SPACE DEBRIS SYMPOSIUM (A6)
Political, Economic and Institutional Aspects of Space Debris Mitigation and Removal (Joint with Space Security Committee) (6)

Author: Mr. Paul Guthrie
Bryce Space and Technology, United States

Ms. Carissa Christensen
Bryce Space and Technology, United States

OVERVIEW OF ORBITAL DEBRIS MITIGATION TECHNOLOGIES

Abstract

This paper summarizes a study identifying and characterizing technologies and concepts for space debris mitigation. The focus of the paper is international.

The study included an exhaustive open source analysis of papers and presentations from NASA, DoD, academia, and international sources; a survey of industry leaders based in the US and internationally, and; a separate survey of young space professionals through Space Generation Advisory Council, a UN-affiliated body that represents the largest network of young professionals in the industry.

The issue of space debris is ascending into prominence among US DoD policy priorities. The 2011 National Security Space Strategy highlights space debris as a major issue of the strategic space environment, in which space is "increasingly congested, contested, and competitive." The Space Strategy states the nation's strategic objectives are to "strengthen safety, stability and security in space" and "maintain and enhance the strategic national security advantages afforded to the United States by space." Mitigation of space debris aligns directly with these strategic objectives.

Recent high profile events include the collision of Iridium 33 and Kosmos-2251 in 2009, which created over 2000 pieces of large debris, and the Chinese ASAT test in 2007, which increased overall debris in orbit by 10% at the time. On January 18, 2012, Secretary of State Hillary Clinton announced that the U.S. would participate in discussions started in the EU aimed at developing a code of conduct for space activities. Since space debris threatens the utility of the space environment for everyone, this is a global problem for all space actors.

The paper provides a description of all publicly available and plausible debris mitigation concepts, and information and analysis to place those concepts in context. Analyses of each of the technologies assess feasibility, the enabling technologies required to develop, the type of debris for which a technology would be effective, potential externalities, any dual-use possibilities, and political sensitivities. In addition to technologies to remove debris from the space environment, the paper will also profile existing and proposed preventative measures. These include agreements and conventions on how many rocket fragments are allowable/acceptable per launch, and discussions of deorbit motors on upper stages.