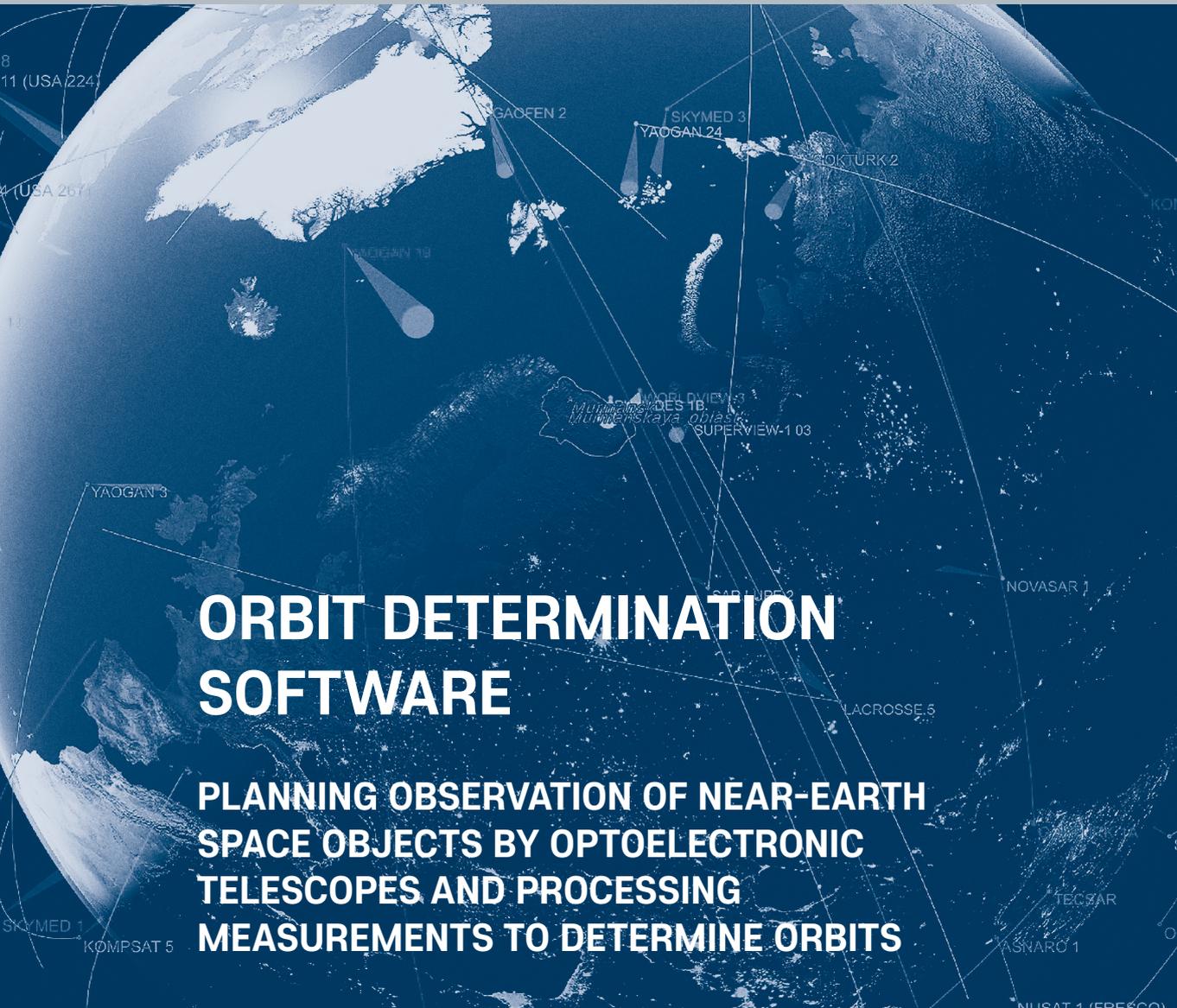




J S C V Y M P E L

JSC VYMPEL is a leading company engaged in development, installation and testing of unique air and space defense systems, including early warning and space monitoring systems.



ORBIT DETERMINATION SOFTWARE

PLANNING OBSERVATION OF NEAR-EARTH SPACE OBJECTS BY OPTOELECTRONIC TELESCOPES AND PROCESSING MEASUREMENTS TO DETERMINE ORBITS

Experience — Knowledge — Development — Reliability — Consistency

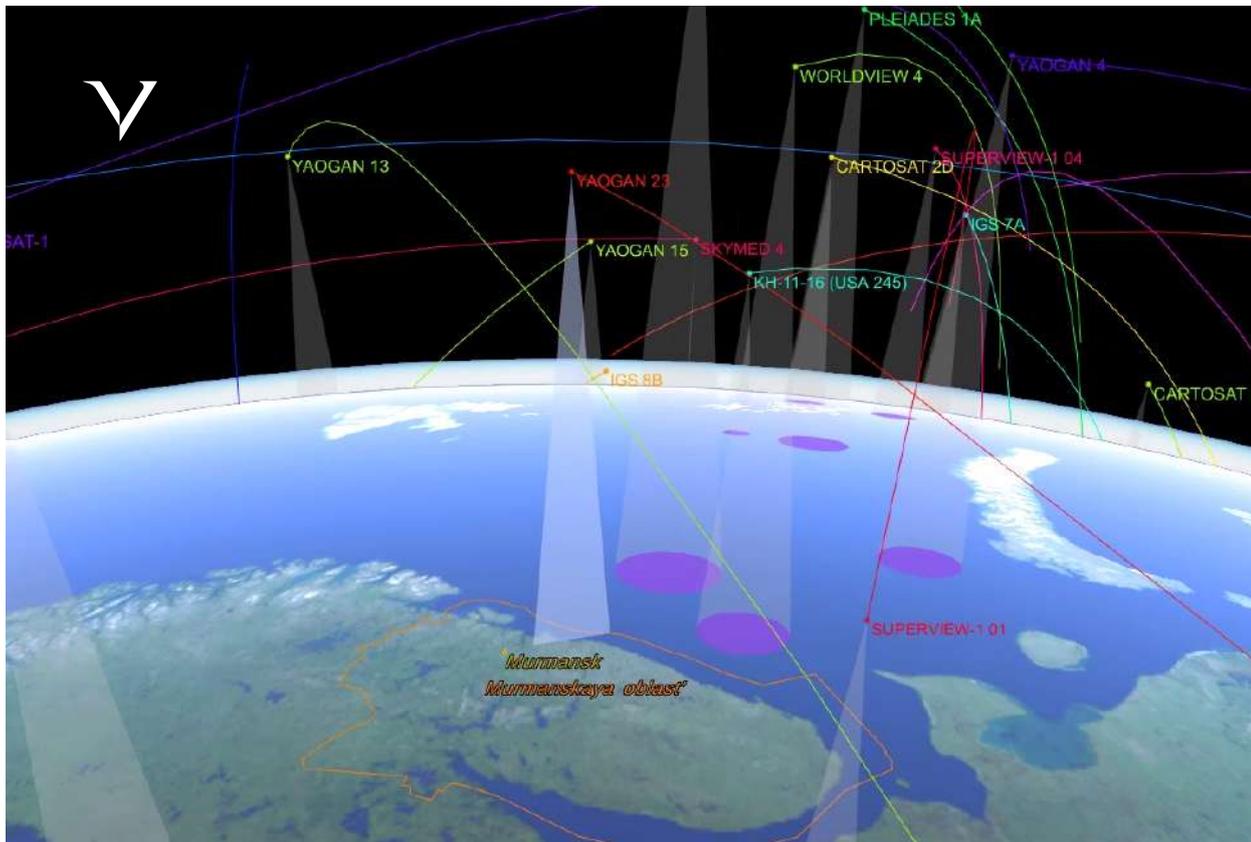
Guarding the cosmos for the world

Providing situational awareness in near-Earth space requires modern and effective software for planning observation and processing of measurements.

JSC VYMPEL, in cooperation with the Astronomical Scientific Center, has created the software complex ODSW (Orbit Determination Software) for planning observations of SO by the network of optical facilities, joint processing of data received from this network, and the formation and updating of its own database of space objects.



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FUNCTIONAL CAPABILITIES OF ODSW

The ODSW software complex performs the following functions:

- Planning of observations of space objects (SO) by the network of optoelectronic complexes (robotic telescopes).
- Obtaining measurements of SO parameters, estimating measurement errors and filtering abnormal measurements.
- Identifying measurements obtained during the observation of SO with objects from the database and clarifying state vectors of the law of their motion.
- Initial determining SO orbits and determining trust regions for orbit parameters (for orbits of any type) with or without a priori data.
- Predicting orbit parameters of observed SO.
- Clarifying SO orbit by fusion of several tracks of different times, including tracks separated by a long-time interval.
- Forming and updating the SO database with the results of observations.
- Analyzing SO database (history and statistics of observations and changes in SO parameters, detecting and determining parameters of dangerous approaches of SO, analysis of SO spans over a specified area, and so on).
- Visualizing the space situation based on observation results and analysis.

- A wide range of tools for analyzing the space situation, including:
 - > Updating geophysical data,
 - > Simulating tracks of SO,
 - > Estimating the accuracy of measurements obtained by optical facilities and the accuracy of ODSW calculations based on the results of observations of “reference” SO,
 - > Analyzing the influence of various external disturbances on the accuracy of the forecast of SO parameters.

IMPLEMENTATION AND USE FEATURES OF ODSW

The ODSW software complex is implemented on computing tools of general use. JSC VYMPEL and ASC have been using the ODSW for several years for planning observations with the network of robotic optical systems and maintaining their own database of SO. During operation, deep testing and validation of ODSW were conducted using model and real measurements.

THE ODSW DELIVERY KIT INCLUDES

- Design project
- Technical description of algorithms
- Source code
- Testing and validation program and methodology
- User manual

