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FROM SHIPS TO STATIONS: THE ROLE OF SOFT LAW IN SHAPING GOVERNANCE MODELS FOR EXTRATERRESTRIAL COLONIES

AUTHORED BY - SEMMATHI B

Abstract

The establishment of human settlements beyond Earth poses unprecedented challenges to existing legal frame works. The ***Outer Space Treaty (1967)*** *declares outer space is the province of all humankind and prohibits national sovereignty, leaving a governance vacuum for future lunar or Martian colonies. This page examines the potential of* ***soft law*** *(non-binding norms, guidelines, and political agreements) as a pragmatic tool for shaping governance in extraterrestrial environments. Drawing comparative insights from the* ***maritime*** *and* ***Antarctic*** *regimes, both of which evolved through soft law mechanisms before achieving codified status, the study argues that outer space governance must follow a similar* ***"softly softly catchy monkey" approach****: gradual, cooperative, and consensus-based development of rules. Instruments such as the Artemis Accords and COPOUS Guidelines demonstrate how soft can encourage responsible behaviors, resource sharing, and conflict prevention without violating the non-appropriation principle. Ultimately, the paper contends that soft law serves as the foundation for an emerging constitutional order in space and one capable of guiding humanity's peaceful, lawful, and sustainable expansion beyond Earth.*

Key Words: *Soft Law, Space Law, Outer Space Treaty, Artemis Accords, COPOUS Guidelines, Extraterrestrial Colonies, Space Governance, Antarctic Treaty System, Maritime Law, Non-Appropriation Principle, International Cooperation, Space Policy.*

I. Introduction:

"In all our searching, the only things we've found that makes the emptiness bearable is each other."

- Carl Sagan

The 21st century has witnessed a renewed surge of interest in outer space exploration, not merely for scientific curiosity but as a frontier for potential human settlement. Space is no longer viewed as an infinite expanse accessible only to superpower governments. It is gradually

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becoming a domain of commercial, private, and membership of the European Union advancing their lunar and Martian missions, the question of how to regulate human conduct beyond Earth assumes profound legal ethical significance. As human settlements move from terrestrial to extraterrestrial domains, governance frameworks must evolve to address the complexities of sovereignty, property rights, environmental protection, and human rights in outer space.

While the Outer Space Treaty of 1967 (OST) remains the cornerstone of international space law, its principles particularly those concerning non-appropriation and the peaceful use of outer space are increasingly strained by technological progress and geopolitical ambition. The OST, supplemented by subsequent instruments such as the Moon Agreement (1969), has laid a broad normative foundation but lacks robust enforcement mechanisms. In practice, much of modern space governance has evolved through soft law (non-binding norms, guidelines, and cooperative arrangements) developed by entities such as the United Nations Committee on the peaceful Uses of Outer Space (UNCOPOUS), the International Telecommunication Union (ITU), and national space agencies. These instruments provide flexibility in adapting to rapid technological change but raise concerns regarding legitimacy, compliance, and accountability. This paper explores how soft law mechanisms can guide the development of governance models for **extraterrestrial colonies**, drawing insights from analogous legal regimes on Earth particularly **maritime law** and **Antarctic governance**. The comparative lens of "from ships to stations" underscores how humanity's earlier encounters with ungoverned or shared spaces (oceans and polar territories) can inform the legal ordering of new frontiers. The central question is whether soft law can serve as an effective transitional framework for building constitutional and judicial systems in future space settlements, without triggering sovereignty disputes or commercial exploration.

II. Historical Evolution of Space Governance and the Rise of Soft Law

The origins of international space law are deeply rooted in the political climate of the Cold War, when the United States and the Soviet Union first ventured beyond the Earth's atmosphere. The launch of Sputnik I in 1957 not only marked the dawn of the space age but also triggered a legal vacuum (no clear rules existed to regulate activities beyond national boundaries). The United Nations, recognizing the potential for conflict, acted swiftly to establish the **Committee on the Peaceful Uses of Outer Space (UNCOPUOS)** in 1959. This body became the principal forum for negotiating the foundational principles of space law.

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The **Outer Space Treaty (OST) of 1967**, often referred to as the "Magna Carta of Space," codified key norms such as the prohibition on national appropriation[1] (Article II), the peaceful use of space[2] (Article IV), and the responsibility of states for national activities in Outer Space [3](Article VI). These provisions emphasized the collective interest of humanity in outer space, framing it as the "province of all mankind[4]." However, while the OST set aspirational standards, it was designed to be flexible rather than prescriptive, leaving operational details open to interpretation. As a result, much of the legal architecture of space activities has evolved outside formal treaties, through **soft law** mechanisms (non-binding resolutions, principles, and codes of conduct).

During the 1970s and 1980s, the international community sought to complement the OST with additional instruments, such as the **Rescue Agreement (1968)**, the **Liability Convention (1972)**, **Registration Convention (1976)**, and the **Moon Agreement (1979)** (largely due to its strong emphasis on redistributive principles) demonstrated the reluctance of major spacefaring nations to commit to stringent legal obligations. Consequently, the governance of outer space began to rely increasingly on soft law tools, which provided flexibility without imposing binding duties.

In the late 12th and 21st centuries, the rapid commercialization of space introduced new actors

[1] https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html - Article II Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

[2] https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html - Article IV States Parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner.
The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited.

[3] https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html - Article VI
States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.

[4] https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html - The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the **province of all mankind**.

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(private corporations, start-ups, and non-state entities). This shift further accelerated the reliance on soft law. The **UN General Assembly's Principles Relating to Remote Sensing (1986)**, the **Guidelines on the Long-Term Sustainability of Outer Space Activities (2019)**, and the **Inter-Agency Space Debris Coordination Committee (IADC) Guidelines** exemplify this trend. These documents, through non-binding, have significantly influenced state practice and corporate behavior by establishing operational standards and ethical expectations.

III. Comparative Analysis: Maritime and Antarctic Governance Models

The governance of outer space bears striking parallels to earlier legal efforts to regulate areas beyond national jurisdiction (mostly the **high seas** and the **Antarctic continent**). Both domains confronted humanity with the challenge of balancing freedom of access, resource sharing, environmental stewardship, and non-sovereignty principles. Examining these analogies helps illuminate how *soft law* evolved as a functional and legitimate mechanism of governance when hard law proved either politically unattainable or technologically premature.

1. Maritime Governance and the Law of the Sea

The oceans were humanity's 1st experience with a "global commons: for centuries, maritime law developed through custom, practice, and state consensus rather than codified treaties (an early form of soft law. The 17th century doctrine of Mare Liberum (freedom of the seas"), articulated by Hugo Grotius, rejected exclusive sovereignty over the oceans. This concept evolved into modern principles embedded in the **United Nations Convention on the Law of the Sea (UNCLOS, 1989),** which recognizes zones of limited jurisdiction (such as territorial seas and exclusive economic zones) while preserving the high seas for common use.[5]

Before UNCLOS' formal adoption, soft law instruments (like the 1958 Geneva Conventions on the Law of the Sea) functioned as transitional guidelines. Similarly, international institutions such as the **International Maritime Organization (IMO)** developed non-binding codes and recommendations that gradually shaped state behavior. This "soft first, hard later" pattern exemplifies how consensus-based norms

[5] https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf - Article 86 Application of the provisions of this Part The provisions of this Part apply to all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State. This article does not entail any abridgement of the freedoms enjoyed by all States in the exclusive economic zone in accordance with article 58.

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can evolve into enforceable regimes. Space law may follow a similar trajectory, where non-binding codes of conduct pave the way for future constitutional frameworks governing lunar or Martine settlements.

2. The Antarctic Treaty System

The **Antarctic Treaty of 1959** and its subsequent protocols represent perhaps the most relevant precedent for extraterrestrial governance. The Treaty established Antarctica as a demilitarized, cooperative scientific zone[6] (akin to the OST's vision of outer space as the "province of all mankind." Importantly, it deferred sovereignty claims without permanently extinguishing them, thereby preventing geopolitical conflict while enabling collaborative administration.

The Antarctic regime also demonstrates the importance of **soft law in maintaining operational governance**. Non-binding measures adopted by the **Antarctic Treaty Consultative Meetings (ATCM)** (covering environmental protection, tourism, and scientific cooperation) function as living instruments, constantly adapting to new challenges. This flexible architecture allows the Antarctic system to remain effective without formal amendments, offering a valuable template for dynamic governance in space colonies, where unforeseen scientific and ecological conditions will demand similar adaptability.

3. Lessons for Space Governance

Both the maritime and Antarctic models illustrate that **effective governance of shared domains require gradual legal evolution**, starting with soft law. These regimes show that legitimacy arises not solely from binding obligations but from consistent practice, transparency, and cooperative oversight. Applying these lessons to extraterrestrial colonies suggests that soft law can serve as a *foundational scaffold*, enabling experimentation with norms of self-government, resource sharing, and environmental care prior to the emergence of rigid constitutional or territorial claims.

[6] https://www.bas.ac.uk/about/antarctica/the-antarctic-treaty/the-antarctic-treaty-1959/ - Article I — Peaceful purposes

1. Antarctica shall be used for peaceful purposes only. There shall be prohibited, *inter alia*, any measure of a military nature, such as the establishment of military bases and fortifications, the carrying out of military manoeuvres, as well as the testing of any type of weapon.
2. The present Treaty shall not prevent the use of military personnel or equipment for scientific research or for any other peaceful purpose.

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IV. Soft Law and the Future of Extraterrestrial Settlements

As humanity contemplates permanent present on the Moon, Mars, and potentially beyond the question arises: how can governance evolve in regions where no sovereign authority exists and where treaty law offers only minimal guidance? In this uncertain legal terrain, **soft law instruments** are likely to play a central role in shaping the governance structures of extraterrestrial colonies as transitional mechanisms between exploratory missions and fully institutionalized system of self-government.

1. The Nature and Function of Soft Law in Space

Soft law refers to **non-binding agreements, guidelines, principles, or codes of conduct** that influence state and private behavior through consensus rather than coercion. Within space governance, soft law allows flexibility and inclusiveness qualities essential for an environmental characterized by rapid technological change and multinational participation. For example, the **UN Guidelines for the Long-Term Sustainability of Outer Space Activities) 2019** encourage responsible conduct by states and private actors in space without creating formal obligations. Similarly, initiatives such as the **Artemis Accords (2020)**[7] (a U.S. led framework for cooperation in lunar exploration) reflect a growing reliance on voluntary principles to coordinate activities in the absence of a comprehensive global treaty.

These instruments reveal that soft law is not a sign of legal weakness but a pragmatic adapting to the limitations of international diplomacy. They enable states and companies to experiment with governance practices, data sharing, and dispute resolution in low-risk environments. Over time, these norms may crystallize into **customary international law** or inspire future treaties once consensus strengthens,

2. Toward Extraterrestrial Constitutionalism

As human habitats evolve from temporary outposts to permanent colonies, governance will inevitably require more structured systems resembling constitutions and courts. here again, soft law can provide the initial scaffolding. For instance, non-binding **charters of conduct for lunar bases** could define internal decision-making processes,

[7] https://www.nasa.gov/artemis-accords/#:~:text=The%20Artemis%20Accords%20reinforce%20the,civil%20space%20exploration%20and%20use. – Artemis Accords, 2020 The Artemis Accords reinforce the commitment by signatory nations to the Outer Space Treaty, the Registration Convention, the Rescue and Return Agreement, as well as best practices and norms of responsible behavior for civil space exploration and use.

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crew rights, and safety responsibilities. International agencies might issue ethical codes on bioengineering, planetary protection, and environmental impact (forming the groundwork for future "space constitutions."

In this respect, the analogy to **maritime and Antarctic regimes** is instructive. Just as early maritime codes governed ships and crews through customary norms before national law extended offshore, early space settlements may operate under internal self-regulations with soft law allows adaptability while maintaining coherence with international principles such as non-appropriation and peaceful use.

3. The Role of Multilateral and Private Actors

Soft law's success in outer space depends on active participation by **multilateral bodies, private corporations, and scientific communities.** UNCOPUOS, the ITU, and international space agencies can issue technical and ethical guidelines; private entities like SpaceX or Blue Origin may develop operational standards that later inform international norms. Public-private cooperation will thus be essential in transforming soft law from mere recommendation into an **operational code of conduct** for extraterrestrial settlements.

Soft law will likely form the backbone of early extraterrestrial governance flexible enough to accommodate innovation, yet normative enough to preserve humanity's shared interest in peaceful and sustainable expansion beyond Earth,

V. Challenges and Legal Gaps in Extraterrestrial Governance

While soft law provides an adaptable and cooperative foundation for extraterrestrial governance it also exposes significant **legal, institutional, and ethical gaps**. The absence of binding enforcement mechanisms, the ambiguity of key principles in existing treaties, and the rise of private actors in space collectively create fragile legal ecosystem that may struggle to manage future colonies effectively.

1. Enforcement and Accountability

The first most critical limitation of soft law is the **lack of enforceability**. Guidelines and voluntary accords rely primarily on political will and peer pressure, not legal compulsion. In the context of outer space, where national jurisdictions end and no supranational authority exists, ensuring compliance becomes nearly impossible. For example, while the **Artemis Accord** promote transparency and interoperability, they

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offer no remedies for non-compliance. As colonies expand and potentially develop internal hierarchies or resource competition, the absence of judicial or quasi-judicial enforcement may lead to governance vacuums or conflicts.

2. **Sovereignty and jurisdictional ambiguity**

The non-appropriation principle **under Article II** of the Outer Space Treaty prohibits national sovereignty over celestial bodies[8], yet it remains unclear how this rule applies to private property, resource extraction, or settlement governance. The question of whether a lunar base or Martian colony may exercise local autonomy without breaching this prohibition is unresolved. Without a clear jurisdictional framework, disputes over control, taxation, or criminal responsibility could emerge (particularly when multiple nations or corporations operate within the same area)

3. **Equity, Access, and Common Heritage**

Another challenge lies in ensuring **equitable access and benefit-sharing**. Developing countries, represented through the **Group of 77** and other UN forums, have consistently emphasized that outer space must serve the collective interests of all humanity. However, the current trajectory of commercial space activity risks reproducing terrestrial inequalities. Soft law alone may not guarantee fair participation or technology transfer, especially when dominated by technologically advances states and cooperations.

4. **Environmental and Ethical Concerns**

The absence of binding planetary protection standards poses risks to both extraterrestrial ecosystems and Earth. Issues such as contamination, waste managements, and resource depletion remain inadequately addressed. Without enforceable environmental obligations, soft law may fail to prevent ecological harm in fragile extraterrestrial environments.

While soft law provides a necessary starting point, its inherent limitations demand eventual codification through binding legal and institutional reforms.

[8] https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html - Article II
Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

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VI. Conclusion

The legal and institutional evolution of space governance reflects a familiar historical trajectory (from the unregulated oceans of the early modern era to the shares, cooperative administration of Antarctica. Each of these experiences demonstrates that **soft law often precedes and Shapes hard law**, serving as a flexible framework during periods of uncertainty and innovation. In the case of extraterrestrial colonies, where no prior governance precedent exists soft law offers and invaluable starting point for establishing norms of behavior, cooperation, and accountability.

However, the growing complexity of space activities, the emergence of private actors, and the geopolitical competition for extraterrestrial resources necessitate a gradual **transition from voluntary principles to binding frameworks**. This may take the forum of an expanded **Outer Space Treaty 2.0**, regional space compacts, or the creation of an international **Space Governance Authority** empowered to mediate disputes and monitor compliance. Moreover, the development of internal governance models (constitutional experiments" within colonies) must remain consistent with fundamental principles of human rights, environmental sustainability, and peaceful use.

The comparative scope of maritime and Antarctic governance underscores that **cooperation, not conquest, ensures longevity in shared domains**. For extraterrestrial settlements, this means that legitimacy and stability will arise not from sovereignty claims but from transparent, inclusive, and adaptive governance systems. Soft law, therefore, should not be viewed as weakness but as a *living framework* capable of evolving into the constitutional and judicial architecture that future human communities beyond Earth will require.

"Where the commercialism exists, then the soft law exists in the form of hard law for uplifting the Common heritage of all mankind

As humanity leaves its first footprints beyond Earth, law must travel with it not as a chain of restriction, but as the compass of conscience"

- ***Semmathi***

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