
Reducing the space debris population in view of the changing scenarios in the space activities

Alessandro Rossi*¹

¹Istituto di Fisica Applicata "Nello Carrara" IFAC-CNR – Italie

Résumé

The space agencies and the space operators are now well aware of the danger posed by the man made orbiting debris.

The mitigation measures proposed worldwide are widely publicized and recommended since decades. Nonetheless the space debris population is still growing.

Why is this happening?

In the recent past a radical change in space traffic started to emerge: a large number of small satellites (CubeSats and alike)

are launched every year. Moreover, in the very next years large constellations of satellites for broadband global internet connection are going to be built in Low Earth Orbit, stacking thousands of satellites in the same altitude band.

What are the challenges posed by these new trends? Can we face them with the current practices? Do we need and can we propose something different that could change the growth pace? Do we need active debris removal?

In the two lessons a number of possible answers to the above questions and of possible solutions will be proposed. In particular we will discuss the following concepts:

- the issues posed by the new space traffic and the forthcoming mega-constellations;
- the concept of passive dynamic disposal at the end-of-life for debris mitigation;
- the use of environmental indexes to quantify the risk in orbit and the state of the space environment;
- the advantages and risks posed by the use of novel technologies such as sail and tethers for deorbiting;
- the advantages of new manufacturing technologies (3D printing) for spacecraft and the experiments made in the framework of the H2020 ReDSHIFT project to validate these technologies (e.g., hypervelocity impacts, design for demise tests, etc.).

*Intervenant