

SPACE DEBRIS SYMPOSIUM (A6)
Measurements and Space Surveillance (1)

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TWO YEARS OF SYSTEMATICAL GEO SURVEYS RESULTS

Abstract

First GEO surveys started within framework of the ISON project in May 2007 using 22-25 cm class optical instruments. Observations from nearly 150 full nights and several dozens of partial nights are collected by now. Large amount of gathered data made possible to establish autonomously maintaining orbital database independent of other sources of orbital information. Large number of previously unknown debris on GEO and GTO orbits has been discovered. Surprisingly, new discoveries of relatively bright (brighter than 16.5 mag) objects are continuing despite of limited sensitivity of using instruments and initial expectations that all such objects should be discovered within a year (or so) after the regular surveys started. At the same time, number of uncorrelated short tracks also continues to grow despite of special efforts on developing and implementation of special software for searching of tracks belonging to the same object and established follow-up measurement sessions involving more powerful instruments. These facts can be partially explained by observed large amplitudes in brightness long term variability for many of newly discovered high altitude space debris objects (confirmed by observations with larger instruments). So, in many cases we really observe different pieces of debris becoming bright enough to be detected by small aperture instruments but then "disappearing" again. Variations of effective area for high area-to-mass ratio (AMR, $>1 \text{ sq.m/kg}$) objects resulting in hard predictable variations in orbital evolution is another cause of the problem with the tracks correlation. We will present obtained statistical results for correlation between brightness and AMR, distribution of high AMR objects by orbital parameters at different epochs (in the past, at present and in the future), analysis of uncorrelated tracks distribution. Examples of successful correlations of short tracks separated by weeks and months will be given. Analysis of orbital and physical properties of larger objects also will be presented.