

IAF SYMPOSIUM ON SECURITY, STABILITY AND SUSTAINABILITY OF SPACE ACTIVITIES
(E9)Interactive Presentations - IAF SYMPOSIUM ON SECURITY, STABILITY AND SUSTAINABILITY
OF SPACE ACTIVITIES (IPB)

Author: Dr. Javier Maldonado-Romo
TECNOLOGICO DE MONTERREY, Mexico

Ms. Diya Jose
Space Generation Advisory Council (SGAC), India
Mrs. Atzin Fernanda Constantino Gomez
Samara National Research University (Samara University), Russian Federation
Mr. Mahhad Nayyer
Purdue University, United States
Ms. Yuti Antani
Space Generation Advisory Council (SGAC), India
Mr. Virgile Gautier
Germany

ANALYSIS AND INDUSTRIAL INSIGHTS FOR DEVELOPING SAFE RENDEZVOUS AND
PROXIMITY OPERATIONS STANDARDS**Abstract**

One emerging technology that has great promise for improving the sustainability and safety of the space environment is On-Orbit Servicing (OOS). Remedialization and mitigation are the two primary approaches it uses to solve the space debris problem. Remediation involves lowering the chance of collisions with already-accumulated space debris, which directly addresses the buildup of junk in orbit and disposing of end-of-life satellites well as actively clearing debris are two of its main tasks. On the other side, by putting policies in place to keep active spacecraft from going into derelict during their operational lives, the mitigation plan seeks to indirectly slow the increase of space trash. This entails refueling, robotic repairs, and towing orbit changes to prolong the useful life of satellites. Rendezvous and Proximity Operations' accuracy and security are critical to the success of OOS operations.

In order to derive critical insights for developing safety standards that apply to both cooperative and non-cooperative RPO scenarios, this article conducts a thorough investigation of previous RPO events. The paper finds recurrent trends, anomalies, and important variables that have greatly impacted the results of these missions through a thorough analysis of numerous RPO missions. This study includes interviews with businesses that are actively involved in RPO in addition to a thorough examination of the literature. This gives the participants a firsthand look at the difficulties and best practices that these businesses face. The recent spike in on-orbit servicing activities—which includes real flights, in-depth research, and on-orbit demonstrations—highlights the importance of this work even more.

The study suggests a set of safety guidelines and best practices intended to reduce the inherent dangers of on-orbit rendezvous and proximity operations by utilizing the results of this thorough investigation. The objective of these suggestions is to establish a structure for subsequent expeditions, giving precedence to the security of spacecraft and the endurance of the orbital environment. This study makes a valuable contribution to the ongoing efforts to improve the safety, sustainability, and dependability of on-orbit servicing and, by extension, the area of space operations, by providing an organized analysis of past and future RPO projects and presenting practical advice.