

15th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Measurements (1)

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OPERATIONAL AND INACTIVE INTACT OBJECTS IN GEO AS SOURCES OF HAMR DEBRIS -
FIRST CLEAR EVIDENCE**Abstract**

Improvement of situation awareness for near-Earth space is essential for safety of space operations in the crowded environment. Taking this into account the State Space Corporation Roscosmos consistently increases efforts to develop and use the Automated Warning System on Hazardous Situations in Outer Space (ASPOS OKP). Operation of dedicated optical observation facilities that provide functional support to the ASPOS OKP have already resulted in discovery of hundreds of objects in GEO region and at various HEOs (GTO, Molniya) during 2015-2016. At present number of objects in GEO tracked by ASPOS OKP have exceeded quantity of objects with orbital data provided at SpaceTrack by more than 1000. Absolute majority of these objects is represented by previously unknown faint space debris and by previously discovered but then lost fragments. At least half of this population is represented by objects having high area-to-mass ratio (HAMR). It is quite challenging if possible at all to establish the origin of these objects due to their presumably long presence in orbit and inaccuracy of backward propagation of their motion caused by various factors. Additional efforts have been undertaken in 2016 in order to find possible candidates for the origin of newly discovered HAMR objects as soon after their initial detection and early orbit determination as possible. Quite good sensitivity (18-18.5 mag during the moonless periods) of larger observation instruments (with 40-65 cm aperture) used by ASPOS OKP and improved operational flow, which permits to interconnect geographically distributed ground facilities in course of the observations, have played a key role in achieving success in these efforts. As a result, during the year we were able to clearly confirm the origin of several newly discovered HAMR debris objects. These debris were released by three different GEO region resident objects, including two operational spacecraft and one rocket body. All three objects seem remained intact. At least, both spacecraft continued to perform station-keeping manoeuvres while the upper stage have not demonstrated significant changes neither in the brightness pattern nor in orbital motion. Therefore, the release of the new objects may not be associated with catastrophic destruction of objects due to any reason. Detailed data on the circumstances of discovery, tracking and analysis of origin of the aforementioned HAMR debris objects will be presented in this paper.