

On current situation in developing of
National Space Situational Awareness (SSA) at
Omarov Assy-Turgen Observatory (OATO)

Fesenkov Astrophysical Institute
Kazakhstan



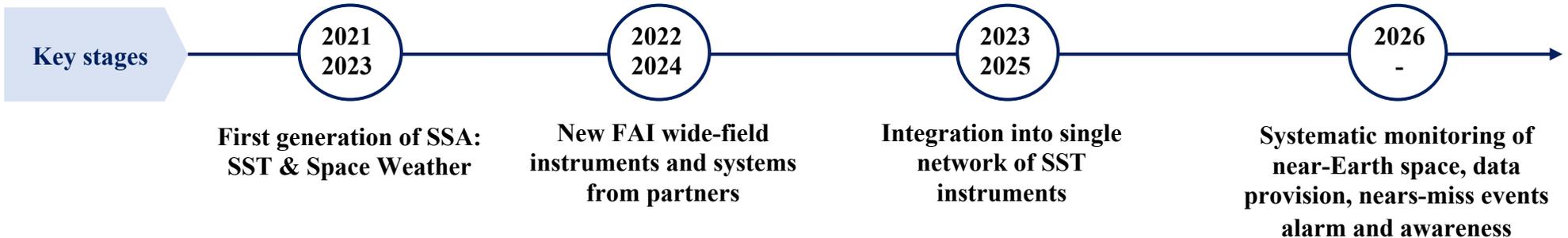
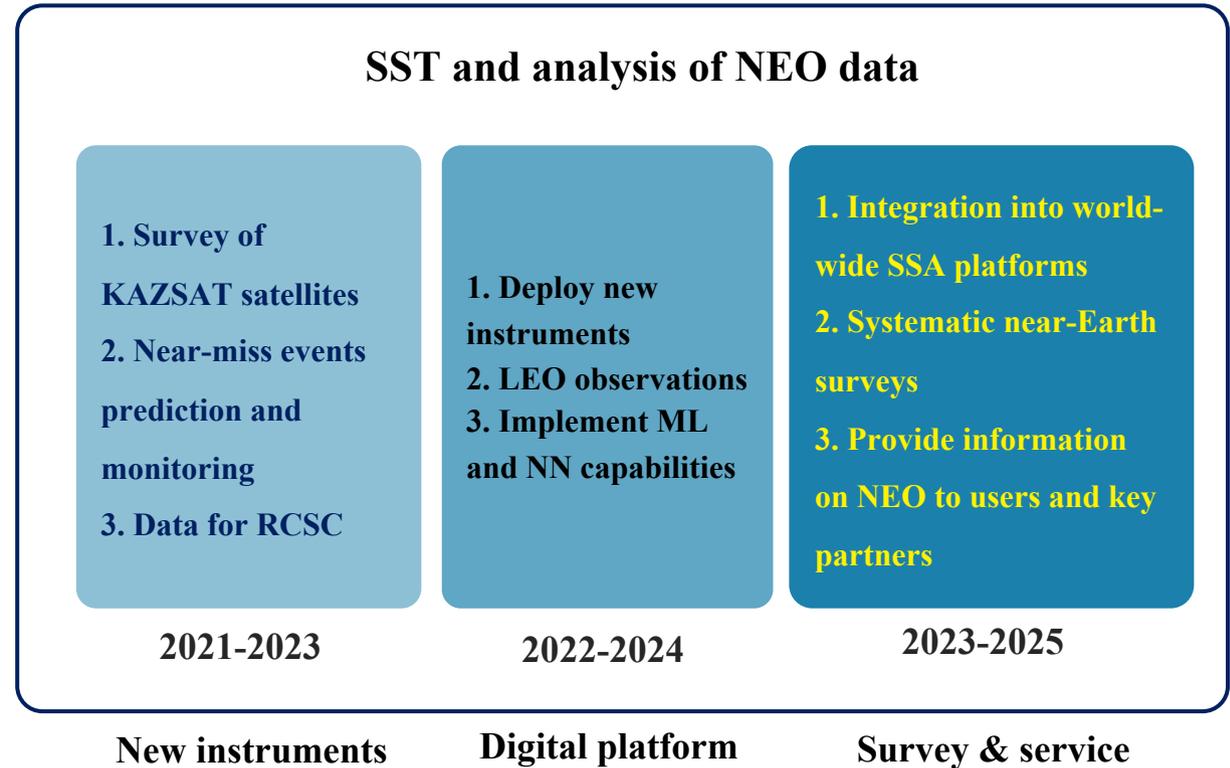
General concept and timetable of SSA development



Space debris and hazardous asteroid

Deploy the system for near-Earth survey and awareness for safety of Kazakhstan satellites

Project overview



Effects

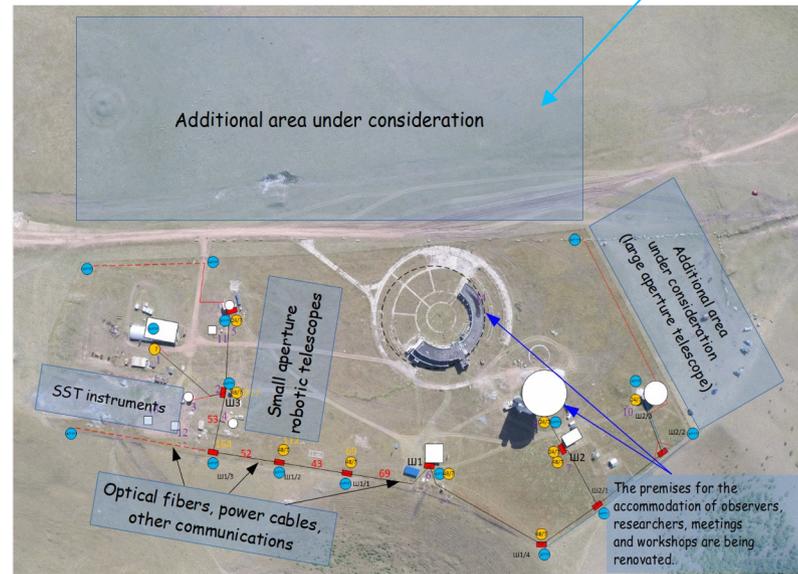
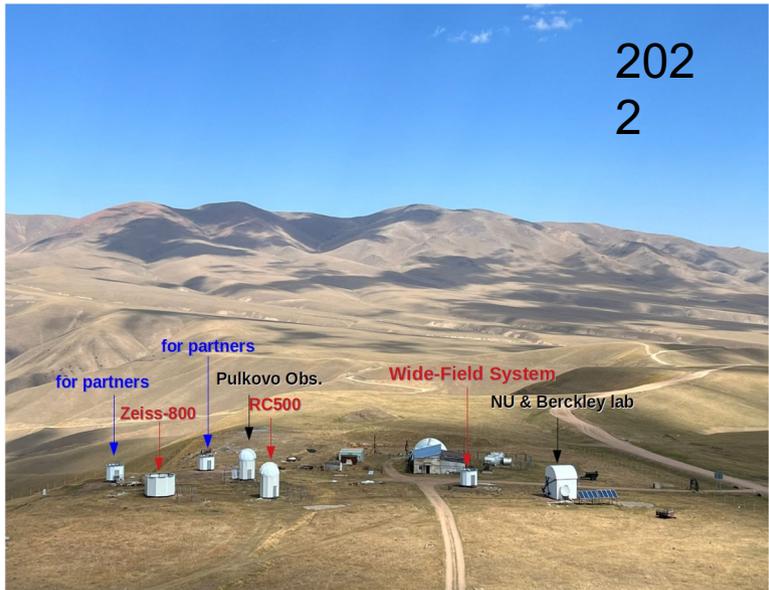
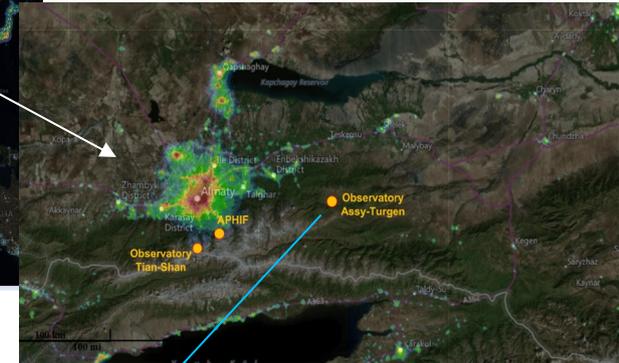
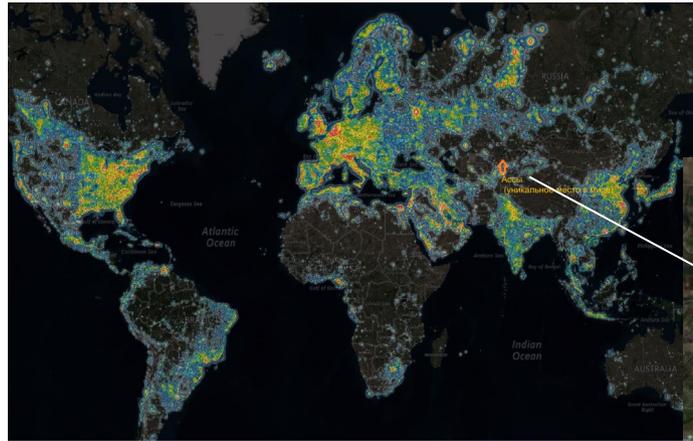
Crucial information for RCSC

High-precision position and near-miss events prevention

Digital platform, updated NEO catalogs

National System of Space Situational Awareness

Space Surveillance and Tracking (SST)

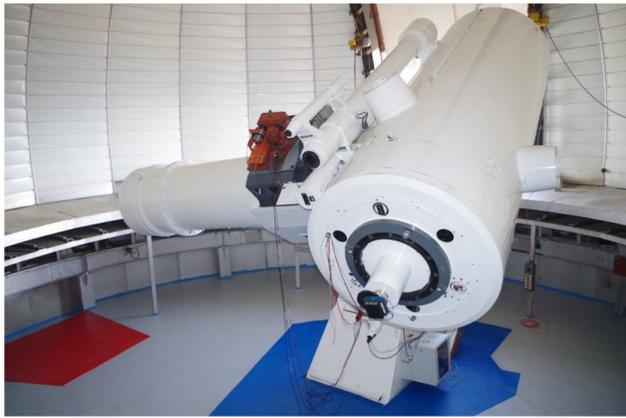


Renovated infrastructure
Installed new instruments
Developed and manufactured Wide-Field optical Systems and domes

Instruments and equipment installed and operational

1. **RC500**: 50-cm with FOV $\sim 1.5^\circ \times 2^\circ$, designed for NEO observations
1. **Wide-Field Telescope**: 40-cm with FOV $\sim 2.5^\circ \times 3.5^\circ$, designed for near-Earth surveys
1. **Zeiss-800** (modernization stage): 80-cm, designed for follow-up observations of NEO and near-miss events monitoring
1. **AZT-20**: 1.5-meter with VPHG-spectrograph in primary focus. In SST is used for spectral observations of NEO, and in photometric regime with EMCCD to discover faint (small size) debris and hazard asteroids

SST: new capabilities



Astrometry: precise positioning, Near-miss events prediction and monitoring



Photometry: objects rotation, shape, color characteristics

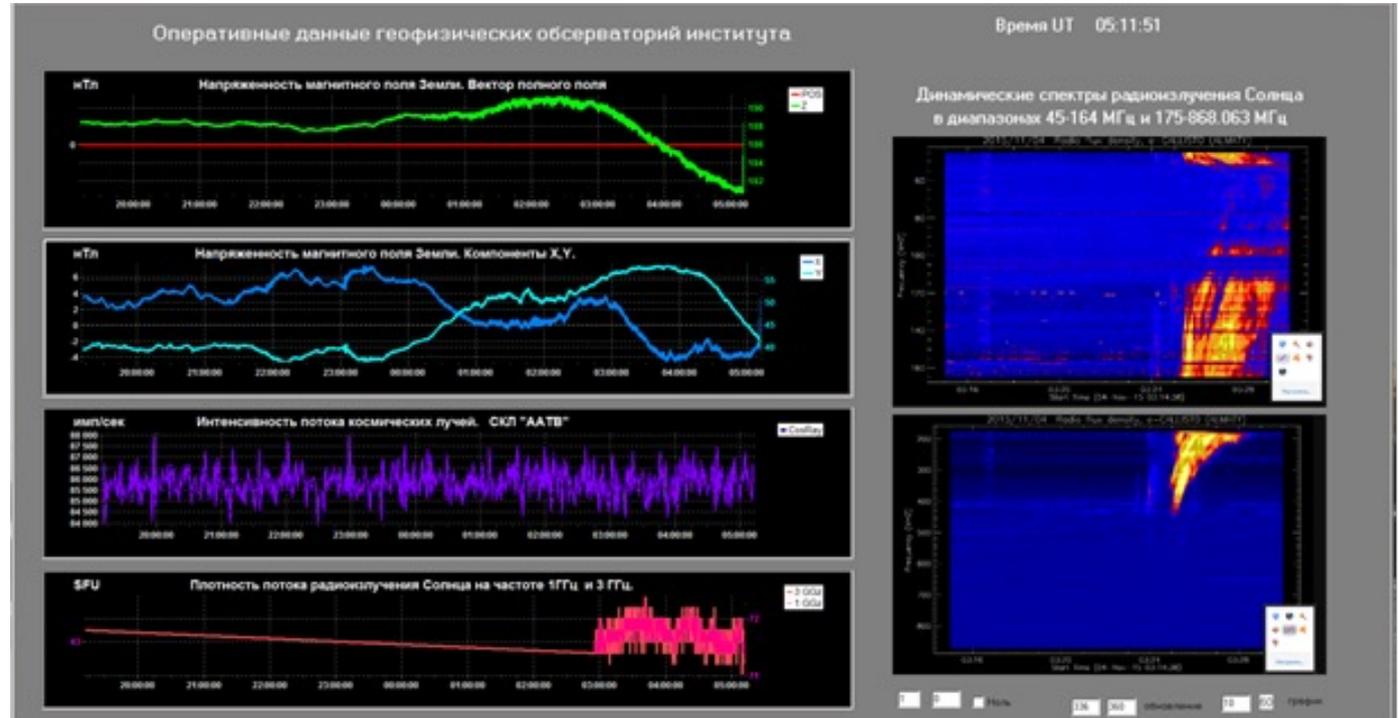


Spectroscopy: asteroid taxonomy, NEO identification, Space weathering of the NEOs surfaces and components

Space Weather activities in Kazakhstan

Institute of Ionosphere
Kazakhstan

Kazakhstan multi-level complex for key space weather parameters measurements



Neutron Monitor 18 NM-64 at high mountain cosmic ray station (**3340 m a.s.l.**) (www.nmdb.eu)

Geomagnetic observatory "Alma-Ata" (**1300 m a.s.l.**)

Measurements of the solar radio spectra of the Sun in the range of 40 - 800 MHz from the CALLISTO spectrometer at Almaty and the solar radio emission flux density at frequencies of 1.08 GHz and 2.8 GHz (**2700 m a.s.l.**)

All measurements are included in a common information system that displays real-time measurements with high resolution

Near future and perspectives

- Further development of OATO
- Installation of new instruments, including instruments of our partners
- Widening international collaboration in SSA segment
- Integration into world-wide near-Earth space safety programs, SSA and asteroid defense programs