

20th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Space Debris Detection, Tracking and Characterization - SST (1)

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OBSERVATION AND ANALYSIS OF COSMOS 1408 FRAGMENTATION.

Abstract

The population of objects in space has increased dramatically over recent decades. Space debris now represent the majority of objects in space resulting from inactive satellites, breakups, collisions and fragmentations. It has become a concern for institutions all over the world and, as such, it has led to the fostering of several programmes to counter the issues. Among these, the use of ground-based sensors for Space Surveillance Tracking (SST) activities and services plays a crucial role.

One major event that has further increased the threat posed by space debris is the fragmentation of the Cosmos 1408 satellite, which occurred on November 15, 2021 and was triggered following an Anti-Satellite Missile test (ASAT). Overall, it resulted in more than 1000 trackable pieces and in millions of smaller debris (estimated from numerical analysis). This work presents the activities carried out by POLIMI (Politecnico di Milano), ASI (Italian Space Agency) and INAF (Italian Institute of Astrophysics) in this framework, which exploited both data from SST networks and the observation measurements from BIRALES (Bistatic Radar for Leo Survey), an Italian bistatic radar belonging to EUSST (EUropean SST), which mostly contributed to the monitoring of the cloud of fragments. First, the processing method adopted from BIRALES in observing Cosmos debris is presented and discussed and a critical analysis about the derivable information is conducted. Then, these data are joined to the ephemerides derived by

SST networks observations and exploited to identify the epoch and the location of the fragmentation. In this procedure, the software toolkit PUZZLE, developed by POLIMI in collaboration with ASI, is used.