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NEW SUBSYSTEM OF THE ISON OPTICAL NETWORK TO IMPROVE THE CONJUNCTION ANALYSIS

Abstract

ISON optical network represents one of the largest ground-based systems specialized in observation of space debris and other objects in high geocentric orbits. In 2015 quantity of telescopes of 40 observatories that collaborate with ISON project in 17 countries will be exceeding 100 units. These telescopes are combined in 4 subsystems – for GEO survey, bright and faint objects follow up, and for asteroids (ASPIN). KIAM collected 10.866 million astrometry measurements during 2014.

Since 2010, ISON is involving in operations of the Roscosmos Automated system of warning on dangerous situations in space (ASPOS OKP). In this system KIAM is responsible for the conjunction analysis at high orbits and developed special software for ASPOS center. In 2013-2014 KIAM is created other software complex ADAPS to provide commercial service for industry entities.

To improve the quality of these activities ISON is deploying additional subnetwork for extended GEO surveys from 7 small (18-19.2 cm aperture) automated telescopes with field of view 7x7 degree with centralized scheduling at KIAM. Each telescope is surveying visible part of GEO and provides up to 12 thousands measurements for 600 objects (with brightness down to 14-14.5 magnitude) per night with duration of object tracks up to a few hours. While 22-25 cm telescope of existing ISON global GEO survey subsystem has limiting magnitude down to 15 - 15.5 and provides the duration of tracks between 15 and 40 minutes. Extended surveys of new ISON subnetwork allows to KIAM to determine more precise GEO orbits for conjunction analysis, to detect maneuvers of active satellites and to help maintain the orbits of GEO objects in clusters.

VT-78a 19.2-cm telescopes are working in Tiraspol (Moldova), Kislovodsk (North Caucasus), Khuraltogot (Mongolia) and Ussuriysk (Far East). VT-52c 18-cm telescope – in Nauchniy-1 (Crimea). In addition, VT-78a will be installed in Multa (Altay region) and 2xVT-52c – in Macon (Argentina) to cover almost all GEO. During 2014, VT-78a in Khuraltogot can obtain 1.2 million measurements in 174.5 thousands tracks, VT-52c in Nauchniy-1 – 1 million measurements in 138 thousands tracks. Many HEO objects were detecting as background.

The analysis of results obtained with this new subsystem will be presented and discussed.

Also it will be explained the goals if other deployed new ISON subsystem for LEO observations. Seven 12,5-25-cm telescopes are working in Tiraspol, Moscow, Kislovodsk, Krasnodar and Blagoveschensk, and one 50-cm - in Ussuriysk.