

POLI 369B Final Paper

The Rise of the New Space Industry and Its Implications for the State-Centric International System: SpaceX's Starlink and Starship

What challenges do Elon Musk and SpaceX pose to the traditional state-centric system of international relations and international law? Is a multilateral response required, and if so, what should it involve?

Sofia Cuyegkeng

POLI 369B International Security: The Governance of Outer Space

Instructor: Dr. Michael Byers

December 24, 2021

Introduction

From under \$200 million in 2005, outer space sector revenue is projected to hit \$22 billion in the next decade.¹ Space activities have evolved from a centralized model dominated by government agencies like NASA, to the “New Space” industry led by billionaire-funded private firms.² Since the 1984 Commercial Space Launch Act, state space agencies have increasingly relied on private corporations like Elon Musk’s SpaceX to operate space activities.³

In pursuing corporate goals, New Space companies often create sociopolitical risks. Notably, SpaceX’s Starlink satellite project raises concerns over ‘tragedies of the commons,’ with liability (traditionally a state responsibility) ambiguous. Meanwhile, SpaceX’s Starship Mars colonization ambitions threaten to disrupt state-centred international space law. SpaceX’s controversial projects are representative of states’ struggle to regulate New Space firms. Due to their increasing power in space activities, corporations pose legal challenges to the traditionally state-centric international system. The international legal framework on space operations must be updated to effectively address commercial actors, requiring a multilateral effort between states, and across public and private sectors.

Starlink

Space Debris and Pollution

SpaceX launched its first Starlink satellites in May 2019,⁴ planning for *40,000 in total* to create an enhanced global broadband communication network.⁵ SpaceX is just one of many New Space corporations pursuing LEO (low earth orbit) satellite megaconstellation systems.⁶ The rapid proliferation of

¹ Weinzierl, Matthew. "Space, the Final Economic Frontier," 179.

² Clewley, Phoebe T. "NewSpace: The Rise of the Private Space Industry is Threatening the Current Legal Framework Governing Outer Space," 376.

³ Clewley, 375-379.

⁴ Foust, Jeff. "The Space Review: Handicapping the Megaconstellations."

⁵ Rees, Martin. "Be Wary of Elon Musk Despoiling the 'Vault of Heaven'."

⁶ Boley, Aaron C., and Michael Byers. "Satellite Mega-Constellations Create Risks in Low Earth Orbit, the Atmosphere and on Earth," 1.

megaconstellations have raised concerns over potential ‘tragedies of the commons’, especially since the current LEO regulatory framework is “ill-equipped to handle large satellite systems.”⁷ The megaconstellations occupation of orbital shells could even be argued to violate Articles I and II of the Outer Space Treaty, which states that space should be used for “for all of mankind”, prohibiting national appropriation (which states could be argued to be doing via their companies).⁸

Consequences include light pollution hindering astronomy⁹ and perpetuating astrocolonialism.¹⁰ Starlink can impede asteroid detection vital to planetary protection due to light pollution,¹¹ which SpaceX has attempted to address via innovations like “DarkSat”, but it remains a work in progress.¹² Megaconstellations also mean an increased build-up of space debris over time, which can impact Earth’s atmosphere and escalates chances of space object collisions and debris crashes.¹³

Addressing Regulatory Loopholes

Aside from geostationary orbit slot licensing by the International Telecommunications Union (ITU), there are no binding regulations on megaconstellations.¹⁴ Even the ITU system is flawed since allocation is based on companies meeting development milestones, placing smaller companies and countries without satellite telecommunication companies at a disadvantage.¹⁵ Meanwhile, the Space Debris Mitigation Guidelines recommends satellite de-orbiting within 25 years, but fails to address the short operational lives, immense number, and placement of megaconstellation satellites.¹⁶ The Liability Convention also partially

⁷ Boley & Byers, 1.

⁸ Boley & Byers, 5.

⁹ Boley & Byers, 1.

¹⁰ Ferreira, Becky. “SpaceX’s Satellite Megaconstellations Are Astrocolonialism, Indigenous Advocates Say.”

¹¹ Rees, 2019.

¹² Starlink. “Starlink.” SpaceX. Accessed December 16, 2021. <https://www.spacex.com/updates/starlink-update-04-28-2020/index.html>

¹³ Boley & Byers, 1.

¹⁴ Boley & Byers, 5.

¹⁵ Boley & Byers, 5.

¹⁶ Boley & Byers.5.

addresses space pollution by mandating space object registration to the launching state. However, the Convention is flawed, having unclear definitions of what constitutes “fault” and “space debris.”¹⁷

Finally, there is no international system to track space objects, this duty remaining with governments and some corporate initiatives.¹⁸ Incohesive international legislation combined with the rise of many small space companies have created “flag of convenience situation[s]” where companies register in whichever state has the easiest operational regulations.¹⁹ This results in tracking inefficiencies of ownership and liability of space objects.²⁰

Evidently, a multilateral approach to clarifying regulation of space debris tracking, accountability, and liability is necessary. An international registry and tracking system of space objects must be implemented to synchronize the current fragmented efforts by states and corporations and resolve “flag of convenience” issues. Legislation must also be updated to: (1) Address direct corporate liability for damages caused by commercial space operations; (2) Clarify existing legal loopholes (i.e., definitions of “fault” and “space debris”); and (3) Update de-orbiting requirements commensurate to the short lifespan of megaconstellation satellites.

Starship

In deep space, SpaceX aims to land the first humans on Mars by 2022 through Starship, making humans an interplanetary species.²¹ Such space colonization will inevitably become an intense geopolitical theatre between states.²² The complexity of this issue is intensified in the way that space corporations have

¹⁷ Wright, Ewan. “Legal Aspects Relating to Satellite Constellations,” 35.

¹⁸ Wright, 36.

¹⁹ Wright, 28.

²⁰ Wright, 36.

²¹ SpaceX. “SpaceX - Missions: Mars.” SpaceX. Accessed December 16, 2021. <https://www.spacex.com/human-spaceflight/mars/index.html>.

²² Szocik, Konrad, Tomasz Wójtowicz, and Martin Braddock. “The Martian: Possible Scenarios for a Future Human Society on Mars,” 9; Veech, Stephanie D. “to Infinity and Beyond? the History of Space Travel and the Legal Implications of Privatized Space Flight through the Lens of SpaceX,” 156.

become major actors in this area,²³ threatening to overturn state-centric understandings of territorial sovereignty and property upon which current outer space legislation is based upon.

Space Colonization and Territory

Current international laws around outer space activities fail to address the role of private corporations in deep outer space activities. For example, while the Outer Space Treaty (OST) and Committee on Space Research “...prevents contamination of planetary environments...” these regulations only apply to government agencies, with laxer guidelines for private firms.²⁴ Moreover, the legality of space colonization according to the OST is extremely ambiguous in multiple ways.

Notably, Article II of the OST prohibits the national appropriation of outer space.²⁵ Pro-space colonization perspectives argue for a literal reading of Article II where “national appropriation” only applies to states, “allowing “other entities” like private companies...to appropriate territory.”²⁶ However, this argument violates treaty interpretations practice according to the Vienna Convention on the Law of Treaties,²⁷ and disregards Article VI of the OST, which places responsibility for private space operations on the launch state.²⁸ Furthermore, the concepts of property rights and territorial jurisdiction in space is inadequate. While Article XII “inherently suggests...some recognition of property rights and state sovereignty, at least of the physical structures...[this] stop[s] on the soil on which they stand....”²⁹ Also, Article VII only acknowledges *temporary* jurisdiction over surface structures “for exploratory or research purposes” rather than indefinite colonization.³⁰

²³ Szocik, Wójtowicz, & Braddock, 9.

²⁴ Veech, 164.

²⁵ Veech, 166.

²⁶ Veech, 167.

²⁷ Veech, 167.

²⁸ Veech, 166-167.

²⁹ Veech, 168.

³⁰ Veech, 175-176.

Conversely, the OST may provide grounds for SpaceX colonization if the territorial acquisition is on behalf of humanity rather than the United States in accordance with Article I.³¹ However, there are different potential forms of Mars governance, ranging from an international consortium led by the U.S., or a division of “country-specific Martian colonies.”³² Keeping country-specific colonies in mind, would it then be possible to create *corporation*-specific colonies (e.g., SpaceX colony)? As some experts argue, “...the basic challenge [of Mars colonization] will be...whether effective governance will be possible if the political centre of a future Martian government will be located on Mars.”³³ In Starship, SpaceX employees would be the main actors and could choose independence, protected under human rights law.³⁴

Ultimately, corporate-led colonization initiatives like Starship raises complex questions over the outer space international legal framework on property and territorial governance. Current international space law “neither endorse[s] nor prohibit[s] the private use of resources in space.”³⁵ When the U.S. passed the 2015 Commercial Space Launch Competitiveness Act, it challenged the ambiguous attitude of the OST to corporate activities in space, subtly encouraging firms like SpaceX to pursue “[who] gets their first” property rights principles in space activities.³⁶ While some states have protested this Act, others like Luxembourg have supported it.³⁷

Updating the OST

Today, corporations are powerful actors in their own right – a reality unacknowledged by the OST. With the unstoppable growth of commercial space, it is necessary for a revision of the OST that addresses individual rights of property in outer space if humans are truly to become an interplanetary species.³⁸

³¹ Veech, 169.

³² Szocik, Wójtowicz, & Braddock, 9-10.

³³ Szocik, Wójtowicz, & Braddock, 10.

³⁴ Byers, Michael. “Elon Musk, President of Mars?”

³⁵ Weinzierl, Matthew. “Space, the Final Economic Frontier,” 189.

³⁶ Weinzierl, 189.

³⁷ Weinzierl, 189.

³⁸ Veech, 169.

Particularly, Article VI must be amended to reduce ambiguity by explicitly addressing non-government activity in space.³⁹ Updating the OST requires a strong multilateral response. Being an extremely complex task, it has been long avoided, with corporations instead testing how far they can push legal boundaries while continuing operations.⁴⁰ The longer this is left unaddressed, the more difficult to address the legal challenges of corporations to the current system become. Clarification on the legalities of corporate property and colonization in space is needed now before the situation escalates.⁴¹

Some experts argue that the United States must lead OST revision, given its dominant position in the New Space industry (e.g., SpaceX is an American firm).⁴² At the same time, a *consensus*-based multilateral approach has so far been successful in regulating the Arctic and Outer Space,⁴³ and is arguably key to the continued governance of such territories. Russia and China, particularly, are needed given their influence in outer space. The interests of non-space faring states in the Global South must also be incorporated to avoid reproducing existing Earth inequalities in space.⁴⁴ Finally, public-private consultations must occur to create a regulatory system that is at least somewhat acceptable to both government and corporate parties to create the highest chances of legal compliance.

Conclusion

It is apparent in the case of both space pollution and space colonization – as exhibited in SpaceX's Starlink and Starship projects – that space corporations like SpaceX have gained immense power in outer space activities unpredicted by the authors of original space law. The New Space industry is challenging to regulate because firms are powerful actors whose presence over crosses international borders, and a multilateral response is required.

³⁹ Clewley, 393.

⁴⁰ Clewley, 391.

⁴¹ Clewley, 392.

⁴² Clewley, 394.

⁴³ Byers, Michael. "Cold, Dark, and Dangerous: International Cooperation in the Arctic and Space."

⁴⁴ Weinzierl, 189.

The current international regulatory framework on outer space must be updated to address corporate activities and create better liability mechanisms for firms like SpaceX. The U.S., China, and Russia must spearhead this movement since they account for the bulk of outer space corporate initiatives. Acknowledging the need for more explicit discussion of property rights and operational liability in outer space, states should work with private corporations in creating a system that balances corporate goals with societal interests.

Word Count: 1,499/1,500

Bibliography

- Boley, Aaron C., and Michael Byers. "Satellite Mega-Constellations Create Risks in Low Earth Orbit, the Atmosphere and on Earth." *Scientific Reports* 11, no. 1 (May 20, 2021).
<https://doi.org/10.1038/s41598-021-89909-7>.
- Byers, Michael. "Cold, Dark, and Dangerous: International Cooperation in the Arctic and Space." *Polar Record* 55, no. 1 (January 2019): 32–47. <https://doi.org/10.1017/s0032247419000160>.
- Clewley, Phoebe T. "NewSpace: The Rise of the Private Space Industry is Threatening the Current Legal Framework Governing Outer Space." *Journal of High Technology Law* 21, no. 2 (2021): 354.
- Byers, Michael. "Elon Musk, President of Mars?" *Washington Post*, January 22, 2016, sec. Opinions.
https://www.washingtonpost.com/opinions/elon-musk-president-of-mars/2016/01/22/732f1520-bfc7-11e5-bcda-62a36b394160_story.html.
- Ferreira, Becky. "SpaceX's Satellite Megaconstellations Are Astrocolonialism, Indigenous Advocates Say." *Vice*, October 5, 2021. <https://www.vice.com/en/article/k78mnz/spacexs-satellite-megaconstellations-are-astrocolonialism-indigenous-advocates-say>.
- Foust, Jeff. "The Space Review: Handicapping the Megaconstellations." *The Space Review*, March 2, 2020.
<https://www.thespacereview.com/article/3892/1>.
- Rees, Martin. "Be Wary of Elon Musk Despoiling the 'Vault of Heaven'." *The Guardian*, December 29, 2019, sec. Opinion. <https://www.theguardian.com/commentisfree/2019/dec/29/be-wary-of-elon-musk-despoiling-the-vault-of-heaven>.
- SpaceX. "SpaceX - Missions: Mars." SpaceX. Accessed December 16, 2021.
<https://www.spacex.com/human-spaceflight/mars/index.html>.
- Starlink. "Starlink." Starlink. Accessed December 16, 2021. <https://www.starlink.com/>.
- Szocik, Konrad, Tomasz Wójtowicz, and Martin Braddock. "The Martian: Possible Scenarios for a Future Human Society on Mars." *Space Policy* 54 (November 1, 2020): 101388.
<https://doi.org/10.1016/j.spacepol.2020.101388>.
- Veech, Stephanie D. "to Infinity and Beyond? the History of Space Travel and the Legal Implications of Privatized Space Flight through the Lens of SpaceX." *Loyola Maritime Law Journal* 18, no. 1 (2019).
- Weinzierl, Matthew. "Space, the Final Economic Frontier." *Journal of Economic Perspectives* 32, no. 2 (May 2018): 173–92. <https://doi.org/10.1257/jep.32.2.173>.
- Wright, Ewan. "Legal Aspects Relating to Satellite Constellations," in *Legal Aspects Around Satellite Constellations* (Springer, 2019) 25–37