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POSSIBILITY OF ESTABLISHING A NEW INTERNATIONAL SPACE EXPLOITATION AGENCY

Author

Doo Hwan Kim

Honorary President, The Korean Association of Air and Space Law,
Visiting Prof. Korea Aerospace University and Chuo Gakuin University in Japan
Doohwank3@kornet.net

Abstract

The aim of the 1979 Moon Agreement is to encourage exploration and exploitation of the moon and other celestial bodies, but on a free and equal basis. To this end , Parties to the Moon Agreement have undertaken to establish an international régime to govern the exploitation of the natural resources 'as such exploitation is about to become feasible'. I would like to propose an establishment of the ISEA as a new international regime based on the Article 11, 5~7 of the Moon Agreement. It should be noted that this political drive will be necessary not only to set up the organization, but also during a subsequent period.

In order to establish as a preliminary procedure, it needs to make the "*Draft for the Convention on the Establishment of an ISEA* "among the space-faring countries. If the heads of the developed countries agree to establish ISEA at a summit conference, 1 believes that it is possible to establish ISEA in future.

FULL TEXT

1. Introduction

The idea of creating an International Space Exploitation Agency (tentative title: hereinafter referred to ISEA) is only my academic and practical opinion. The establishment of an ISEA would lead to a strengthening of the cooperation deemed essential by the global community towards joint undertakings and exploitation of the natural resources of the Moon and other celestial bodies. The ISEA would act as a catalyst for the efforts on space exploitation and allow resources, technology, manpower and finances to be centrally managed in an independent fashion to the benefit of the mankind. *"Space already exists for the global community, so the question is what we do there."*

It's our job to make sure that all opportunities are used to integrate the power and exploitation of the Moon and other celestial bodies among the global all countries. In the 21st century, space science and technology will develop with ever greater rapidity. Having developed rapidly for about half a century, some space superpowers and organization such as the United States, European Space Agency, Russia, China, Japan and India and with space activities have scored remarkable achievements that greatly promoted the development of social productivity and progress. 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. As it will be explained in the following paragraphs, space law does not contain any dedicated rule, dealing with the exploitation of extraterrestrial resources, which has received the general acceptance of States.[1]

Nevertheless, in order to allow such an exploitation 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.

There is no Law of the Moon, comparable to the Law of the Sea or Antarctica. The 1979 Moon Agreement was adopted by the UN General Assembly on December 5, 1979 and then entered into force it on July 11, 1984. The United States and certain other nations backed away from a proposed UN Moon Agreement in 1982. There is a more limited, though not inconsequential, Outer Space Treaty agreed to in 1967 and eventually signed by approximately 189 countries.[2] The aim of the 1979 Moon Agreement is to encourage exploration, but on a free and equal basis. To this end , Parties to the Moon Agreement have undertaken to establish an international régime to govern the exploitation of the natural resources 'as such exploitation is about to become feasible'. I would like to propose an establishment of the ISEA as a new international regime based on the Article 11, 5~7 of the Moon Agreement.

2. Joint Exploitation of the Natural Resources (Heliumn-3, etc.) in the Moon and ISEA

Helium-3 (He-3) is a light, non-radioactive isotope of helium with two protons and one neutron. It is rare on Earth, and is sought for use in nuclear fusion research. [3]The Moon and other celestial bodies of our solar system contain large quantity of natural resources. The exploitation of the natural resources of the Moon and other celestial bodies represents one of the most exiting 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 exploitation of these 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 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.

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 40 years, natural gas after 60 years, and

[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.

[2]) http://www.nasa.gov/pdf/368984main_Every_ones_going_to_the_Moon.pdf

[3]) http://en.wikipedia.org/wiki/Helium-3

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 scientists warns of the exhaustion of fossil fuels such as coal, oil and natural gas on earth. By 2050 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 Apollo17 astronaut and Fusion Technology Institute (FTI) researcher Harrison Schmitt.

The stocks of raw materials are running out and experts estimate that fossil fuels will be finished by 30~40 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. 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.[4]

For instance, oxygen and hydrogen are contained in the lunar regolith at all latitudes. There is also evidence that the lunar poles contain amounts of water and ice. 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 Heliumn-3 for the Nuclear Fusion Reactor is not embedded in the earth, but it is estimated to be embedded 1 million tonnes~500 million tones 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 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 tones of

[4]) It has been estimated that 25 tones of Helium-3 can provide all the power that the United States needs in a year, See Sci/Tech. Moonmap aids discovery at http://news.bbc.co.uk/1/hsci/tech/2260

lunar soil would produce one tone of helium. Only 10 kilograms of helium-3 are available on earth.[5] As space superpowers such as the United tates, Russia, European Union, Japan, China 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 40-50 years, so it is absolutely necessary the active and reciprocal cooperation of space science and technology in the first place among the space superpowers.

It is desirable for us the establishment of the ISEA 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 ISEA 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 ISEA as soon as possible.

3. Activities for the exploitation of Moon and Mars by the space-faring powers

3.1. The United States

NASA's Lunar Reconnaissance Orbiter (LRO) and the Lunar Crater Observation and Sensing Satellite (LCROSS) launched aboard an United Launch Alliance Atlas V rocket from Cape Canaveral Air Force Station on June 18, 2009. The LRO and LCROSS spacecraft were tucked inside the payload fairing at the top of the rocket to protect them from atmospheric heating as the rocket climbed through the atmosphere toward space. The fairing separated as planned and LRO pushed away from LCROSS and the Centaur stage on its way to going into orbit around the moon.

The LCROSS probe remained attached to the Centaur and will steer the empty rocket stage for about four months as mission controller's line up LCROSS and Centaur to collide with the moon in an effort to determine conclusively whether water exists on the lunar surface. LCROSS is equipped with sensors to evaluate the plume from the Centaur stage when it hits the moon. Then LCROSS will fly through the plume before crashing into the lunar surface to kick up a second plume.[6]

NASA now opened a new chapter in our understanding of the moon. Preliminary data from the Lunar CRater Observation and Sensing Satellite, or LCROSS, indicates that the mission successfully uncovered water during the Oct. 9, 2009 impacts into the permanently shadowed region of Cabeus cater near the moon's south pole. Scientists have long speculated about the source of vast quantities of hydrogen that have been

[5]) http://www.abc.net.au/news/newsitems/200411/s1252715.htm

[6]) http://www.nasa.gov/mission_pages/LCROSS/launch/index.html

observed at the lunar poles. The LCROSS findings are shedding new light on the question of water, which could be more widespread and in greater quantity than previously suspected. Multiple lines of evidence show water was present in both the high angle vapor plume and the ejecta curtain created by the LCROSS Centaur impact. On December 4, 2006, NASA announced it was planning to build a permanent moon base.[7] NASA Associate Administrator Scott Horowitz said the goal was to start building the moon-base by 2020, and by 2024, has a fully functional base that would allow for crew rotations and in-situ resource utilization. Additionally, NASA plans to collaborate and partner with other nations for this project.[8] On September 28, 2007 Michael D. Griffin, who was at the time Administrator of NASA, stated that NASA aims to put a man on Mars by 2037.[9]

3. 2. European Space Agency

ESA's Council gave the go-ahead to proceed with the implementation of the Exo Mars Programme on December 19, 2009. This decision paves the way for two Mars exploration missions in cooperation with NASA in 2016 and 2018. Establishing if life ever existed on Mars is one of the outstanding scientific questions of our time. To address this important goal, the European Space Agency (ESA), in cooperation with NASA, has established the ExoMars Programme to investigate the Martian environment and to demonstrate new technologies paving the way for a future Mars sample return mission in the 2020's.

Two missions are foreseen within the ExoMars programme: one consisting of an Orbiter plus an Entry, Descent and Landing Demonstrator (to be launched in 2016) and the other, with a launch date of 2018, consisting of two rovers. Both missions will be carried out in cooperation with NASA.[10]

The first robotic mission to return samples to Earth from Mars took a further step toward realization with the recent publication of a mission design report by the iMARS Working Group. The report defines key elements of the future internationally-funded mission involving the cooperation of ESA, NASA and other national agencies. iMARS, which stands for the International Mars Architecture for the Return of Samples, is a committee of the International Mars Exploration Working Group made up of scientists, engineers, strategic planners, and managers. The report, which comes after months of deliberation, outlines the scientific and engineering requirements of such an international mission to be undertaken in the time-frame 2020-2022.

The Mars Sample Return mission is an essential step with respect to future exploration goals and the prospect of establishing a future human mission to Mars. Returned samples will increase the knowledge of the properties of Martian soil and contribute significantly to answering questions about the possibility of life on the Red Planet. This mission will improve our understanding of the Mars environment to support planning for the future human exploration. The iMARS report outlines the mission's scientific objectives including the types and quantities of samples to be returned from Mars; the different mission elements (launchers,

[7]) NASA Office of Public Affairs (December 4, 2006). "GLOBAL EXPLORATION STRATEGY AND LUNARARCHITECTURE"(PDF).NASA. http://www.nasa.gov/pdf/164021main_lunar_architecture.pdf. Retrieved July 15, 2009.

[8]) Hawkins-Cox, Diane (December 5, 2006). "NASA wants permanent moon base"; http://www.cnn. com/2006TECH/space/12/04/moon.base/index.html. Retrieved July 15, 2009.

[9]) NASA aims to put man on Mars by 2037". Independent Online. September 25, 2007. Retrieved July 15, 2009.

[10]) http://exploration.esa.int/science-e/www/object/index.cfm?fobjectid=46048

spacecraft, Mars lander, a rover and a Mars ascent vehicle) and ground processing facilities necessary to contain and analyze the received samples in a protected environment.

3.3. Russia

The Federal Space Agency operates as a state customer with respect to coordination and control regarding implementation of the Federal Space Program. In accordance with the Space Act, Russian Federal Space Program (FSP) is a basic document for establishment of the state orders which comprehend design and utilization of the space equipment aimed at achieving scientific and socioeconomic objectives. Russian Federal Space Program for 2006-2015 was approved by Regulation № 635 of the Government of the Russian Federation, dated October 22, 2005.

Luna-Glob (Lunar sphere) is the name of a Moon-exploration program by the Russian Federal Space Agency (Roscosmos) based on plans dating back to 1997. Due to financial problems, however, the project was put on hold only to be revived a few years later. Initially scheduled for launch in 2012,[11] the mission has been brought forward twice, first to 2010 and then to 2009. However, as of late 2008, the plan is again to meet the original 2012 launch date. Luna-Glob is the first of four missions planned before the creation of a fully robotic lunar base scheduled for after 2015. Luna-Glob 1 is an unmanned mission to the Moon planned by Russia including an orbiter with ground penetrating sensors.[12] Luna-Glob is slate to be launched in 2012 by Soyuz 2 rocket.[13] A Luna-Glob joint orbiter-rover mission (the orbiter will be the Indian Chandrayaan-2), is also planned for in 2012, and will feature a 58 kg Russian Polar Moon Rover and lander, as part of the International Lunar Network.

This mission will land in Moon's South Pole, examine a crater and operate for up to one year. The six wheeled, solar powered rover will land near one of the poles and will survive for a year, roving up to 150 km at a speed of 360 m/h. The next two missions,[14] to be called Luna-Grunt, will launch in 2014, featuring an orbiter and a lander. The lander carries a large 400 kg rover capable of in-situ soil analysis.

Later, in 2015, a second lander with an 400 kg ascent stage will return up to 1kg of surface and rock samples. The Lunnyj Poligon robotic lunar base[15] that follows Glob and Grount would be a "Robotic proving ground", consist of several components: ① solar power station, ② telecommunication station, ③ technological station, ④ scientific station, ⑤ long-range research rover, ⑥ landing and launch area, ⑦ orbiting satellite, ⑧ This project is planned for 2020. Russian Space Agency Energia Chief Executive Nikolai Sevastyanov has given indications that his company will be able to provide moon exploitation options to the Russians, even before the their Kliper shuttle starts service in 2015.

A new, modified version of the Soyuz TMA vehicle, either manned or remotely controlled via a new digital system, could be used to extract the lunar reserves of He3 (Helium-3), according to Russian media agency RIA Novosti. While He3 holds great value to the new range of fusion

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[11]) Lavochkin begins phase B work for Luna-Glob 1 orbiter. Retrieved 2008-10-16.

[12]) Russia Plans Ambitious Robotic Lunar Mission". Aviation Week. 2008-06-27.

[13]) Lavochkin begins phase B work for Luna-Glob 1 orbiter. Retrieved 2008-10-16.

[14]) PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES; ESA.PROGRAM OF THE MOON EXPLORATION BY AUTOMATIC SPACE COMPLEXES". ESA. Retrieved 2008- 10-21.

[15]) "Russian project Luna-Glob: goals and status". Retrieved 2008-10-21

nuclear power stations, it is not known why Sevastyanov would see value in an earlier target of exploitation from the lunar surface, when the new power stations are believed to be decades away from making He3 commercially viable.

The flamboyant-yet influential-Energia CEO is under no illusions about the 2012-2014 timeline it would take for his company to support Russia's first manned mission to the Moon, including the mining of isotope helium-3 by 2020. Now it would seem his targets are not restricted to the introduction of the Kliper. This was hinted at before, during a wide-ranging interview with Vedomosti magazine. 'We could make a landing as early as 2012-2014 using the Soyuz-type technology,' he said. With a budget within $2 billion, we could land on the Moon in three missions.

'The first would be just a lunar fly-around mission, the second would involve a circumlunar orbit injection with automatic landing of the lunar module, and the third would be the manned landing on the Moon. 'As for the industrial transportation system to support regular missions to the Moon and lunar mining operations, we could develop it by as early as 2020.' It is available on the Moon. 'The earth's reserves of helium-3 are so negligible that their industrial use is absolutely out of the question. According to some estimates, our natural satellite contains no less than 1 million tons of helium-3, which can fully meet the entire Earth's power demand for a period of more than 1,000.[16]

3.4. China

Chinese Lunar Exploration Program (CLEP: 中國探月) is a program of robotic explorations and human missions to the Moon undertaken by China National Space Administration (CNSA). [17] Chang'e 1 was an unmanned Chinese lunar-orbiting spacecraft, part of the first phase of the Chinese Lunar Exploration Program. The spacecraft was named after the Chinese moon goddess, Chang'e.[18] Chinese Lunar Exploration Program (CLEP) is a program of robotic explorations and human missions to the Moon undertaken by CNSA. It uses Chang'e lunar orbiters, rovers and soil return spacecraft and adapted Long March 3/A, Long March 5/E and Long March 7 launch1 vehicles.

The first spacecraft of the program, Chang'e 1 an un-manned lunar orbiter was successfully launched at Xichang Satellite Launch Center on October 24, 2007.[19]

China's first lunar probe, Chang'e-1, is now orbiting successfully the moon. China will launch a second lunar probe, Chang'e-2, before the end of 2011. China plans that a satellite will land on the moon in 2012, and another one will collect samples from moon and return to China from the moon in 2017. China' also plans the moon base construction and China space station in 2022.[20]

3.5. Japan

SELENE (Selenological and Engineering Explorer), better known in Japan by its nickname Kaguya, was the second Japanese lunar orbiter spacecraft. Produced by the Institute of Space and Astronautical Science and NASDA (both now part of the Japan Aerospace Exploration Agency, JAXA), the spacecraft was launched September 14, 2007.

After successfully orbiting the moon for 1 year and 8 months, the main orbiter was intentionally crashed onto the lunar surface near

[16]) http://www.nasaspacef.light.com/2006/04/russian-moon-exploitation-soyuz-involved

[17]) http://en.wikipedia.org/wiki/Chinese_Lunar_Exploration_Program

[18]) http://en.wikipedia.org/wiki/Chang'e_1

[19]) http://en.wikipedia.org/wiki/Chang'e_program

[20]) http://english.cri.cn/2906/2007/03/11/65@204310.htm

Gill lunar crater at 18:25 UTC on June 10, 2009.[21] JAXA succeeded in launching Lunar orbit explorer er *Kaguya*, also known as SELENE (costing 55 billion yen including launch vehicle), the largest such mission since the Apollo Program, on an H-2A rocket. Its mission is to gather data on the moon's origin and evolution. It entered into a lunar orbit on October 4, 2007. The JAXA and NHK (Japan Broadcasting Corporation) have successfully performed the world's first high-definition image taking by the lunar explorer "KAGUYA" (SELENE) which was injected into a lunar orbit at an altitude of about 100 km on October 18, 2007.

The image shooting was carried out by the onboard high definition television (HDTV) of the KAGUYA, and it is the world's first high definition image data acquisition of the Moon from an altitude about 100 kilometers away from the Moon.[22] Consisting of a 3-ton main orbiter and two 50-kilogram sub-satellites, Kaguya is equipped with 14 scientific instruments and a high-definition television camera.

Human Lunar Systems Team of Japan works for the conceptual system study on the future human lunar outpost. Based on the achievements and lessons learned from the International Space Station Program, system architecture on the basis of the international cooperation and the way of Japan's contribution are discussed continuously.[23]

Asteroid explorer Hayabusa arrived at the small asteroid Itokawa of 500m in size and showed us the mysterious world of Itokawa. Thanks to HYABUSA, it became possible to see exact nature of very small asteroid that approaches to the earth. JAXA is now considering a mission named Hayabusa-2 This is a similar mission as Hayabusa that will return samples of surface from an asteroid to the earth.[24] On May 18, 2010, the Venus Climate Orbiter "AKATSUKI" satellite and the Small Solar Power Sail Demonstrator "IKAROS" will be launched at Tangashima Space Center in Japan by the H-IIA Launch Vehicle No. 17. AKATSUKI is the world's first planetary probe that deserves to be called a meteorological satellite.

3.6. India

Chandrayaan-1 has been built and will be launched from Indian soil and sent on a mission to study the lunar surface. The Indian Space Research Organization (ISRO) will use its highly successful Polar Satellite Launch Vehicle (PSLV) to get the lunar probe into space.

This is an impressive mission for a small space agency, making huge strides in the exploration of space.[25] In its fourteenth flight conducted from Satish Dhawan Space Centre (SDSC) SHAR, Sriharikota on October 22, 2008, the Indian Space Research Organization's (ISRO's) Polar Satellite Launch Vehicle, PSLV-C11, successfully launched the 1380kg Chandrayaan-1 spacecraft into a transfer orbit with a perigee (nearest point to Earth) of 255 km and an apogee (farthest point to Earth) of 22,860 km, inclined at an angle of 17.9 deg to the equator. After a 52 hour count down, PSLV-C11 lifted off from the Second Launch Pad at SDSC SHAR at 06:22Hrs Indian Standard Time (IST) with the ignition of the core first stage.

Chandrayaan-1 is India's first spacecraft mission beyond Earth's orbit. With well-defined objectives, Chandrayaan-1 mission intends to put an unmanned spacecraft into an orbit around the moon and to perform remote sensing of our nearest celestial neighbor for about two years

[21]) http://en.wikipedia.org/wiki/SELENE
[22]) http://www.jaxa.jp/press/2007/11/20071107_kaguya_e.html
[23]) http://www.jspec.jaxa.jp/e/activity/humanlunar.html
[24]) http://www.jspec.jaxa.jp/e/activity/hayabusa2.html
[25]) http://www.universetoday.com/2008/08/17/india-has-big-plans-for-lunar-exploration

using eleven scientific instruments built in India and five other countries.

The primary objectives of Chandrayaan-1are:

- To place an unmanned spacecraft in an orbit around the moon
- To conduct mineralogical and chemical mapping of the lunar surface
- To upgrade the technological base in the country

Chandrayaan-1 aims to achieve these well-defined objectives through high-resolution remote sensing of moon in the visible, near infrared, microwave and X-ray regions of the electro-magnetic spectrum. With this, preparation of a 3-dimensional atlas of the lunar surface and chemical and mineralogical mapping of entire lunar surface is envisaged. India expects to launch another indigenous lunar mission by 2010~20011 which would place a motorized rover on the surface of the moon to collect samples of its soil and conduct experiments. The ISRO has also plans for sending a manned mission to space by 2014 and an astronaut to the moon by 2020. Japan and China have also plans to send manned missions to moon in 2020.[26]

3.7. Korea

In the area of space technology, Korea Aerospace Research Institute (KARI) will be launched the KSLV-1 (Korea Space Launch Vehicle 1), NARO STSAT-2 (Science and Technology

Satellite-2: and COMS (Communication, Ocean and Meteorological Satellite) in he first half of 2010 and also KARI and KT (Korea Telecommunication Co. will be committed to the successful launch of KOMPSAT-5 (Korea Multi-Purpose Satellite-5, and Mugunghwa Telecommunication Satellite-6in the second half of 2010 and STSAT-3 (Science and Technology Satellite-3), KOMPSAT-3 in 2011. South Korea announced an ambitious plan on November 20, 2007 to join Asia's space race by launching a lunar orbiter by 2020 and sending a probe to the moon five years after that. The science minister unveiled the project one month after China launched its first lunar orbiter and two months after Japan did.

According to the *"road map to the implementation of space development,"* developing its own 300-ton rocket is projected to require KRW 3.6 trillion (USD 3.9 billion) over the next decade. "South Korea will send a probe into lunar orbit by 2020 and another to the surface of the moon by 2025 under the road map, "a ministry spokes person said.[27] A rocket, which is called the KSLV-II (Korea Space Launch Vehicle) and weighs about 300 tons, will be ready by 2017 to fulfill the mission, while a smaller 130-ton KSLV-I will be launched within June this year.

4. Legal Problems and Solution for the Exploitation and Mining Rights of the Natural Resources in the Moon and 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 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

[26]) ISRO also plans to undertake a manned spaceflight by 2014 and a manned mission to the moon by the year 2020; http://www. dailystar.net/campus/2008/11/01/reflections. htm

[27]) http://www.kari.re.kr

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)[28] and the 1979 Moon Agreement[29], these two instruments does not offer an adequate legal framework which is able to ensure the safe, orderly and peaceful development and extraction from the 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[30].

As a consequence, its principles lose relevance when applied to the exploitation of extraterrestrial resources. The major problem of the Treaty is that it does not contain any specific reference to space resources and to their exploitation. The exploitation of moon materials raises several specific legal issues, such as those related to the right of 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.[31] 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 ISEA is the international organization through which States manage and control the exploitation of the natural resources of the Moon and other celestial bodies. The ISEA 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 ISEA 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.

5. Procedure of Establishing the ISEA

The ISEA is the international organization through which States manage and control the exploitation of the natural resources of the Moon and other celestial bodies. In order to establish the ISEA, we need to take the following five step's procedure. As a first step, it is necessary to hold a workshop, symposium or Internet mass media

[28]) 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, and the Soviet Union on January 27, 1967, and entered into force on October 10, 1967. As of January 2008, 99 countries are states-parties to the treaty, while another 26 have signed the treaty but have not yet completed ratification.

[29]) *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 December 19, 2008, only 13 states; Australia, Austria, Belgium, Chile, Kazakhstan, Lebanon, Mexico, Morocco, Netherlands, Pakistan, Peru, Philippines, and Uruguay, have ratified it. France, Guatemala, India and Romania have signed but have not ratified it.

[30]) 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.

[31]) Fabio Tronchetti, *op.cit.*, pp. 133~144.

assembling space law professors, lawyers, scientists, technicians, high-ranking officials and staff members from the global space agencies such as the UNCOPUOS, the United States (NASA), European Union (ESA), China (CNSA), Japan (JAXA), India (ISRO) including Korea (KARI) etc. in order to concentrate on their opinions concerning the establishment of the ISEA. As a second step, we need to organize a preparatory committee for establishing the ISEA 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 International Space Exploitation Agency"* should be legislated by excellent space law professors, 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"* by diplomatic conference in the UNCOPUOS, they must pass the *"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 Exploitation Agency."* I would like to propose the following Preamble to the *"Draft for the Convention,"* base on the International Space Exploitation Agency.[32]

Preamble of the Draft for the Convention on the Establishment of an ISEA;

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 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 environ-nmental 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 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space,

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[32]) 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.

the Convention on International Liability for Damage Caused by Space Objects, and the Convention on Registration of Objects Launched into Outer Space,

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.

6. The Principal Points that Need to be Included in the Draft for the Convention

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

6.1. Members and Legal Personality

The members of ISEA shall be the States parties to the *"Convention for the Establishment of an Asian Space Agency."* The ISEA shall have legal personality. The ISEA 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.

6.2. Purpose of Establishment

The purpose of establishing the ISEA 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 and other celestial bodies, with a view to their being used for scientific purposes and for operational space applications systems. The purposes of the ISEA 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, securing and use of fund, 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.

6.3. Space Policy

The Agency is in charge of elaborating and implementing the medium and long-term global space policy, of actual activities and programmes and a related industrial policy in the space field, and the coordination of UN member's states and their national space programmes with respect to international organizations and institutes.

Furthermore, the member States decide on global assimilation of their national space programmes by integrating them into the ISEA programmes. Finally, the Agency 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.

6.4. Licensing

The license to carry out the exploitation of the resources of a lunar or other celestial bodies' site is a contract between the ISEA and the licensee. The license will contain: ① a declaration of the licensee accepting the space law principles and the rules of the present legal regime and affirming his duty to operate in good faith; ② the indication of the geographical location of the extraterrestrial site object of the license; ③ the schedule of the activities to be undertaken on the lunar site. The Agency, by means of the Council, has the duty to control the operator of the licensee[33]. In case such a control shows that licensee has not respected the terms of the license, the Council would ask the licensee to stop these violations and to take the required measures.

The license would be given for a maximum period of twenty years. This is an essential for ensuring the compliance of the legal regime regulating the exploitation of extraterrestrial resources with the non appropriative nature of outer space sets out. The obtainment 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 resources 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.

6.5. Financial Contributions

The ISEA 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.

6.6. Raising and Use of fund

Though the benefits derived from the natural resources of moon are sharing equitable to all States Parties due to the common heritage of mankind of it according to the Article 11 of Moon Agreement, but the ISEA must secure fund in order to prepare and prevent space accidents caused by space debris and another space catastrophe, research for exploitation of moon and other celestial bodies and assistance for exploration of developing countries by the levy such as 5 % of the abovementioned benefits.

6.7. Exchange of Information

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

6.8. Education and Research

The ISEA shall ensure the execution of basic activities, such as education (astronauts etc.), documentation, studies of future projects and technological research work. The ISEA also facilitates the collection of relevant information

[33]) 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

and its dissemination to Member States, assistance and advice for harmonizing national and international programmes and the elaboration and execution of scientific programmes 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 or space transport system from the earth to the moon and other celestial bodies.

6.9. International Cooperation

The ISEA 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.

6.10. Organs

An organization to be named the International Space Exploitation 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.

6.10.1. 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 ISEA 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 of the ISEA 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.

6.10.2 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 of 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.

6.10.3. Director General

- The Director General is the executive of the ISEA 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 ISEA, the execution of the programmes 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 ISEA Convention.

6.10.4. 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.

6.11. Disputes and Arbitration

Disputes between Member States or between any of them and the ISEA 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. 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. [34] 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.

6.12. Headquarters

Though Europe's 710 million people make up 11% of the world's population, but Asia accounts for over 60% of the world population with almost 3.8 billion people. [35] By comparing the world's population, I think that it is adequate to decide headquarter of the ISEA in Asian region. However, in Asia, as the Republic of Korea located at the middle and buffer region between China and Japan as the geopolitical powers, so it is desirable for us to place the headquarter of the ISEA at Seoul in the Republic of Korea. The seat of the ISEA shall be placed at Seoul in Korea or another city such as Shanghai or Tokyo in the Asian region.

7. Conclusion

The International Space Exploitation Agency (ISEA) 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 ISEA also coordinates the broad thinking needed to meet new challenges in the global countries. The ISEA will provide a bright prospects and vision of the world community's future in the

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[34]) E. R. C. Van Bogaert, "*Aspects of Space Law*", Kluwer, (1986), at 271.

[35]) http://en.wikipedia.org/wiki/World_population

Moon and other celestial bodies, and for the benefits for people on the ground that satellites and spacecraft can supply. 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 global countries.

I am sure that it is possible to establish an electronic the ISEA like electronic Government through Internet as well as an electronic Global Center for the Exploitation of the moon and other celestial bodies as a first step. It is necessary for us to establish the ISEA 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.[36] It is desirable for us to establish the ISEA in order to exploit and mine efficiently the natural resources of moon and other celestial bodies. I am sure that it is possible to establish the ISEA in future, if the heads of the space super powers would agree to establish the ISEA through a summit conference.

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[36]) 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.