SPACE DEBRIS SYMPOSIUM (A6)
Modelling and Risk Analysis (2)

Author: Dr. Elisa Maria Alessi
IFAC-CNR, Italy, em.alessi@ifac.cnr.it

Dr. Alessandro Rossi
IFAC-CNR, Italy, a.rossi@ifac.cnr.it
Dr. Giovanni Valsecchi
INAF-IAPS, Italy, giovanni@iaps.inaf.it
Dr. Luciano Anselmo
ISTI-CNR, Italy, luciano.anselmo@isti.cnr.it
Dr. Carmen Pardini
ISTI-CNR, Italy, carmen.pardini@isti.cnr.it
Dr. Camilla Colombo
University of Southampton, Italy, camilla.colombo@polimi.it
Dr. Hugh G. Lewis
University of Southampton, United Kingdom, H.G.Lewis@soton.ac.uk
Dr. Florent Deleflie
IMCCE, France, Florent.Deleflie@imcce.fr
Mr. Jerome Daquin
IMCCE, France, jerome.daquin@imcce.fr
Dr. Massimiliano Vasile
University of Strathclyde, United Kingdom, massimiliano.vasile@strah.ac.uk
Dr. Klaus Merz
European Space Agency (ESA), Germany, klaus.merz@esa.int

EFFECTIVENESS OF GNSS DISPOSAL STRATEGIES

Abstract

The management of the Global Navigation Satellite Systems and of the MEO region as a whole is a subject that cannot be deferred, due to the growing exploitation and launch rate in that orbital regime. The advent of the European Galileo and the Chinese Compass constellations significantly added complexity to the system and calls for an adequate global view on the four constellations presently in operation. Taking into account and, whenever possible, exploiting the orbital dynamics in this peculiar region of space, several different disposal scenarios (including de-orbiting toward reentry and re-orbiting in graveyard zones) for the spent upper stages and the satellites at end-of-life will be explored. The mitigation measures currently adopted are taken into account and will be compared with more aggressive scenarios. The possibility to exploit non gravitational perturbations with passive de-orbiting devices will be analyzed as well. Whenever possible, according to the current and foreseen performances of the space surveillance network, avoidance maneuvers between active satellites and debris will be considered. The effectiveness of the different disposal strategies will be analyzed in terms of residual collision risk and avoidance maneuvers rate. This work was performed under an ESA/GSP Contract.