Near-Earth Space Observation Activities at Ukraine in 2019

Dr. O. Kozhukhov
Observations of spacecraft and space debris for Ukrainian Space Monitoring and Analysis System (SMAS)

Sensors modernization and new sensors development

International Cooperation

NEOs observations
SMAS Facilities

Radar 5N86 "Dnepr", Mukachevo

Perspective L-band Radar

Perspective cm-band radar

QOS "Sazhen-S" and OEOS type 1 at CSIRP and NFC, Dunaivtsi

Outer Space Monitoring Center

Optical sensors at Odesa Astronomical Observatory

OEOS type 2 at RD SCP, Novosilky, Kyiv region

Optical sensors at Uzhhorod National University
Modernized UHF Radar (5N86)

- Detection of SO in the sector 120 degrees at a range: from 250 to 5600 km
  
  Replacement of the control and data processing system

L-band radar with digital antenna array

- Detection of SO in all directions (support and rotary device) at a range: up to 3000 km
  - Modular principle of the construction of receiving and transmitting equipment

Perspective centimeter-band radar based on the 25-m Cassegrain antenna

- Ultraprecise measurement of orbit parameters of SO

- Identification of the spacecraft designation

Undergoing tests

Under development
Optical Sensors of SMAS
Optical Sensors of SMAS in 2019

QOS "Sazhen-S", Khmelnitsky region

New control system

OEOS, type 1, Khmelnitsky region

New 0.5 m f/3.8 telescope.
Operational

OEOS, type 2, Kyiv region

New 0.3 m f/1.0 telescope.
Operational
International Cooperation

Inter-Agency Space Debris Coordination Committee

Achievements

• >100 participants, 13 space agencies (SSAU is back!)
• IADC guidelines updated after 12 years
• Many joint WG sessions
• Speed-up the WG-SG approval cycle
• 3-month frequency SG meetings (added by teleconf)
• New IADC website soon available

“if you are doing nothing, you do not break any law”
International Cooperation

Chandryan-2 launch positional and photometrical observations (25/07 - 12/08/2019)

3 telescopes:
0.8 m – Mayaki, RI OAO;
0.3 m – Dunavitsi, CSIRP and NFC
0.4 m – Derenivka, UzhNU.
Observation of NEOs by Ukrainian observatories in 2015-2019

Total: 8499 observations, 327 NEOs

(https://newton.spacedys.com/neodys/)
Near Earth Objects

Ukrainian Software for Surveillance of NEOs - CoLiTec

Main features of CoLiTec

1. Automatic detection of weakly moving objects (WMO>2.5)
2. Work with super-wide fields of view (more than 10 sq. degrees)
3. Automatic calibration and image correction
4. Automatic robust algorithm for astroreduction
5. Automatic filtering of poor measurements
6. Viewer of results (LookSky) with GUI
7. Multithreading support in multi-core systems and in a local network
8. Processing in near-real time managed by OLDAS (OnLine Data Analysis System)

Results (2010 – 2018)

Observations: 600 000+.
Discovered: 1566 asteroids and 4 comets.

Comets
- The first comet discovered by the Russian astronomer for the last 20 years.
- P/2011 NO1 – July 7, 2011 (ISON-NM)
- C/2012 S1 – September 21, 2012 (ISON-Kislovodsk)
- P/2013 V3 (Nevski) – November 6, 2013 (ISON)

Tropical of Jupiter

NEOs
- 2011 QY37
- 2012 RQ16
- 2013 TB80
- 2014 KH2

Unusual
- 2013 UL10, 2018 SQ13 (confirmation only)

http://www.neoastrosoft.com/
1. Ukraine's software and hardware facilities allow us to carry out a full range of tasks for monitoring near-Earth space throughout the whole range of altitudes, including space debris and NEO.

2. During 2019, two new optical sensors entered operations. A few more sensors were modernized.

3. The National Space Facilities Control and Test Center is ready for mutually beneficial cooperation on topics related to the monitoring of near-Earth space.
Proposals for further cooperation

establishment of the Ukrainian-Polish Association for the Monitoring of Outer Space

signing of a Memorandum of Cooperation between the NSFCTS and the Polish Space Agency

THANK YOU FOR YOUR ATTENTION!

ncuvkz@spacecenter.gov.ua

www.spacecenter.gov.ua

Phone: +38 (044) 253-43-49
Address: 01010, 8 Moskovska Str., Kyiv, Ukraine