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THE PROTECTION OF AI-BASED SPACE SYSTEMS FROM A DATA-DRIVEN GOVERNANCE
PERSPECTIVE

Abstract

Space infrastructures have long represented the pinnacle of technological and engineering achievements. This complexity has been further amplified by the advent of the new space race, where private actors are taking the lead, alongside states, in deploying thousands of satellites in outer space. The outer space environment of 2040 will look very different from today. Spacecraft will necessitate more frequent maneuvers to avoid potential collisions, with the need to be more conscious of their surroundings. Indeed, as the frequency of events and the number of space objects rises, decision-making tasks will increasingly challenge human operators, especially as physical and temporal margins diminish. Such complexity is enveloping thanks to the synergy of space technologies and Artificial Intelligence (AI), which is revolutionizing the functioning of space systems.

The forward trajectory clarifies the significance that AI in outer space will retain in the years ahead. The *Corpus Juris Spatialis* finds itself at a crossroads, faced with the defiance of withstanding the technological advances catalyzed by the impending integration of AI into all facets of space missions. Given

the ubiquitous nature of AI, its implementation will invariably pose multifaceted legal challenges across diverse aspects of International Space Law. The acquired autonomy of space assets prompts crucial questions regarding the legal standards applicable to AI in outer space, and how these autonomous space systems should be protected against hostile interference.

The main purpose of this paper, presented by the Space Law and Policy Project Group of the Space Generation Advisory Council (SGAC), is to examine the pivotal legal dimensions stemming from the automation of space-based applications from a ‘data-driven governance’ standpoint. The increase in production and acquisition of space data will just augment the sophistication of AI systems, therefore necessitating their data assets to be reliable, accurate, and consistent to safeguard the long-term success of AI technologies in space missions. The paper aims to address the overarching legal challenges posed by the integration of AI into outer space operations, specifically on cybersecurity, intellectual property, and data governance, which are critical for safeguarding autonomous systems. By examining the various nuances of these domains, it seeks to contribute to a comprehensive understanding of the legal landscape of the current AI-space pairing. Ultimately, the conclusion will offer a set of recommendations to pave the way for a secure, ethical evolution of autonomous space systems in the near future.