

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

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ON-ORBIT FRAGMENTATION OF BRIZ-M

**Abstract**

Orbital debris objects in the size regime between one to ten centimeters diameter pose a particular risk to satellites. They are too small for being tracked. But on low Earth orbits (LEO) they have sufficient kinetic energy to put a satellite out of action in the case of a collision. The largest share of objects in this size regime is fragmentation debris. Explosions of spacecraft due to the ignition of on-board fuels are a major source for the production of such debris. In October 2012 an upper stage of the type Briz-M exploded on an eccentric orbit with a very low perigee. The event produced a debris cloud. The explosion took place at the perigee of the orbit close to the Earth's atmosphere. Thus a short orbital lifetime of the debris can be expected. The fragmentation event is simulated. The debris distribution is presented. It is examined how the debris is spread over Earth's orbits and which risk they pose to satellites. The contribution to the background population is determined. The descent rates of the fragments are calculated. The expected lifetime of the debris is analyzed for the coming years. It turns out that the vast majority of objects larger than ten centimeters is expected to re-enter the atmosphere within two years.