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IMPACT OF END-OF-LIFE MANOEUVRES ON THE RESIDENT POPULATIONS IN PROTECTED
REGIONS

Abstract

The Inter-Agency Space Debris Coordination Committee (IADC) Space Debris Mitigation Guidelines issued in 2002 and revised in 2007 address the post mission disposal of objects in orbit. After their primary mission, objects crossing the Low Earth Orbit (LEO) should have a remaining time in orbit not exceeding 25 years or a perigee altitude above 2000km. Objects in the geosynchronous region (GEO) should be placed in an orbit that remains above the GEO protected region.

We investigate the long-term impact of both satellites and rocket bodies performing end-of-life (EOL) orbital manoeuvres on the resident populations of the LEO and GEO protected regions. We study the cases of full or partial compliance with the IADC post mission disposal guideline. ESA's Meteoroid and Space Debris Terrestrial Environment Reference tool (MASTER) is used to compare the space debris flux rate of the object during the remaining lifetime estimated for the pre-EOL-manoeuvre and for the post-EOL-manoeuvre orbit. ESA's Debris Environment Long Term Analysis (DELTA) tool is used to estimate the evolution of the space debris environment vis-à-vis the implementation, or not, of EOL manoeuvres.

The study shows that, on average, an object performing an EOL manoeuvre decreases the flux rate it encounters which decreases the probability of a collision. However, the impact on the resident populations is of a lower significance due to the small fraction of objects currently performing EOL manoeuvres.