

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

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P2-ROTECT : PREDICTION, PROTECTION & REDUCTION OF ORBITAL EXPOSURE TO  
COLLISION THREATS – GENERAL OVERVIEW AND FIRST RESULTS**Abstract**

The strategic importance of space systems is growing in Europe, for civil and defence applications, such as satellite communications, Earth observation, satellite navigation, etc. Recent examples have shown that on-orbit collisions brought on by space debris are actual threats. On one hand, some space debris are routinely tracked, making collisions predictable, but the increasing number of collision alerts affects the cost of space missions' management. On the other hand, most debris items are untracked because of their small size, making prediction impossible. The way to reduce vulnerability is then to reduce the severity of collision and the probability of occurrence.

The FP7 - 3rd Space Call - selected P2-ROTECT project aims at assessing the risks associated with space debris collisions and at recommending possible solutions (better prediction, better protection or action on debris environment) to reduce vulnerability of future space missions with respect to on-orbit collisions. In order to make these recommendations, the project firsts elaborates a vulnerability index and tool which quantifies the efficiency of solutions with respect to trackable and untrackable debris effects and which provides access to sensitive terms of collision probability or severity. Furthermore, trade-offs are made between efficiency and cost to propose new design options for future space infrastructures. In order to work with concrete examples depending on orbit types, three missions of interest for EU are analysed: Sentinel-1 in Low Earth Orbit, the GALILEO constellation in Medium Earth Orbit and MTG, the weather observation constellation in Geostationary Orbit.

The presented paper will mainly address programmatic work, as the project began on the 1st of March 2011 and will last thirty (30) months. It will also address the first results available at the time. They will

mainly focus on the vulnerability index developed previously by Onera and proposed for the P2-ROTECT project and applied to a simplistic space mission example.