been generally accepted by States. According to the 1967 Outer Space Treaty (OST)[60] and

59) https://www.facebook.com/karipr/posts/892512887523294/)

60) The Outer Space Treaty, formally known as the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, is a treaty that forms the basis of international space law. The treaty was opened for signature in the United States, the United Kingdom,

the 1979 Moon Agreement,[61]these two instruments does not offer an adequate legal framework which is able to ensure the safe, orderly and peaceful development and exploitation from the natural resources of the Moon and other celestial bodies. On one side, the Outer Space Treaty does not contain any mention of space resources or to their possible exploitation.

On the other side, the Moon Agreement, whose main purpose is to set forth rules aimed at regulating the use for scientific and commercial reasons of lunar and other celestial bodies' materials, has been rejected by the majority of States, comprising the space-faring States.[62]

As a consequence, its principles lose relevance when applied to the exploitation of extraterrestrial resources. The major problem of the Space Treaty and Moon Agreement is that it does not contain any specific reference to space resources and to their exploitation.

But Prof. Dr. Ram Jakhu[63] often recommended "All States should ratify the Moon Agreement as soon as possible." The exploitation of moon materials raises several specific legal issues, such as those related to the right of

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and the Soviet Union on January 27, 1967, and entered into force on October 10, 1967. As of April 2018, 107 countries are parties to the treaty, while another 23 have signed the treaty but have not completed ratification.

61) *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, (usually referred as Moon Agreement) signed on 18 December 1979; As of January 2018, only 18 states; Australia, Austria, Belgium, Chile, Kazakhstan, Lebanon, Mexico, Morocco, The Netherlands, Pakistan, Peru, Philippines, Saudi Arabia, Turkey and Uruguay, etc. have ratified it. France, Guatemala, India and Romania have signed but have not ratified it.

62) The refusal of the developed States to ratify the Moon Agreement was largely due to the insertion of the Common Heritage of Mankind idea in Article XI of the Agreement declaring the Moon and its resources to be "the Common Heritage of Mankind", see C.Q.Christol, "*Important concepts for international law of outer space*", in Proceedings of the Fortieth Colloquium on the Law of Outer Space, (1997), p. 73; F.G.von de Dunk, "*The dark side of the Moon: public concepts and private enterprises*", in Proceedings of the Fortieth Colloquium on the Law of Outer Space, (1997), p. 121.

63) Professor, Institute of Air and Space Law, McGill University, Montreal, Quebec, Canada.

mining extraterrestrial sites or to property rights over the extracted materials, which may not be properly dealt with and solved by simply relying on the existing space law principles. It is realistic to anticipate that the exploitation of these mineral resources will take place in a three phase process:

① pre mining phase;

② mining phase;

③ post mining phase.[64] The rules regulating the exploitation of the resources of the Moon and other celestial bodies should be inserted in a legal instrument which will be opened for acceptance by State and International Organizations. The ISA is the international organization through which States manage and control the exploitation of the natural resources of the Moon and other celestial bodies.

The ISA has the power to authorize persons to exploit for commercial purposes a certain lunar or other celestial bodies' area. At the same time, however, the ISA has the duty to control that the exploitative activities are carried out in accordance with the space law principles and in a not detrimental manner for the space environment.

V. Procedure for Establishing of the New International Space Agency

The ISA is the international organization through which States manage and control the exploitation of the natural resources of the Moon and other celestial bodies. The establishment of ISA as a new international regime is based on the Article 11, 5[65] and Article 18[66] of the 1979 Moon Agreement.

64) Fabio Tronchetti, *op.cit.*, pp. 133~144.

65) Article 11, 5. States Parties to this Agreement hereby undertake to establish an

In order to establish as a preliminary procedure, it needs to make the Draft for the Convention on the establishment an ISA among the space-faring countries. This provision shall be implemented in accordance with article 18 of this Agreement. It is necessary for us to take the following five step's procedure in order to create an ISA.

As a first step, it is necessary to hold a workshop, symposium or Internet mass media assemb- ling space law professors, lawyers, scientists, technicians, high-ranking officials and staff members from the global space agencies such as the United Nations Commmittee on the Peaceful Use of Outer Space (UNCOPUOS), the United States (NASA), European Union (ESA), China (CNSA), Japan (JAXA), India (ISRO) and South Korea (KARI) etc. in order to concentrate on their opinions concerning the establishment of the ISA.

As a second step, we need to organize a preparatory committee for establishing the ISA through a ministerial conference or diplomatic conference of the space powers countries including delegate of the United Nations Committee on the Peaceful Use of Outer Space (UNCOPUOS).

As a third step, a *"Draft for the Convention on the Establishment of an*

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international regime, including appropriate procedures, to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible. This provision shall be implemented in accordance with article 18 of this Agreement.

66) Article 18 Ten years after the entry into force of this Agreement, the question of the review of the Agreement shall be included in the provisional agenda of the General Assembly of the United Nations in order to consider, in the light of past application of the Agreement, whether it requires revision. However, at any time after the Agreement has been in force for five years, the Secretary-General of the United Nations, as depository, shall, at the request of one third of the States Parties to the Agreement and with the concurrence of the majority of the States Parties, convene a conference of the States Parties to review this Agreement. A review conference shall also consider the question of the implementation of the provisions of article 11, paragraph 5, on the basis of the principle referred to in paragraph 1 of that article and taking into account in particular any relevant technological developments.

International Space Agency" should be legislated by excellent space law professors, lawyers, space scientists or diplomats in collaboration with specialists from the aforementioned Committee.

As a fourth step, after extensive discussion and screening of the abovementioned "*Draft for the Convention for the Establishment of an International Space Agency.*" by diplomatic conference in the UNCOPUOS, they must pass the abovementioned "*Draft for the Convention*" by two-third majority of Diplomatic Conference in the UNCOPUOS.

As a fifth step, the UN member's countries would like to ratify "*The Convention for the Establishment of an International Space Agency.*"

I would like to propose the following Preamble to the "*Draft for the Convention for the establishment of an International Space Agency.*"in refering the "Convention for the Establishment of a European Space Agency"[67]

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- **Preamble of the Draft for the Convention on the Establishment of an International Space Agency;**

The States Parties to this Agreement,

Recognizing the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes,

Determined to promote on the basis of equality the further development of co-operation among States in the exploration and use of the

67) In 1975, European Space Conference, meeting in Brussels, approved the text of the *"Convention for the Establishment of a European Space Agency"* setting up the European Space Agency. The member states are now fifteen countries: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Canada is a Cooperating State: United Nations, *"Space Activities of the United Nations and International Organizations"*, UN (New York, 1992), at 135; H.L. van Traa-Engelman, "*Commercial Utilization of Outer Space*," Martinus Nijhoff Publishers (1993), pp.160-161.

moon and other celestial bodies,

Desiring to contribute to broad international co-operation in the scientific as well as the legal aspects of the exploration and use of the moon and other celestial bodies for peaceful purposes,

Desiring to prevent the moon and other celestial bodies from becoming an area of international conflict and environmental damage,

Bearing in mind the benefits which may be derived from the exploitation of the natural resources of the moon and other celestial bodies,

Recalling the contents and essence of Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (1967), the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (1968), the Convention on International Liability for Damage Caused by Space Objects (1972), the Convention on Registration of Objects Launched into Outer Space (1975) and Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (1979).

Taking into account the need to define and develop the provisions of these international instruments in relation to the moon and other celestial bodies, having regard to further progress in the exploration and use of the moon and outer space.

VI. The Main Items that need to be included in the Draft for the Convention on the Establishment of ISA

I would like also to propose the following ten principal points that need to be included in the said "*Draft for the Convention.*

1. Members and Legal Personality

The members of ISA shall be the States parties to the *"Convention for theEstablishment of an International Space Agency."* The ISA shall have legal personality. The ISA may exercise also its functions and powers, as provided in this Statute, on the territory of any State Party and, by special agreement, on the territory of any other State. It shall also have such legal capacity as may be necessary for the exercise of its functions and the fulfillment of its purposes.

2. Purpose of Establishment

The purpose of establishing the ISA is to provide for and to promote, for exclusively peaceful purposes, cooperation among the global States in space research and technology and their space application for the moon, Mars and other celestial bodies, with a view to their being used for scientific purposes and for operational space applications systems.

The purposes of the ISA shall include in particular:

- Drawing up international rules and monitoring the application of such rules, including the gathering of technical information on space activities conducted under existing legal texts (on license, registration, recovery liability, satellites with nuclear power resources) or future texts (space shuttle, space station, space debris, etc.……);
- Encouraging the transfer of space technologies to developing countries, the training of specialists, and wide circulation of data gathered in the course of space activities, especially data adapted to the needs of these countries (for ex: distribution of remote sensing data);
- Coordinating environmental monitoring by satellites and spacecraft
- Establishing a monitoring and researching organization in order to protect

the environment of earth and space so as to mitigate space debris.

3. Space Policy

The ISA is in charge of elaborating and implementing the medium and long-term global space policy, of actual activities and programs and a related industrial policy in the space field, and the coordination of UN member's states and their national space programs with respect to international organizations and institutes. Furthermore, the member States decide on global assimilation of their national space programs by integrating them into the ISA programs. Finally, the ISA elaborates and implements a space industrial policy, which is designed, in particular, to improve the exploitation and developments of the global space industry for the moon and other celestial bodies.

4. Licensing of Mining the Natural Resources

Unexploited minerals in the moon and other celestial bodies shall not be mined without establishment of mining rights. The license of mining the large quantity of the natural resources in the lunar or other celestial bodies will be bestowed by the ISA. Persons wishing to secure establishment of mining rights shall apply to and obtain approval of the ISA.

The applicant of receiving the mining license must submit application document with document including ① applicant’s name, birth day, address and occupation, plan (time schedule) of the exploitation minerals on the the moon and other celestial bodies by applicant, ② indication for the geographical location of the extraterrestrial site as an object of the license, ③ compliance with regulation of ISA and international space conventions by appilicant to ISA. The ISA, by means of the Council, has the duty to control the operator of the licensee[68].

In case such a control shows that licensee has not respected the terms of the license, the Council could ask the licensee to stop these violations and to take the required measures.

5. Mining Right

The term, "mining right" means the right to mine or acquire registered minerals, Helium-3 and other minerals buried in the same mineral deposits as the registered minerals, within a rock regolith district of the moon and other celestial bodies (hereinafter referred to as "mining area"). Minerals separated from the mining area without mining rights or mining concession rights shall be owned by the mining right holders or mining lease right holders. The legal nature of mining rights is the property rights.

If a mining applicant receives notice of approval of establishment of a mining right, he shall pay registration commission under the conditions as prescribed by the ISA regulation, and apply for registration to the General Secretary of ISA within 30 days from the date of receiving the notice of approval. A mining right holder or any other interested person may apply to the ISA a survey of the boundaries of his mining area or the adjacent mining area.

6. Duration of Mining Rights

The term of a mining right shall not exceed 25 years. A mining right holder may extend the term of a mining right with the approval of the ISA before the expiration of such term, under the conditions as prescribed by the ISA regulations.

68) The Council will have two ways to verify if the licensee is operating in accordance with the license: 1) through a report which every license is obliged to provide on an annual basis containing information on the activities which have been undertaken; 2) through a manned mission which can check in loci the status of the exploitative activities. The Council should give the licensee one month notice before undertaking the control. The licensee shall offer proper collaboration and provide information during the control

In this case, such renewal shall be made for a period of not more than 25 years. This is an essential for ensuring the compliance of the legal regime regulating the development of natural resources in thw moon and other celestial bodies with the non-appropriative nature of outer space sets out. The obtainments of the license will be subject to the payment of an initial fee.

The licensee will have also to pay a fee every five years. Additionally, in case he does not comply with certain terms of the license a fine can be imposed.

The licensee enjoys two rights for the whole duration of the license: the rights of continued use over the area object of the license and the right to exercise property right over the extracted materials and the benefits generated thereof. Property rights over the extracted natural resources in the moon and other celestial bodies are necessary in order to provide the licensee with a reward for the effort they made to explore and exploit a lunar site and to make such exploitation a profitable business.

7. Exchange of Information

Members and the ISA shall facilitate the exchange of space policy, programs, scientific and technical information pertaining to the fields of space technology for the moon and other celestial bodies.

8. Education and Research

The ISA shall ensure the execution of basic activities, such as education (astronauts etc.), documentation, studies of future projects and technological research work. The ISA also facilitates the collection of relevant information and its dissemination to Member States, assistance and advice for harmonizing national and international programs and the elaboration and execution of scientific programs including the design, development, construction, launching,

placing satellites and space shuttle in orbit and control of satellites and all similar activities for launching facilities, moon station, airport or space transport system from the earth to the moon and other celestial bodies.

9. International Cooperation

The ISA may, upon decisions of the Council taken by vote of a two-thirds majority of all Members States, cooperate with other international organizations and institutions and with Governments, organizations and institutions of non-Member States, and conclude agreements with them to this effect.

10. Financial Contributions

The ISA will be financed by its member States. The scale of contributions shall be based on the average national income of each Member State for the three latest years for which statistics are available.

11. Raising and Accumulating Funds

According to Article 11, (7), (d) of the 1979 Moon Agreement, the ISA must raise and accumulate the funds for the equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration.

12. Organs

An organization to be named the International Space Agency is formed by

the Convention. It is made up of a General Assembly, a Council, a Director General, a Senior Staff and such other bodies as may be necessary.

12.1. The General Assembly

- The participation in the works of the General Assembly is, indeed, open to all States which have accepted the present legal regime and which are member of UNCOPUOS.
- The General Assembly, which is the principal organ, is composed of representatives of all Member States.
- The Assembly shall meet annually and shall be convened by the Council at a suitable time and place. Extraordinary meetings of the Assembly may be held at any time upon the call of the Council or at the request of any ten contracting States addressed to the Secretary General.
- It meets when it is required and is composed of either Ministers of the Member's States or government delegates. When it meets at ministerial level it can fulfill the political and practical function for the International conference on the exploitation and development of the moon and other celestial bodies.
- The General Assembly elects its chairman and its vice-chairman for a period of three years, and re-election is possible for a further year.
- The Chairman shall direct the meetings, the proceedings, prepare the decisions and maintain appropriate contact with the Member States; he shall advice the Director General and obtain from him all necessary information.
- When the Council meets at the ministerial level, it shall elect a chairman for that meeting.

12.2. The Council

- The Council shall be a permanent body responsible to the Assembly. It

shall be composed of twenty-four contracting States elected by the Assembly. An election shall be held at the first meeting of the Assembly and thereafter every two years, and the members of the Council so elected shall hold office until the next following election.

- The Council shall elect its President for a term of three years. He may be reelected.

  He shall have no vote. The Council shall elect from among its members one or more Vice Presidents who shall retain their right to vote when serving as acting President.

  The President need not be selected from among the representatives of the members the Council but, if a representative is elected, his seat shall be deemed vacant and it shall be filled by the State which he represented.
- Its functions and powers represent the core of the system including license regulating the exploitation of the mineral resources of the moon and other celestial bodies.

12.3. Director General

- The Director General is the executive of the ISA and its representative.
- The Director General, who is the head of the executive body, is appointed by a two-thirds majority of all Member States.
- He is responsible for the management of the ISA, the execution of the programs and he accomplishes all the tasks imposed on him by the Council as well as the implementation of its policy and the attainment of its objectives in accordance with the ISA Convention.

12.4. Senior Staff

Members of senior staff for management, defined by the Council, shall be appointed by the Council on the recommendation of the Director General.

13. Disputes and Arbitration

Disputes between Member States or between any of them and the ISA must first be settled by the Council. If the dispute is not settled this way, it shall at request of any party to the dispute be submitted to arbitration. Unless the Parties agree differently or the Council adopts other rules, the Arbitration Tribunal shall consist of three members of contracting states. Each Party shall appoint one of them, and those two arbitrators shall designate a third member. The third member is the umpire and presides over the tribunal.[69]The rules of procedure may be agreed between the Parties or imposed by the Council. The award shall be decided by the majority of votes (abstentions are not allowed) and it is final and binding.

14. Headquarters

The permanent seat of the ISA shall be determined by the resolution of the final meeting of UNCOPUOS and UN General Assembly. As the headquarters of the International Court of Justice and the International Criminal Court are located at The Hague (The Netherlands) and the headquarter of the International Tribunal for the Law of the Sea is located in Hamburg (Germany), already three International Court's headquarters are all located in Europe. So, it has to be taken into account that Europe's 710 million people only make up 11% of the world's population but Asia accounts for over 60% of the world population with almost 3.8 billion people.[70]

Therefore it should be adequate to decide on locating the ISA headquarters in the Asian region and since in Asia the Republic of Korea is located as a “buffer region” between China and Japan as the geopolitical powers, Seoul (the Republic of Korea), Shanghai (China) or another city in the Asian

69)) E. R. C. Van Bogaert, “*Aspects of Space Law*”, Kluwer, (1986), at 271.
70)) http://en.wikipedia.org/wiki/World_population

Pacific region should be eligible for this purpose.

Ⅶ. Conclusion

The International Space Agency (ISA) will be regarded as a new road for the global space policy and exploitation of the moon and other celestial bodies in the global community. The ISA also coordinates the broad thinking needed to meet new challenges in the global countries. The ISA will provide a bright prospects and vision of the global community's future in the moon and other celestial bodies, and for the benefits for mankinds on the ground that satellites and spacecraft can supply.

As the moon, Mars, Venus, asteroid, Jupiter, Satern and Titan and Oother Celestial Bodies had been buried a large quantity of the precious natural resources, so we must estabish a new International Space Agency in order to develop efficiently and effectively the abovementioned minerals. Due to the developments of internet, telecommunication by the satellites, spacecrafts and international space stations, it will be extinguished gradually or step by step the boundary among the developed countries.

It is necessary for us to establish the ISA so as to work together in union, to strengthen cooperation in research, and to establish friendly relations for the benefit of the mankind.

Finally, a very important point is that a political drive, at the highest level, should be given to mobilize states to this initiative, possibly taking the form of a solemn statement by heads of the space superpower's countries setting out objectives and prospects for the long term. It should be noted that this political drive will be necessary not only to set up the organization, but also during a subsequent period.[71] It is desirable for us to establish the ISA in

order to develop and mine efficiently the natural resources of moon and other celestial bodies. I am sure that it is possible to establish the ISA in tnear he future, if the heads of the space super powers would agree to establish the ISA through a summit conference as well as conference of UNCOPUOS, General Assembly and Security Council of UN.

71) Gabriel Lafferranderie, *"Outlook on Space Law over the next 30 years",* Essays Published for the 30th Anniversary of the Outer Space Treaty, Kluwer Law International (1997), at 427.

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초 록

본 논문의 제목은「달, 화성 및 기타천체에 있는 자원채굴을 위한 새로운 국제 우주기구의 설립제안」이다. 새로운 국제우주기구 (가칭: 이하 ISA이라고 호칭 함)를 만들겠다는 아이디어는 본인의 학문적이며 실용적인 의견의 제시이다.

달과 화성 및 다른 우주천체에 있는 천연자원을 효율적이고 빠르게 개발하기 위해서는 국제기구로서 ISA의 설립이 필요하다.

이 새로운 국제우주기구인 ISA를 설립하는데 필요로 하는 법적이 근거는 1979 년의 달협약 제11조, 제5항 및 제18조에 근거를 두고 있다. ISA를 설립시키기 위한 절차로 우선 우주조약에 가입한 우주선진국들간에 논의를 거쳐 ISA 설립에 관한 조약초안을 마련하는데 있다.

이 논문에서 본인은 우주법에 관한 미국, 룩셈부르크, 유럽우주기구, 중국, 일본, 한국의 국내입법례와 달, 화성, 소행성, 금성, 목성, 토성, 타이탄별 등의 우주탐험과 앞으로의 개발계획 등을 살펴 보았다. ISA의 창설은 선진국들간에 우주탐험과 개발에 관한 협력사업을 추진하는데 있어 꼭 필요하고 또한 각국들 간에 국제협력이 증진됨으로 달과 화성, 기타천체에 있는 자원개발에 촉매적인 역활 을 하게된다.

한편 우주선진국들은 우주자원의 탐험과 개발에 관한 기술확보, 우주 인력의 양성과 우주에 관련된 금융 등을 ISA를 통하여 중앙집중적으로, 능율적으로 관리할 수 있게 된다. 향후 우주 선진국들 간에 우주탐험과 개발에 관한 정책수립과 법율의 마련, 우주과학기술의 연구와 우주산업의 발전면에 국제협력이 절대로 필요함으로 ISA의 창설이 바람직하다고 본다.

우리가「유럽우주기구 (ESA)의 설치에 관한 협약」을 참고하여「국제우주기구의 설치에 관한 조약 초안」을 마련하는 것이 필요하다고 본다. 이「국제우주기구의 설치에 관한 조약 초안」은 유엔의 우주평화적이용위원회 (UNCOPUOS)의 외교회의에서 3 분의 2의 찬성으로 위의「조약 초안」을 통과시키는 것이 바람직하다.

마지막으로, 매우 중요한 점은 최고 수준의 정치적 추진력이 필요로 하는데 국제 연합을 포함한 우주선진국들의 수장들이 중▪장기적인 우주개발 목표달성

을 위해 ISA설립을 찬성한다는 엄숙한 공동성명을 발표하는 것이 매우 중요하다고 본다. 우주선진국들간에 우주산업을 더욱 발전시키고 국제협력관계를 증진시키고 새로운 이데올로기와 창조적인 아이디어를 기반으로 우주선진국들 간의 연구협력을 촉진시키기 위해 ISA를 설립시키는 것이 꼭 필요하다.

가까운 장래에 유엔을 포함한 우주선진국들의 정상들이 모이는 정상회담에서 ISA를 설립시키기로 합의만 한다면 ISA는 반듯이 창설될 수 있다고 본인은 확신하는 바입니다.

주제어 : 우주개발, 헬륨-3, 광업권, 우주, 달, 화성, 금성, 목성, 천체, 토성 및 천체, 미국의 항공우주국(NASA), 중국의 국가우주국(CNSA), 일본의 우주항공연구개발기구(JAXA), 인도의 우주연구기구(ISRO), 유엔의 우 주평화적이용위원회(UNCOPUOUS), 우주감항능력담보의무, 우주국내 입법례, 한국의 항공우주연구원(KARI), 우주조약, 우주책임조약, 달협약

Abstract

Proposal of Establishing a New International Space Agency for Mining the Natural Resources in the Moon, Mars and Other Celestial Bodies

Doo-Hwan Kim*

The idea of creating a new International Space Agency (ISA) is only my academic and practical opinion. It is necessary for us to establish ISA as an international organization for the efficient and rapid exploitation of natural resources in the moon, Mars and other celestial bodies.

The establishment of ISA as a new international regime is based on the Article 11, 5 and Article 18 of the 1979 Moon Agreement. In order to establish as a preliminary procedure, it needs to make a *" Draft for the Convention on the Establishment of an International Space Agency"* among the space-faring countries.

In this paper, I was examined the domestic space legislation in the United States, Luxembourg, European Space Agency, China, Japan, the Republic of Korea as well as space exploration and planning of the moons, Mars, Asteroids, Venus, Jupiter, Saturn, Titan and Other Celestial Bodies. The creation of an ISA would lead to a strengthening of the cooperation needed essentially by the developed countries towards joint and cooperative undertakings in space and would act as a catalyst for the space exploration and exploitation of the moon, Mars and other celestial bodies.

It will be managed effectively and centrally the exploitation and exploitation of space the natural resources, technology, manpower and finances as an independent organization in order to get the benefit of the space developed countries by

* Honorary President, Korea Society of Air &Space Law and Policy in Seoul,
Visiting Professor, School of Law, Beijing Institute of Technology and Tianjin University Law School in China.

ISA. It is desirable and necessary for us to establish ISA in order to promote cooperation in space policy, law, science technology and industry among the space developed countries in the near future. The establishment of the ISA will be promoted the international cooperation among the space-faring countries in exploration and exploitations of the natural resources in the moon and other celestial bodies.

I would propose the "*Draft for the Convention for the Establishment of an International Space Agency.*"in refering the "Convention for the Establishment of a European Space Agency."

This "*Draft for the Convention Convention for the Establishment of an ISA*" must pass the abovementioned "*Draft for the Convention*" by two-third majority of Diplomatic Conference in the UNCOPUOS.

Finally, a very important point is need that a political drive at the highest level and a solemn statement by heads of state of the space devloped countries including the United Nations for the space exploitation of the medium and long term.

It should be noted that this political drive will be necessary not only to set up the organization, but also during a subsequent period. It is desirable and necessary for us to establish the ISA in order to develop the space industry, to strengthen friendly relations and to promote research cooperation among the space-faring countries based on the new ideology and creative ideas. If the heads of the superpowers including the United Nations will be agreed to establish ISA at a summit conference, 1 am sure that it is possible to establish an ISA in the near future.

Key Words : Space Exploitation, Helium-3, Mining Rights, Space, Wilful-miscoduct, moon, Mars, Venus, Jupiter, Astroid, Saturn and Celestial Bodies, NASA, CNSA, JAXA, ISRO, UNCOPUOUS, Spaceworthiness, Space National Legislation, KARI, Outer Space Treaty, Space Liability Convention, Moon Agreement