

IISL COLLOQUIUM ON THE LAW OF OUTER SPACE (E7)  
Artificial Intelligence and Safe Space Communication (3)

Author: Dr. Annachiara Pagano

University of Trento, Department of Physics, National PhD in Space Science and Technology, Italy

AI PIONEERING THE FINAL FRONTIER: NAVIGATING LEGAL CHALLENGES IN SPACE  
EXPLORATION

**Abstract**

Technological advancement in the field of Artificial Intelligence is revolutionizing numerous sectors, including the exploration and use of Space. It is evident that international space law requires a legal-conscious approach in light of the introduction of AI technologies, which will significantly benefit space activities but will also pose legal challenges regarding liability, sovereignty, and regulation. Several legal issues arise when AI machines are granted legal personality and space activities show the complexity of these legal issues. The definition of the acting and legal personality for AI technologies in space activities is a topic of great relevance, which directly calls into question the principles of responsibility and accountability. Based on a review of the Corpus Iuris Spatialis (OST, ARRA, LIAB, REG, MOON), it is evident that some crucial areas of the current legal framework are lacking due to the introduction and implementation of artificial intelligence. The paper presents the outcome of a study that discussed the potential applications of AI in Space. Several positive aspects of AI will be highlighted in the findings, including its application in space traffic management and space security programs, and most importantly, space sustainability and the associated legal challenges. In regard to space sustainability applications, a case study on space debris mitigation and the role of AI is addressed from a technical point of view in correlation to relevant legal perspectives. Recommendations are drawn from the study to address the state responsibility and the legal implications to be considered when implementing AI in space. Despite industrial advances, international space law suffers from few limitations when it comes to addressing emerging AI issues. In alignment with related literature, it is found that the integration of AI technologies into space activities can significantly contribute to space science and technology advancements. To achieve these benefits, however, a legal framework that regulates space AI effectively is needed to meet emerging legal concerns.