PROGRAM OF AUTOMATED ASTEROIDS DETECTION CoLiTec - NEW FEATURES AND RESULTS OF IMPLEMENTATION. V. E. Savanevich[1], A. M. Kozhukhov[2], A. B. Bryukhovetskiy[2], V. P. Vlasenko[2], E. N. Dikov[3], Yu. N. Ivashchenko[4], L. Elenin[5], [1]Kharkiv National University of Radioelectronics, 14 Lenin Av., 61166, Kharkiv, Ukraine (vadym@savanevych.com), [2]National Centre of Space Devices Control and Test, 97419, Evpatoria – 19, AR Crimea, Ukraine, [3]Recearch and Design Institute of Micrography, 1/60 Parkhomenko Lane, 61046, Kharkiv, Ukraine, [4]Andrushivka Astronomical Observatory, 3-7 Observatorna Str., 13400 Andrushivka, Zhitomir reg, Ukraine, [5]Keldysh Institute of Applied Mathematics RAS, 4, Mius Sqr., 125047, Moscow, Russian Federation.

Introduction: Report on the development and implementation results' of program of automated asteroid search and detection was represented at the previous conference LPSC–42 [1]. Within this year the present software was updated and showed significant implementation results. The present report illustrates major updating and implementation results of CoLiTec (CLT) [2] in 2011.

Major software updating. The main improvement of the software for 2011 is OLDAS (OnLine Data Analys System) launching, permitting to process observations within conditions close to the real time. The main functions of this system are: automatic distribution of frames among series; several (local network) computers' parallel treatment of frames. If these computers have multicores' processors, OLDAS creates multithreads treatment of data on local network computers (quantity of threads depends on cores).

OLDAS implementation permits highly increasing of observations processing efficiency. Now, the first results of frames' series processing can be available within 20 minutes after the last frame of this series is formed. Before that, the first results were available within 40 – 60 minutes after CoLiTec (CLT) launching that could start only after all planed areas observation. This time-difference obtained due to OLDAS implementation permits to observe new interesting objects within the same night.

Some more useful updatings:

1) module of manually coordinates measurements of objects' missed by the software but detected by observer;

2) capacity of series processing with a big quantity of frames (more than 50 frames);

3) development of a system for big size frames' adjustment (up to 1 GB per frame);

4) automatic detection and display of NEO-rating for all detected objects;

5) a new method of objects with near-zero (about one pixel per frame) apparent movement detection based on dispersion analysis;

6) velocities range expansion of detected objects up to 10''/min (up to 100 pixels per frame);

7) the new matching algorithm, invariant with respect to axes orientation of frame's coordinates system and camera's rotation angle, permits wide fields' matching (for example, 8x8 degrees);

8) frames' stacking now is possible without external star catalogue;

9) algorithm modification of threshold's calculation for preliminary signals' detection that now permits to detect faint signals on the frames within celestial area around Milky Way;

10) reduction (3-4 times faster) of time spent for inner catalog formation of motionless objects.

Results of the program operation. The present software updating turned to be fruitful. In 2011 the software was used by Andrushivka Astronomical Observatory (AAO) (the 0.6-m reflector, equipped with CCD-camera FLI PL09000) and the Russian remotely-operated observatory ISON-NM, located in the State of new-Mexico (USA) (the 0.45-m astrograph, equipped with CCD-camera FLI ML09000-65). 32891 measurements was formed [3] and 71 new asteroids were discovered [4] by AAO in 2011 till December 10. That exceeds the previous maximal achievement (19990 measurements in 2008 year [3]). Implementation of the present software in ISON-NM observatory permitted to form 129888 measurements, discover 688 asteroids and already the second comet (January 1 – December 10, 2011) [3, 4]. For December 10, 2011 these observatories had the 8th (ISON-NM) and the 13th (AAO) places on the list of the most efficient observatories after asteroids' observation done in 2011.

Quite a few interesting objects were discovered by CoLiTec (CLT) in 2011: periodic comet (P/2011 NO1 [5]); NEO (2011 QY37 [6]); Jupiter Trojans (2011 QJ9, 2011 QQ47); asteroid with orbit close to NEO's one (2011 HY52 [7]); asteroid with orbit close to comet's one (2011 QD23 [8]); asteroid 2011 RC17 [9], it's perihelion distance is smaller than the semimajor axis of Jupiter's orbit and its aphelion distance is bigger than the the semimajor axis of Saturn's orbit.

References: [1] Savanevich V. E. et al. (2011) *LPSC XXXXII*, Abstract #1140. [2] http://neoastrasoft.com/home/. [3] http://www.minorplanetcenter.net/iau/special/CountObsByYear.txt. [4] MPC 72993 – 77510. [5] MPEC 2011-O10. [6] MPEC 2011-Q51. [7] MPEC 2011-J02. [8] MPEC 2011-Q39. [9] MPEC 2011-W37.