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Author: Dr. Igor Molotov
Keldysh Institute of Applied Mathematics, RAS, Russian Federation, im62@mail.ru

Mr. Leonid Elenin
Keldysh Institute of Applied Mathematics of RAS, Russian Federation, l.elenin@gmail.com
Dr. Igor Izmailov
Central Astronomical Observatory of the Russian Academy of Sciences, Russian Federation,
i.izmailov@mail.ru

IMPROVED SPACE OBJECT OBSERVATION TECHNIQUES IN ISON PROJECT

Abstract

Interagency International Scientific Optical Network (ISON) project started as an open international voluntary project on self-financing basis represents now an interagency association that includes the 4 main segments with own scheduling centers and independent sources of the financing - scientific cooperation, Roscosmos subsystem, industry organizations collaboration and new subset for commercial activities.

ISON provides permanent monitoring of the whole GEO region, regular surveying of the Molniya type orbits, and tracking of objects at GEO, GTO, HEO and LEO. In 2017, the observations of 100 telescopes of 43 observation facilities in 18 countries allowed to KIAM collect 22.689 million measurements in 2.647 million tracklets for about 6000 space objects have been collected.

On first stages of the project, the efforts were concentrated mainly on implementation of few survey strategies with telescopes having large FOV to maintain the KIAM catalogue and to improve the accuracy of primary orbit determination. Therefore now it is under improvement the follow up abilities of the ISON network. Such improvement includes installation of a lot of the 25 cm telescopes with small FOV and cameras with electronic shutter and application of new observation techniques with new KDS software to increase limiting magnitude. Thank to using longer exposure time the 35 - 40 cm class telescopes can reach 18.5 magnitude.

Other direction of the ISON development is elaboration of the multiple telescope system for panoramic survey to detect the LEO objects. The 6-element prototype of 20-cm optical tubes with common FOV of 4.5x42 degree was created. Experiments with various lens objectives, fast (few times per second) cameras with electronic shutter and new software for image processing have been arranged to estimate accuracy of measurements for LEO objects. New optical tube for future panoramic survey system is designed - 23 cm aperture with FOV of 10 degrees.

Results of high accuracy observations, tracking with new observation technique and KDS software and experiments of LEO detections will be presented and discussed.