# GET OFF THE ROCK DA

### A. Uniqueness

#### [Howell] Exoplanet research is growing now, and private entities are playing a huge role in these efforts.

Howell: Howell, Steve,B. [Professor at NASA Ames Research Center, National Aeronautics and Space Administration] “The Grand Challenges of Exoplanets.” *Frontiers in Astronomy and Space Sciences*, April 8, 2020. TB

The start of the **Exoplanet section of Frontiers in Astronomy and Space Sciences comes at an opportune time in the history** of this fledgling field. Starting about 25 years ago, with the discovery of small planets orbiting a pulsar (Wolszczan and Frail, 1992) and soon thereafter the seminal discovery of 51 Peg b (Mayor and Queloz, 1995), exoplanet research today spans many scientific disciplines. **The stature of this research area was recently highlighted via the 2019 Nobel prize being awarded to exoplanet researchers Michel Mayor and Didier Queloz. Exoplanet exploration is truly a world-wide phenomena, a topic of conversation and study in many scholarly areas and at many levels.** Science is an obvious area of interest where **exoplanets have become the poster child for multi-disciplinary collaborative science**, encompassing astronomy, astrobiology, biology, astrophysics, geology, and planetary science to name the major players. But other fields of study, such as philosophy and religion are involved as well. The broad reach and general appeal of exoplanet research stems from a long fascination we have for the night sky. “Are we alone?” that uniquely human question, has deep roots within us all, likely beginning as soon as we looked up at the night sky and wondered. If we examine the history of major scientific areas of research, those that stemmed from grass root beginnings based on an amazing and unexpected discovery or idea and then quickly proceeded to produce many initial results, we find **that such fields of study swiftly gained momentum and became their own research speciality within a few years. From each beginning, scientists migrated to the field, out of curiosity, interest, and desire to make early and major contributions.** The rapid re-purposing or development of **new tools** (e.g., instruments, techniques) **quickly led to many new discoveries.** Today, scientists are often drawn to a field by the available resources or funding, but as scientists we all love something challenging, a new playground in which to flex our brains and put our experience to work. Taking the scientific topics of relativity, quantum mechanics, and dark energy as examples of new breakthrough areas of science that exploded on the scene, we note that typically about 20–25 years after the stirrings began, major discoveries, deep understanding, and paradigm changing results appeared. Thus, **I fully expect that same** **revolution to happen in exoplanet research in the next few years. From the NASA Kepler mission (Borucki et al., 2010; Howell et al., 2014), through TESS (Ricker et al., 2016), and CHEOPS (Cessa, 2019), to the next generation of large, specialized instruments and telescopes planned for the ground and space, the field of exoplanet research is moving forward at a fast pace. We have already seen the significant shift from exoplanet discovery to exoplanet characterization. Exoplanets aims to be a large part of this research endeavor by bringing open access scientific results, covering all aspects of exoplanet and related science to the world.** Below, we outline where we are at present and then discuss a number of grand challenges that face the field. **These are areas rich in discovery potential and likely to** become sub-fields in their own right. So, come along and **explore the grand challenges of exoplanet science.** Discover for yourself the excitement and opportunities available for scientific study within this research area.

### B. Link

#### [Nguyen-Le] Private entities in space make space exploration more efficient and cost effective.

**Nguyen-Le**: Nguyen-Le, Hanh. [Hanh Nguyen-Le is a second-year Master of Public Administration student at the London School of Economics. She is also the Government Affairs Associate at the Space Foundation, a nonprofit advocate organization for space exploration and space-inspired industries, where she focuses on U.S. Congressional relations and national space policy.] "Billionaire private investment is good for the space industry, whether we like it or not.", *The LSE US Centre*, July 19, 2021. EM

**How billionaires support the space industry Private investment in space has created competition and reduced space launch costs. New space actors began to challenge the government-created monopoly, United Launch Alliance (ULA), for contracts, creating competition and introducing a market for small-medium class reusable launch. SpaceX’s Falcon 9’s average cost is $62 million, while ULA’s Atlas V starts at $110 million per launch. Commercial actors enable the government to have multiple competitive proposals to select from during project development. NASA would pay less money upfront for a service, while private companies can operate and have autonomy over their final product. The government can act as a buyer of commercial services, which allows NASA to be more efficient and cost-effective, as the agency can cut costs by only developing projects it has expertise and funding for. Such competition has dramatically changed space technology. New players that enter the space industry are able to embark on ambitious projects at a greater scale and faster pace. Innovative concepts such as reusable rocket stages has shifted the launch industry into integrating reusability into vehicle design and the proliferation of ridesharing missions has decreased the costs of space launch.** This has lowered barriers to enter the space industry, making small satellites rideshare as low as $1 million per mission. Innovations in space launch have further changed the policy environment and streamlined launch and reentry regulations. Billionaires in space are here to stay Investment from wealthy individuals in recent decades have stimulated private markets and paved the way for many startups to enter the industry. As more new players join the commercial space industry, access to space becomes cheaper, resulting in an explosion of proposed satellite constellations and small launch vehicle concepts. Wealthy entrepreneurs have seen an opportunity to take advantage of a lack of government interest in space exploration funding. The high-risk nature of space exploration requires substantial upfront investment that only wealthy individuals can provide before any pay-off. Private investments in space promote competition and innovation. Billionaires providing upfront investments has stimulated the space market and made space more accessible – and profitable.

### C. Internal Link

#### [Goswami] The billionaire space race has long term benefits.

**Goswami**: Goswami, Swish. [Forbes Councils Member] "Why The Billionaire Space Race Is A Good Thing", *Forbes*, September 14, 2021. EM

Odds are you’ve recently seen the news that both Richard Branson and Jeff Bezos have successfully left our planet temporarily in spacecraft their own companies have built. **These two successful trips are just the latest chapter in the “Billionaire Space Race.” The beginnings of this story originate with Peter Diamandis, who helped spur the initiation of the Ansari XPrize. According to the organization’s website, “The $10 million Ansari XPRIZE was designed to lower the risk and cost of going to space by incentivizing the creation of a reliable, reusable, privately financed, crewed spaceship that finally made private space travel commercially viable.”** While the XPrize was initiated in the mid-‘90s, the winner was crowned in 2004, with Richard Branson and his company Virgin Galactic coming in to license the technology. Branson wasn’t the only entrepreneur interested in privatized space travel. Four years prior to the awarding of the Ansari X Prize in 2004, Amazon CEO Jeff Bezos founded his own space exploration company, Blue Origin. Two years later, after the acquisition of PayPal, Elon Musk founded his company SpaceX. Before diving into why I think the Billionaire Space Race is a good thing, I want to take a minute to look back — **all the way back to the 1960s space race. What started with a speech from President Kennedy in 1962 ended with a man on the moon less than seven years later. This space race unified a country, created 400,000 jobs across science, technology and manufacturing and inspired a generation to think ambitiously. The impacts of the original Space Race are still felt today.** NASA’s 2019 article highlights some of the Apollo technologies still in use more than 50 years after the moon landing. Their list includes things like digital flight controls, food safety, space blankets, quake-proofing, rechargeable hearing aids and more!

**[Williams]** Satellites are essential for Earth, and private entities supply them. We need private entities to increase the production of these important satellites.

**Williams:** Williams, Matthew, Space writer HeroX “Is it worth it? The cost and benefits of space exploration” *Interesting Engineering* 2019

**The** most obvious **benefit of** the **Space** Age **was the way it advanced humanity**'s knowledge of space. **By putting satellites and** crewed **spacecraft into orbit, scientists learned a great deal about Earth**'s atmosphere, Earth's ecosystems, **and led to the development of** Global Position Satellite (**GPS)** **navigation**. The deployment of satellites also **led to a revolution in communications technology**. Ever since *Sputnik 1* was launched to orbit in 1957, about **8,100 satellites have been deployed by** forty countries **for** the purposes of **telecommunications, television, radio broadcasting, navigation, and military operations.** As of 2019, the United Nations Office for Outer Space Affairs (UNOOSA) estimated that were [5,074 satellites](http://www.unoosa.org/oosa/osoindex/search-ng.jspx?lf_id=#?c=%7B%22filters%22:%5B%7B%22fieldName%22:%22en%23object.status.inOrbit_s1%22,%22value%22:%22Yes%22%7D%5D,%22sortings%22:%5B%7B%22fieldName%22:%22object.launch.dateOfLaunch_s1%22,%22dir%22:%22desc%22%7D%5D%7D) in orbit of Earth. And **in the coming years, thousands more are expected as part of the growing telecom and satellite internet markets.** In the latter case, these **satellites will be essential to meeting** the growing **demands** for wireless services **in the developing world.** Between [2005 and 2017](http://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx), the number of people worldwide who had internet access went from 1 billion to over 3.5 billion - 16% to 48% of the population. Even more impressive, the number of people in developed nations to have internet access went from 8% to over 41%. **By the latter half of this century, internet access is expected to become universal.**

### D. Impact

[**Maanas Sharma]** Private space exploration and appropriation will lead to more accessible ressources.

Maanas Sharma: Maanas Sharma “The privatized frontier: the ethical implications and role of private companies in space exploration” 2021.

**Another** **key matter to note is** restricted **capitalism in space “could also be our salvation.**”[11] **Private space exploration could** reap **increase**d **access to resources** **and other benefits that can be used to solve** thevery **problems on Earth** that critics of capitalism identify**.** Since governments offset some of their projects to private companies, **government agencies can focus on altruistic projects that otherwise would not fit in the budget before and do not have the immediate commercial use that private companies look for.** Scott Hubbard, an adjunct professor of aeronautics and astronautics at Stanford University, discusses how **“this strategy allows the space agency to continue ‘exploring the fringe where there really is no business case’” but still has important impacts on people down on Earth.**[12]

#### [Gohd] We are RUNNING OUT OF TIME, we will run out of resources on earth in a few hundred years.

Gohd: Gohd, Chelsea. [Writer for Futurism.] “Stephen Hawking: Humans Must Leave Earth Within 600 Years.” *Futurism*, November 7, 2017. TB

Earlier in the year, **Hawking said that: “We are running out of space and the only places to go to are other worlds. It is time to explore other solar systems. Spreading out may be the only thing that saves us from ourselves. I am convinced that humans need to leave Earth.”** A major concern of Hawking, and others, is that **climate change is already causing rapid sea level rise.** It is possible that, **if this progression isn’t diminished by a cut in emissions, a significant percentage of what is currently land will be under water.** (This is, of course, in addition to the other life-threatening effects of climate change.) Additionally, as this continues, **populations are set to continue increasing, which could have disastrous consequences. Hawking is confident that within the next few hundred years, Earth will no longer be a habitable option for humans.** This hypothetical day when humans will supposedly have to leave Earth has been likened to a “Doomsday.” Hawking has asserted multiple timelines for this eventual moment, but he is certain that, at some point, we will have to find a new home. With ongoing projects by NASA, SpaceX, and both private and government agencies around the globe, it is likely that within the next few decades we will land humans on Mars. And, between proposals to terraform Mars and innovative designs like those from the Mars City Design competitions, it is possible that, if humans must leave earth, the red planet could one day be our alternate home. In addition to efforts to reach Mars, Hawking helped to launch the Breakthrough Initiatives, a series of projects seeking to probe “the big questions of life in the Universe,” including finding and communicating with extraterrestrial life. **One of these initiatives is Breakthrough Starshot, which will send nanocraft to Alpha Centauri, our closest star, in an effort to better understand life in the Universe. This technological platform could also allow us to find faster and better ways to travel to other planets.** After all, if Hawking is right, **the International Space Station (ISS) isn’t big enough to house the billions of people who currently reside on planet Earth.**

EXTINCTION OUTWEIGHS THEIR IMPACTS, IF SOMETHING IS PREVENTING EXTINCTION IT IS JUST

### NON PROFIT CP

#### [Duren] Private space appropriation is unjust, except for the Carbon Mapper nonprofit program that will map out emissions to help fight climate change.

**Duren**: Duren, Riley. [Research Scientist at the University of Arizona and an Engineering Fellow at NASA’s Jet Propulsion Laboratory.] "In Partnership with UArizona, New Nonprofit to Launch Satellite Program to Track Greenhouse Gas Emissions" *UArizona.* April 15, 2021. TB

**In a first-of-its-kind coalition to accelerate climate change action**, and with help from UArizona researchers, **a** new **nonprofit organization called Carbon Mapper is launching a program to improve scientific understanding of global methane and carbon dioxide emissions**. Carbon Mapper, a new nonprofit organization partnering with the University of Arizona, today announced a groundbreaking program **to help improve understanding of and accelerate reductions in global methane and carbon dioxide emissions.** The **Carbon Mapper** consortium also **announced plans to deploy a satellite constellation to pinpoint, quantify and track methane and carbon dioxide emissions.** "This decade represents an all-hands-on-deck moment for humanity **to make critical progress in addressing climate change**," said Riley Duren, research scientist in the UArizona Office of Research, Innovation and Impact and CEO of Carbon Mapper. "**Our mission is to** help **fill gaps in the emerging global ecosystem of methane and CO2 monitoring systems by delivering data that's timely, actionable and accessible for science-based decision making**." **Current approaches to measuring** methane and carbon dioxide **emissions** at the scale of individual facilities – particularly intermittent activity – **present challenges, especially in terms of transparency, accuracy, scalability and cost.** **Carbon Mapper** – which also is **partnering with** the state of California, **NASA**'s Jet Propulsion Laboratory, Planet, Arizona State University, High Tide Foundation and RMI – **will help overcome these technological barriers and enable accelerated action by making publicly available high emitting methane and carbon dioxide sources quickly and persistently visible** at the facility level. The data collected by the Carbon Mapper constellation of satellites will provide more complete, precise and timely measurement of methane and carbon dioxide source level emissions as well as more than 25 other environmental indicators. **Through the** Carbon Mapper-**UArizona partnership**, Duren and other UArizona **researchers offer scientific leadership** of the methane and carbon dioxide emissions data delivery **including developing new algorithms** and analytic frameworks **for testing** them with an ongoing research program. "Time is of the essence when it comes to understanding and mitigating methane and CO2 emissions," said Senior Vice President for Research and Innovation Elizabeth "Betsy" Cantwell. "Partnering with **Carbon Mapper will give** University of Arizona **researchers the tools needed to** not only see emissions hot spots, but to **understand their causes and develop actionable plans** for reducing or eliminating these sources." **Carbon Mapper, in collaboration with its public and private partners, is developing the satellite constellation** in three phases. The initial study phase, now complete, included two years of preliminary engineering development and manufacturing. **The first phase is underway and includes development of the first two satellites** by Planet and JPL, **scheduled for launch in 2023**, accompanying data processing platforms, and ongoing cooperative methane mitigation pilot projects using aircraft in California and other U.S. states. P;’

#### [Pope] And the PIC is unique, nonprofits are private corporations for the public’s benefit

**Pope**: Pope, Lauren. [Content Marketing Manager at Oracle and a former content marketer at G2] "What Is a Nonprofit Organization and How Is It Different from a Charity?" *G2.*  July 10, 2019. TB

No matter what causes a nonprofit chooses to support, there are a few base-line rules that every nonprofit organization must follow. **In order to qualify as a nonprofit, an organization must** meet the following three criteria. The organization must **be a private organization separate from the government** The organization must **be an established, self-governing body** The organization must not distribute profit to anything else other than the advancement of the organization. There are countless other legal qualifications required in order to be recognized as a nonprofit organization. However, if your organization does not meet the baseline criteria listed above, there’s no chance of it being recognized as a nonprofit.

#### **[Flinders University]** A loss of even one species because of climate change is enough to cause extinction.

Flinders University: Flinders University. "Climate change risks 'extinction domino effect': Loss of animal or plant species to climate change causes global 'extinction domino effect'." *ScienceDaily*. November 2018. AK

New research reveals the extinction of plant or animal species from extreme environmental change increases the risk of an 'extinction domino effect' that could annihilate all life on Earth. This would be the worst-case scenario of what scientists call 'co-extinctions', where an organism dies out because it depends on another doomed species, with the findings published today in the journal Scientific Reports. Think of a plant's flower pollinated by only one species of bee -- if the bee becomes extinct, so too will the plant eventually. "Even the most resilient species will inevitably fall victim to the synergies among extinction drivers as extreme stresses drive ecosystems to collapse." says lead author Dr Giovanni Strona of the European Commission's Joint Research Centre based in Ispra in northern Italy. Researchers from Italy and Australia simulated 2,000 'virtual earths' linking animal and plant species. Using sophisticated modelling, they subjected the virtual earths to catastrophic environmental changes that ultimately annihilated all life. Examples of the kinds of catastrophes they simulated included runaway global warming, scenarios of 'nuclear winter' following the detonation of multiple atomic bombs, and a large asteroid impact. "What we were trying to test is whether the variable tolerances to extreme global heating or cooling by different species are enough to explain overall extinction rates," "But because all species are connected in the web of life, our paper demonstrates that even the most tolerant species ultimately succumb to extinction when the less-tolerant species on which they depend disappear." "Failing to take into account these co-extinctions therefore underestimates the rate and magnitude of the loss of entire species from events like climate change by up to 10 times," says co-author Professor Bradshaw of Flinders University in South Australia Professor Bradshaw and Dr Strona say that their virtual scenarios warn humanity not to underestimate the impact of co-extinctions. "Not taking into account this domino effect gives an unrealistic and exceedingly optimistic perspective about the impact of future climate change," warns Professor Bradshaw. It can be hard to imagine how the demise of a small animal or plant matters so much, but the authors argue that tracking species up to total annihilation demonstrates how the loss of one can amplify the effects of environmental change on the remainder. "Another really important discovery was that in the case of global warming in particular, the combination of intolerance to heat combined with co-extinctions mean that 5-6 degrees of average warming globally is enough to wipe out most life on the planet," says Dr Strona. Professor Bradshaw further warns that their work shows how climate warming creates extinction cascades in the worst possible way, when compared to random extinctions or even from the stresses arising from nuclear winter.

#### **[Flinders University]** Outweighs on probability: other estimates don’t take into account the co-extinctions that magnify the chance of extinction 10-fold.

Flinders University: Flinders University. "Climate change risks 'extinction domino effect': Loss of animal or plant species to climate change causes global 'extinction domino effect'." *ScienceDaily*. November 2018. AK

"Failing to take into account these co-extinctions therefore underestimates the rate and magnitude of the loss of entire species from events like climate change by up to 10 times," says co-author Professor Bradshaw of Flinders University in South Australia Professor Bradshaw and Dr Strona say that their virtual scenarios warn humanity not to underestimate the impact of co-extinctions. "Not taking into account this domino effect gives an unrealistic and exceedingly optimistic perspective about the impact of future climate change," warns Professor Bradshaw. It can be hard to imagine how the demise of a small animal or plant matters so much, but the authors argue that tracking species up to total annihilation demonstrates how the loss of one can amplify the effects of environmental change on the remainder. "

# CASE

#### American private appropriation of outer space is a core issue that tanks our relations- specifically asteroid mining.

Taichman 21 [Elya Taichman is currently obtaining his J.D. at Temple University Beasley School of Law where he is a Beasley Scholar, a Law and Public Policy Scholar, and a Staff Editor on the Temple Law Review. Elya Taichman is the former Legislative Director for Congresswoman Michelle Lujan Grisham (current Governor of New Mexico). Elya advised the Congresswoman on foreign policy, national security, space, and economic issues., 2021, The Artemis Accords: Employing Space Diplomacy to De-Escalate a National Security Threat and Promote Space Commercialization,https://digitalcommons.wcl.american.edu/cgi/viewcontent.cgi?article=1131&context=nslb, 12-15-2021 amrita]

U.S. Commercial Space Launch Competitiveness Act of 2015 (“Space Act”): The Dawn of the Second Space Age **Until recently, it did not matter that the OST was unclear**, and the Moon Treaty failed to garner support. Space exploration remained the province of state actors like NASA because the sheer expense of rocketry and other technologies remained beyond the reach of private corporations and investors throughout the twentieth century.61 However, over the last two decades the industry has changed rapidly. **In the U**nited **S**tates alone, several of the most **innovative companies have invested in space exploration tech**nology.62 As the research accelerates, costs have decreased, and the potential for profits is tremendous – in 2018 the space economy was $360 billion.63 By 2040, its estimated worth is anywhere between $1.1 trillion and $1.7 trillion.64 However, investors demand certainty, and the uncertainty surrounding OST interpretation was reason to pause.65 After all, no investor or company wanted to pour millions, or even billions, into a company designed to mine liquid ice on the Moon only to discover that this violated international law and that the United States had decided to stop licensing such ventures. Just as President Eisenhower feared, the military-industrial complex, augmented by private industry, lobbied Congress heavily to reduce regulatory hurdles and legal uncertainty in space investment.66 In 2015, their efforts bore fruit **when Congress passed the Space Act**, which President Obama signed into law.67 Chapter 513 of Subtitle V – “Space Resource Commercial Exploration and Utilization” – was the shift **that enabled the** American **private** space **industry to flourish**. This **affirmed tha**t American **citizens could own and sell any “space resources”** that were **obtained through “commercial recovery**.”68 In one stroke, **Congress guaranteed property rights to American** citizens and **companies on a “first come, first served basis.”**69 Moreover, American courts would not permit foreign lawsuits accusing entrepreneurs and businesses of violating the OST.70 The law also required the executive branch to “discourage government barriers” to development and for regulation to “facilitate commercial utilization” in space.71 Finally, it required the President to promote the interest of the American space industry.72 Ever wary of the ambiguities of the OST, and likely out of concern that the Space Act might violate the treaty, the law included a disclaimer that it was the sense of Congress that nothing in the Space Act asserted American sovereignty over any celestial body.73 This disclaimer should be read as opinio juris of American interpretation of the OST. In 1967, the United States and the Soviet Union shared a concern that other nations would challenge their technological preeminence in space.74 In 2015, this proved no different, except, this time, the United States was alone in its preeminence. **Russia**, in fact, **strongly objected and claimed that the Space Act violated i**nternational **law.**75 Russia **submit**ted **an objection to** the United Nations Committee on the Peaceful Uses of Outer Space (“**COPUOS**”), claiming the Space Act demonstrated “total disrespect for international law order [sic].”76 **Russia** went on to **declare that this law manifested a “doctrine of domination in outer space**.”77 Nonetheless, a careful reading of Russia’s complaint to COPUOS elucidates that Russia never actually asserted that the United States violated the OST.78 To be sure, **Russia came as close as possible** to this, but never outright said it.79 Indeed, the Russians lag behind in investment in outer space and technology and fear American exploitation of space’s vast resources in space without their participation.80 American private investment has accelerated this gap with NASA paying companies like SpaceX $55 million per seat to ferry astronauts to the ISS instead paying the Russians more than $90 million to do the same.81 In fact, in its objection to the Space Act, **Russia stated that the U**nited **S**tates “**could propose** discussing the possibility to reach **uniform understanding** of the status of resources and set forth the structure of the doctrine that would include safety and security aspects.”82 It seems Russia is pining for its prior role of crafting space law with the United States. This also suggests that if Russia had the same capabilities as the United States, its policy would likely be comparable.83

#### US asteroid mining pushes Russia to do the same despite it violating international law- increases the likelihood for tensions to escalate.

Mallick and Rajagopalan 19 [Senjuti Mallick and Rajeswari Pillai Rajagopalan, If space is ‘the province of mankind’, who owns its resources?, 1-24-2019,ORF,https://www.orfonline.org/research/if-space-is-the-province-of-mankind-who-owns-its-resources-47561/, 12-16-2021 amrita]

Meanwhile, **a few other countries**—**which have been critical of the US and** Luxembourg, **at the forefront of** the **space mining** efforts—**have** also **decided to join** the field. **The increasingly competitive and contested nature** of outer space activities is spurring major spacefaring nations to **push the boundaries in** their **space exploration**. **Asteroid mining** could possibly become the next big thing and **is** already **seeing a race** among the space powers. The US and Luxembourg are at the forefront in space resource extraction in terms of the policy frameworks and funding.[xxxvi] **Even as the US has clarified that the** US Space **Act** 2015 **is** being **misunderstood** and that there is no change in the US policy towards national appropriation of space, **the reality** is that it has already **spurred a** major **debate**.[xxxvii] China and Russia are among those countries that are following on the path of the US and Luxembourg in undertaking mining missions in space. According to media reports, Ye Peijian, chief commander and designer of China’s lunar exploration programme has stated that China would send the first batch of asteroid exploration spacecraft around 2020.[xxxviii] Speaking to China’s Ministry of Science and Technology-run newspaper, Science and Technology Daily, Ye said that these asteroids have a high concentration of precious metals, which could rationalise the huge cost and risks involved in these activities as their economic value could run into the trillions of US dollars. Therefore, extraction, mining and transporting them back to Earth through robotic equipment will be a significant activity. Chinese scientists are working on missions to “bring back a whole asteroid weighing several hundred tonnes, which could turn asteroids with a potential threat to Earth into usable resources.”[xxxix] Ye was also quoted as saying that China has plans of “using an asteroid as the base for a permanent space station.”[xl] Helium mining on the moon is also part of China’s goals.[xli] **Russia,** for its part, **is** also **responding to the space-mining developments** of the last decade. For one, it plans to have a permanent lunar base somewhere between 2015 and 2020 for possible extraction of Helium.[xlii] **Even as** Russia’s **official position** on asteroid mining **is that it is forbidden** under the 1967 OST—which states that space is the “province of mankind”—the Russian **industry players** are of the view that they **must follow the** lead taken by the **US** and Luxembourg.[xliii] In early 2018, the director of the Scientific-Educational Center for Innovative Mining Technologies of the Moscow-based National University of Science and Technology MISIS (NUST MISIS), Pavel Ananyev, spoke about the Russian ambitions and proposed activities including space drilling rigs, water extraction on the Moon and 3D printers at space stations.[xliv] **Russia’s private space companies** including Dauria Aerospace, one of the first Russian private space companies, also **hold the opinion that they must go forward** in the same direction and call for a larger space to private sector to engage in extracting space resources.[xlv] **Moscow may not have** yet **actively pursued space mining** and resource extraction, **but it is likely to pick up pace** in the coming years alongside global efforts. Moscow clearly has a capacity gap in terms of funding because its earlier plans to have a permanent base in the Moon by 2015 is yet to happen.