

SPACE DEBRIS SYMPOSIUM (A6)
Mitigation and Standards (4)

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ANALYSIS OF MITIGATION GUIDELINES COMPLIANCE AT INTERNATIONAL LEVEL IN LOW
EARTH ORBIT**Abstract**

Since 1994, where COPUOS considered for the first time, on a priority basis, matters associated with space debris, many countries and international organization have agreed, via the publication of space debris mitigation guidelines, on the need to mitigate the risk posed by the space debris environment. At international level, the Inter Agencies space Debris Committee (IADC) published its mitigation guidelines in 2002 and COPUOS adopted its space debris mitigation guidelines in 2007. In France, the French Space Operations Act (FSOA), which also deals with this problematic, came into force in 2010.

The work presented on this paper aims to investigate the global compliance of mitigation guidelines by space operators over a 13 years period (2000 – 2012). We are particularly interested in studying the expected decrease of the mid or long term risk in LEO, through the application of the 25 year rule or the re-orbitation above the LEO graveyard orbit.

First of all we have gathered orbital information, mainly from publicly available sources, of spacecrafts and launcher elements crossing or near the LEO protected region (defined by an altitude lower than 2000 Km). From the previous sub-set of space objects, we have identified those arriving to end of mission between 2000 and 2012 by detecting the last orbital maneuver. This has been possible by the development of maneuver detection algorithms, which from the analysis of temporal series of orbital data are able to compute the maneuvers dates and magnitude.

For the space objects arriving to end of mission between 2000 and 2012 that have not decayed yet, the knowledge of their physical characteristics as the ballistic coefficient, is necessary to estimate a re-entry duration. In order to obtain such information, specific algorithms have been developed and validated in the frame of this study.

Finally, the orbital lifetime of each space object has been computed under the standard methods defined in the framework of the FSOA for what concerns solar activity prediction Results obtained under a given predicted variable solar activity are also shown in order to estimate the sensitivity of the results to solar activity.

One of the main results of our study consists in the rate of compliance of LEO mitigation guidelines for each year between 2000 and 2012, for spacecrafts as well as for launcher elements. This allows us to analyze the existence of trends showing the improvement of the mitigation guidelines compliance over the years.