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DEVELOPMENT OF SURVEY TELESCOPES IN THE ISON PROJECT

Abstract

International scientific optical network (ISON) project started in 2004 as open international voluntary project on self-financing basis to be an independent source of data about natural and artificial space objects. Main focus of the ISON development always was on creating telescopes with large field of view (FOV) for a quick survey of the sky. At different stages of the project new tasks and problems appeared that required the development of new classes of survey telescopes. Firstly it were elaborated 22-cm telescopes with FOV 4x4 degree that could cover the entire visible part of the GEO overnight. As next step it were produced 25-cm telescopes with FOV 3.3x3.3 degrees that must apply combined (survey and tracking) mode. Three such telescopes were installed in Western Hemisphere so that ISON can survey whole GEO ring. This work made it possible to maintain a list of orbits of all bright GEO-objects. Then 19.2 cm telescopes with FOV 7x7 degree were elaborated to increase the accuracy of the orbits for all bright GEO-objects by multiple scans of GEO. As part of the joint work with Roscosmos, such telescopes were combined in pairs (FOV 9x7 degrees) and fours (FOV 9x14 degrees) systems to better detect objects in high elliptical orbits (HEO). Also it were elaborated 50-cm and 65-cm telescopes with FOV 2.5x2.5 and 2.2x2.2 degrees to develop the methodology of local deep GEO surveys to detect faint debris. To observe HEO in perigee area is was elaborated "barrier" system from six 20-cm optical telescopes with a field of view of 7x7 degrees (common FOV 3.5x42 degrees). Most productivity is demonstrated by two quadruple 19.2 cm systems from Roscosmos observatories. For a good night each such system now receives more than 55 thousand measurements in 6000 tracklets for 1100 different space objects at GEO, HEO and LEO. First 40-cm telescope of new generation with FOV 5.6x4.2 degree is putting in operation to perform full deep surveys of GEO. Next step is connected with 30-cm class telescopes with FOV 6x6 degrees which combine advantages of 19.2 and 22 cm telescopes and exceed them in sensitivity. First two such telescopes will be installed in 2021, next two – in 2022. Also there is a plan to elaborate small telescope with extra-large FOV to detect LEO objects. Report will present an analysis of the results, obtained with different survey telescopes and explain current status of the ISON project.