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Assuring a Safe, Secure and Sustainable Environment for Space Activities (4)

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REFRAMING SPACE LAW: TAILORING INTERNATIONAL AND NATIONAL LEGAL STRUCTURES TO FACILITATE NUCLEAR PROPULSION IN DEEP SPACE EXPLORATION

Abstract

The development of nuclear propulsion (NP) system technologies for deep space missions brings a huge challenge to the existing international and national regulatory frameworks. Therefore, this study investigates the legal structures of NP for deep space missions based on their applica- bility and limitations. In the era of NP, the relevance, and the scope of the key international treaties like the Outer Space Treaty and the Liabil- ity Convention are critically assessed. Furthermore, this work identifies gaps and potential conflicts within these legal frameworks that could hin- der both the deployment of NP technologies as well as advancements in deep space missions. Therefore, to keep pace with technological advance- ments, the need for legal evolution was recognized, and for that needful, a set of modifications and new guidelines are proposed under this study which aim to create a more cohesive and supportive legal environment. The balance between ensuring safety and environmental protection and fostering technological innovation and international collaboration is also explored. Better definitions for the liability regime, improved safety stan- dards, and establishing international protocols for emergency response have been modified by this study. Additionally, we recommend the in- tegration of space laws at the national level with international treaties, emphasizing the requirement for readjustment to avoid legal divergen- cies and conflicts. Also, this analysis expands to implement the practical aspects of these legal changes, considering the multiple stakeholders in both government and private space companies. The modifications tar- geted will improve simultaneously with the current and future potential technological advancements in NP. Our suggestions and recommendations will lead to synchronizing the legal standards with technological advance- ments, safety, and environmental concerns, and international collabora- tion. The result of this research is a roadmap to better shape the legal frameworks regulating space activism to embrace the potential of NP tech- nologies. Through a proactive and collaborative legal approach, the full potential of NP systems can be unlocked to initiate a new era of deep space exploration that is safe, sustainable, and in line with international law