

博士論文要約

Legal Frameworks Concerning Space Resource Utilization in a Dynamic Era: Emerging Mechanisms and Global Implications

(変革期の宇宙資源の利用に関する法的枠組み—新たなメカニズムとその国際的な意義)

陶陽子

The 21st century has witnessed unprecedented developments in space technology, with both public and private actors increasingly engaging in the exploitation of celestial bodies for extraterrestrial resources as the groundwork for further deep space exploration. While the practical use of mineral resources in outer space, primarily through space mining, remains in its infancy, technological progress suggests that such activities will become feasible in the near future. This emerging reality underscores the urgent need for a comprehensive legal framework to govern space resource utilization (SRU).

This doctoral thesis addresses the fundamental legal question: What are the existing rules of international law regarding SRU, and how can gaps within these rules be addressed through the development of appropriate governance mechanisms? Given that SRU has attracted interest from various participants, the answer to this question also necessitates a clear understanding of space resources and relevant domestic legislation.

Chapter 1 provides the historical context and technological advancements of SRU. It describes the growing interest from both the public and private sectors in exploiting and utilizing space resources. In this chapter, space resources are categorized into four main types: orbit resources, environment resources, radioactive resources, and mineral resources. Among these, mineral resources are most relevant to this thesis as extraterrestrial exploitations on the Moon, asteroids, and other celestial bodies contain valuable minerals that could support future space missions and bring significant controversies. This chapter also discusses the status quo and prospects of space mining.

Chapter 2 examines the core principles of international space law that govern SRU. Through comprehensive examinations of relevant legal instruments and their historical developments, it has interpreted some fundamental principles such as the non-appropriation principle, which prohibits national appropriation of outer space and celestial bodies, and the principle of free exploration and use, which guarantees the right of States to freely explore and use outer space without discrimination. These principles underscore equitable access to space resources and create both opportunities and ambiguities in the regulation of space resource activities. This chapter provides a detailed analysis of the Outer Space Treaty and its effectiveness in addressing SRU issues, as it is the Magna Carta of international space law. It also examines relevant provisions of other treaties and agreements, particularly the liability framework established by the Liability Convention, which is crucial for resolving disputes related to potential liabilities arising from SRU. The chapter also touches on the implications of military use in outer space, considering that SRU may

involve military uses as well. This chapter sets the stage for further discussions of specific legal issues and governance mechanisms in subsequent chapters.

Chapter 3 examines the domestic laws of 3 countries that have developed frameworks for SRU: the United States, Luxembourg, and Japan. Although the United Arab Emirates has incorporated SRU-related elements into its federal laws, it was not discussed in this research due to the insufficiency of its movements related to SRU at this time. This chapter compares these domestic laws and their approaches to regulating space resource activities, highlighting similarities and differences. It analyzes how these national laws align with or diverge from international space law principles and the potential conflicts that may arise. This comparative study provides insights into the complexities of harmonizing domestic legislation with international law principles to ensure a coherent approach to SRU governance.

Chapter 4 evaluates the impact of international regulatory efforts on SRU, focusing on the ongoing work of the Legal Subcommittee of the United Nations Committee on the Peaceful Use of Outer Space, which has been instrumental in addressing legal issues, emphasizing key debates, emerging trends, outcomes, and the Hague International Space Resources Governance Working Group with its development of the “Building Blocks” for an international framework on space resource activities. This chapter underscores the critical role of the UN instrument and the challenges it faces in facilitating international consensus and collaboration concerning a legal framework for SRU.

Chapter 5 explores the role of regional cooperation organizations in SRU governance, utilizing the Asia-Pacific Space Cooperation Organization (APSCO) as a case study. This chapter details the establishment of APSCO and its role in promoting space cooperation and capacity-building in the Asia-Pacific region. It discusses APSCO’s initiatives, such as the Small Multi-Mission Satellite Constellation Program and the Data Sharing Service Platform, which demonstrate the potential for regional cooperation to address SRU challenges. The chapter also examines China’s strides in space activities and its influence within APSCO, providing insights into the broader implications of regional cooperation. Programs such as the International Lunar Research Station, initiated by China and Russia, exemplify the ambitious goals of establishing human settlements in outer space, necessarily involving the exploitation and utilization of space resources. This chapter underscores the importance of regional approaches in promoting SRU governance mechanisms that enhance geopolitical stability and ensure coherence with the principles of international space law.

In conclusion, this thesis posits that effective governance of SRU requires a multifaceted approach that integrates international treaties, national legislation, and regional cooperation. The development of a comprehensive legal framework that addresses the unique challenges of SRU is essential, and “regional cooperation organizations” may function for future initiatives in SRU governance, promoting benefit-sharing, capacity-building, and sustainable use of space resources.