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TOWARDS THE OBSERVATION AND REMOVAL OF AN UPPER STAGE ROCKET BODY – THE  
JAXA-ASTROSCALE ADRAS-J MISSION

**Abstract**

In order to create a market for the removal of space debris it is essential to have strong support from government entities. This takes the form of (1) funding for missions to develop the necessary technology, and (2) active involvement on a regulatory environment that will lead to safe and sustainable operations. The Government of Japan and the Japan Aerospace Exploration Agency (JAXA) are taking strong steps to drive the creation of a market by pursuing both of these paths. This paper will address the technical and policy implications of a groundbreaking JAXA mission that is a significant step forward in commercializing space debris removal.

In February 2020, JAXA announced that it would be funding the first phase of a mission line focused on the observation, characterization and eventual removal of a large piece of Japanese space debris. The initial phase of the mission line includes the location, close approach and rendezvous with a pre-determined Japanese upper stage rocket body, followed by the acquisition of in-situ data to better understand the movement characteristics of the debris.

The first phase of the mission will be completed by the end of Japan Fiscal Year (JFY) 2022 (April 2023). The second phase, which has yet to be announced by JAXA, is expected to propose the removal of a Japanese upper stage by the end of JFY 2025 (April 2026). JAXA has selected Astroscale and its Active Debris Removal by Astroscale-Japan (ADRAS-J) satellite as the commercial partner for the first phase of this mission.

The focus of this paper will be twofold. First, it will include a summary of the technical background and concept of operations of ADRAS-J. Astroscale is demonstrating much of the necessary technology in its End of Life Services-demonstration (ELSA-d) mission, but there will be several key technical enhancements that will be necessary to complete ADRAS-J and follow-on missions for debris removal.

Second, the paper will address the policy implications of this mission line. Astroscale will not only be developing the technology for ADRAS-J that will lead to a safer and more predictable environment, it will address the domestic regulations and international policies that support such missions and help to foster transparent and sustainable orbital operations.