SPACE DEBRIS SYMPOSIUM (A6)
Measurements (1)

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RESULTS OF OPTICAL SURVEYS FOR SPACE DEBRIS IN MEO

Abstract

During the last decades considerable effort has been spent to measure the space debris environment in different orbital regimes using radar and optical sensors. Most surveys concentrated either on the densely populated low Earth orbit altitudes (LEO) or on the unique region of the geostationary ring (GEO). Some limited results from surveys of the geostationary transfer region (GTO) are available, as well. The increasingly populated medium Earth Orbit (MEO) space used by the global navigation satellite constellations like GPS, GLONASS, Beidou-2/COMPASS, and GALILEO has not been systematically investigated so far.

Previous GEO surveys revealed a substantial number of small-size debris, leading space debris modelers to assume a number of at least 10 breakup events in the GEO region (including the two known events). Applying the same ratio of fragmentations per inserted object to approximately 230 MEO catalogue objects would lead to a high probability for one or several breakup events in the MEO region. Measurements to characterize the debris environment in MEO are thus highly desirable.

Dedicated MEO survey strategies were developed and corresponding survey campaigns performed at the ESA 1-meter telescope in Tenerife. The paper presents the results from these surveys and analyzes their statistical significance. Upper limits for the number of breakup events in different orbital planes are derived based on a simulated breakup event population. The results from the ESA telescope are complemented by surveys from the ZimSMART wide-field telescope located at the Zimmerwald observatory in Switzerland.