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Policy, Legal, Institutional, Economic and Security Aspects ofDebris Mitigation, Debris Remediation and STM (8-E9.1)

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SPACE ENVIRONMENTAL GOVERNANCE: A COMPREHENSIVE FRAMEWORK FOR ENSURING SECURITY, STABILITY AND SUSTAINABILITY OF SPACE ACTIVITIES

Abstract

The concept of Space environmental governance (SEG) was initially proposed by the China Academy of Space Technology (CAST) during the 573rd Xiangshan Science Conference (XSSC) in 2016 as a way to tackle the increasing threats posed by space debris. It was further elaborated during the 683rd XSSC in 2020 as a more comprehensive alternative to space traffic management (STM). Now it is generally accepted by space authorities, the industry and the academia in China as a comprehensive framework which includes a set of mechanisms, rules and technologies that can ensure security, stability and sustainability of space activities and, at the same time, ensure that the space environment can be used for current and future generations through appropriate use of limited resources in outer space. SEG focuses on the use of common pool resources in outer space, which include, among others, orbital space, electromagnetic

frequency bands, mineral resources, and biotic resources. It encompasses a wide range of space activities in all orbital areas. Active satellites, space debris, space weather, frequency interference, cybersecurity, near-Earth objects, planetary protection and in-situ space resources utilization, inter alia, are factors that can make an impact on the use of common pool resources by the humankind. Generally SEG can be further divided into three different parts, namely, situation awareness and warning, traffic management and operation, and disposal and utilization. Reduce, Reuse and Recycle (3R) is used as basic principles of SEG, while Refine, Internationalize and Operationalize (RIO) is proposed as trends to guide the development of new requirements for mechanisms, rules and technologies. Currently the most urgent issue for SEG resides in the low Earth orbit (LEO). The orbital capacity and frequency bands are to be exhausted by the rapid deployment of a variety of LEO constellations. A dedicated fleet of constellations for space weather observation, frequency monitoring, in-orbit operation surveillance, collision avoidance, space object removal, in-orbit maintenance and service is proposed as space infrastructure for SEG. Debris-free spacecraft, in-situ debris/meteoroids detection and modeling, real-time interference reporting, among others, are new technologies that are identified as essential for SEG. Moreover, a UNCOPUOS-centered governance approach is proposed as a possible means to realize the goals of SEG.