

An aerial photograph of Tomsk, Russia, showing a river, a bridge, and various city buildings. A large white rectangular area is overlaid on the top left, containing the title and speaker information. To the right of this area is a decorative graphic with overlapping circles and triangles in shades of green, orange, and grey.

EU & Russia Climate Change Research and Innovation Priorities:

Challenges and Opportunities for Tomsk Region

Lyudmila Ogorodova

Tomsk Region Deputy Governor for Research and Education

Tomsk Region

Square – 314,400 km²

Population – 1,077 mln people, 73% urban population

Average age – 38

Tomsk was founded in 1604

28.8 mln ha

Forest reserve land

91,5% of Tomsk Region territory

2.9 bln m³

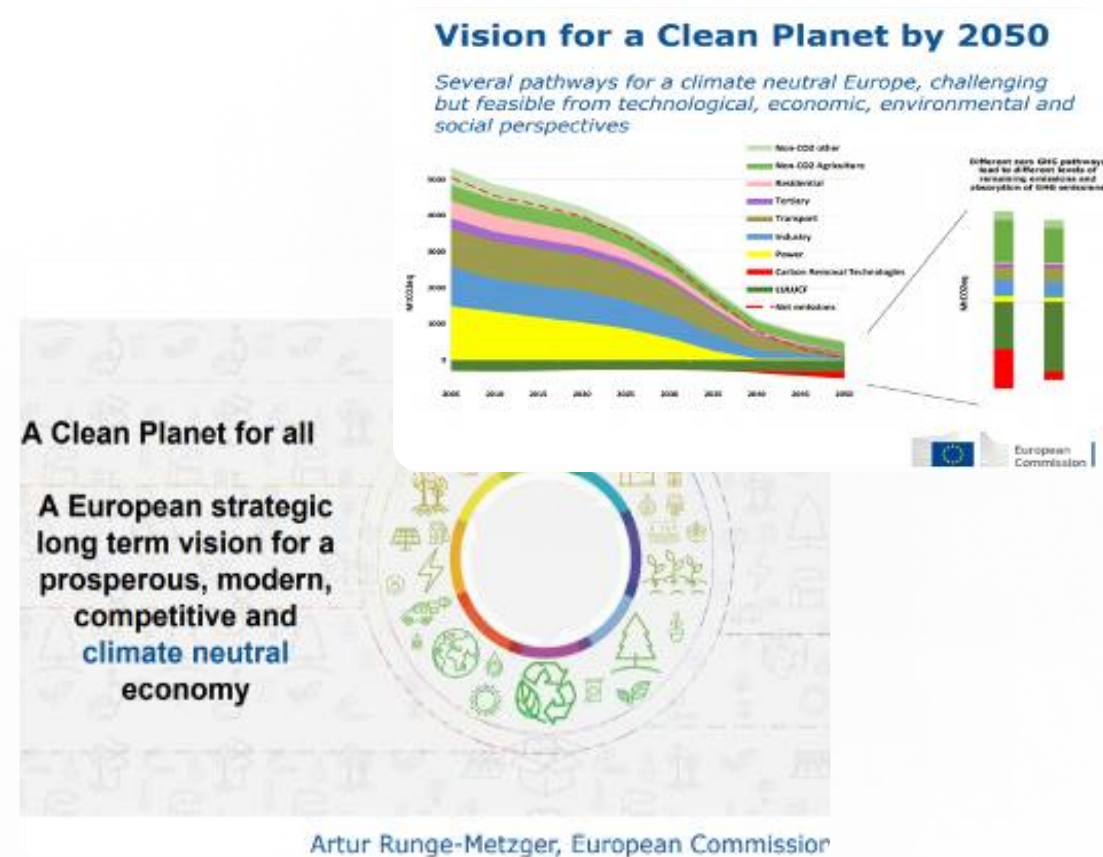
Total forest yield in
Tomsk Region

9.6 mln tons – oil
5.9 bln m³ – gas
condensate

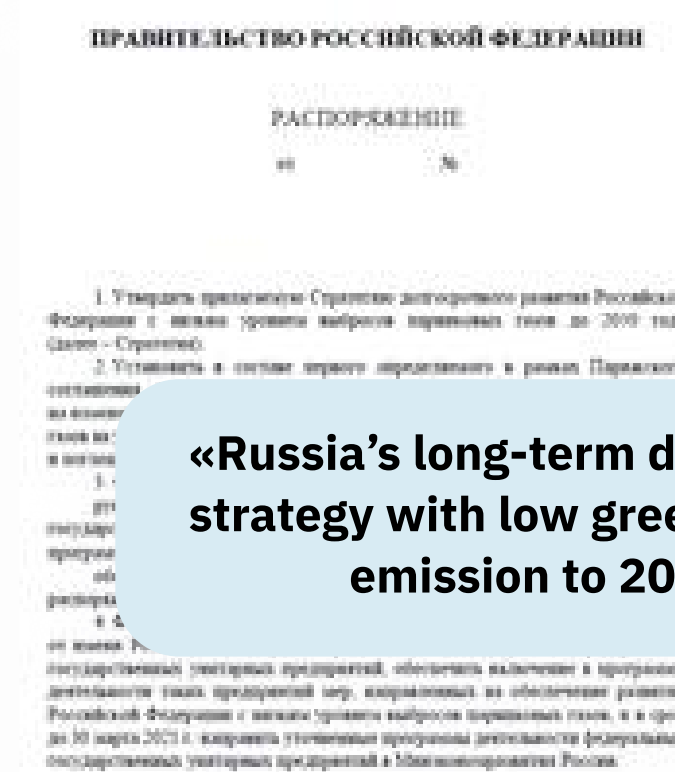
Annual production
of hydrocarbons



Ratified by the Russian Federation
in September 2019



European Commission, COM (2018) 773, final version



«Russia's long-term development
strategy with low greenhouse gas
emission to 2050»

Tomsk Region strategy for social and economic development to 2030



Forest fire protection and pest control, developing sustainable farm and forestry practices



Science intensive technology for monitoring of the state of the environment, global changes and life quality



Alternative sources of energy and energy saving solutions in energy development, industry and buildings

1. Forest Fire Protection

REGIONAL PROJECT

Complete Integrated Automation for Wild Fire Prevention, Monitoring and Forest Fire Extinguishing

Key functionality of the project:

Terrestrial, aircraft and satellite monitoring, involving air drones
Forest fire early detection
Forecasting the emergence and development of wild fire
Analysis of the situation
Assessment of available resources

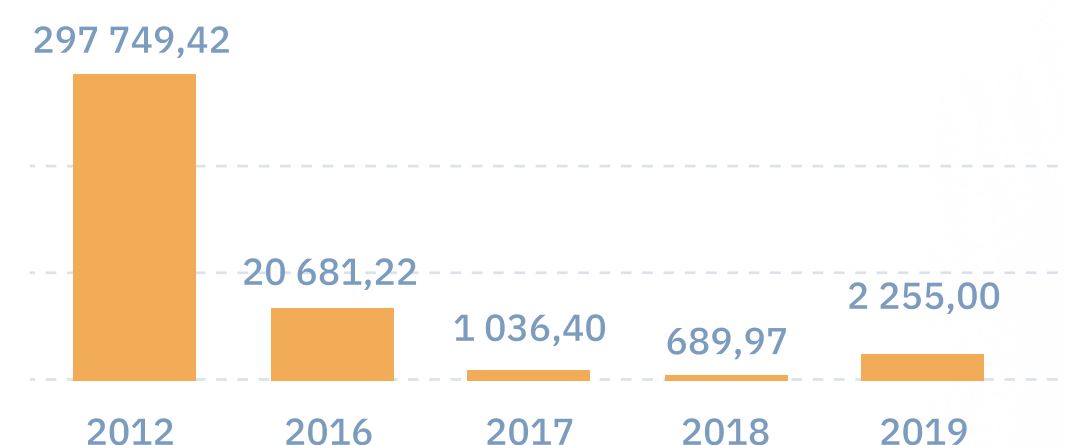
Key indicators of wild fire:

Number of fires
Fire concentration and speed of expansion
Characteristics (active, localized, extinguished)
Location
Resources involved
Resources required

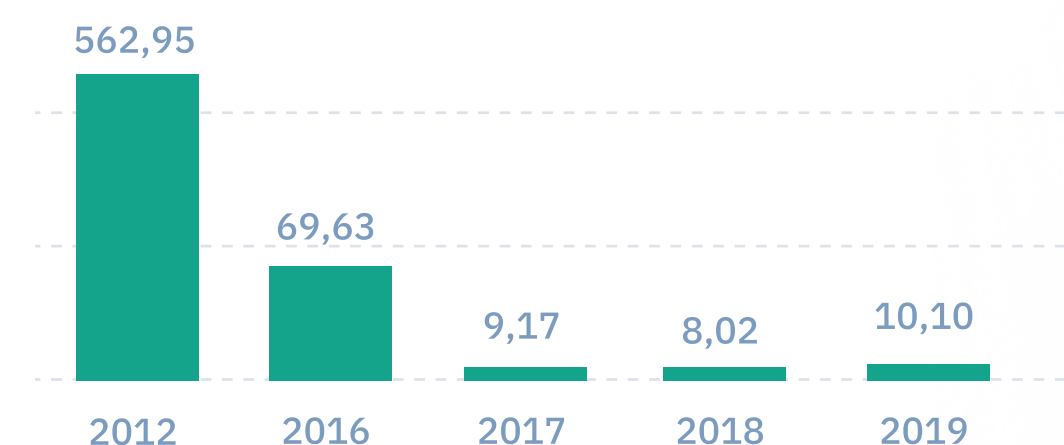
Consortium:

Group of Companies "INCOM" (Tomsk)
National Research Tomsk Polytechnic University
Space Research Institute of the RAS
Center for Forest Ecology and Productivity of the RAS
All-Russian Research Institute of Silviculture and Mechanization of Forestry etc.

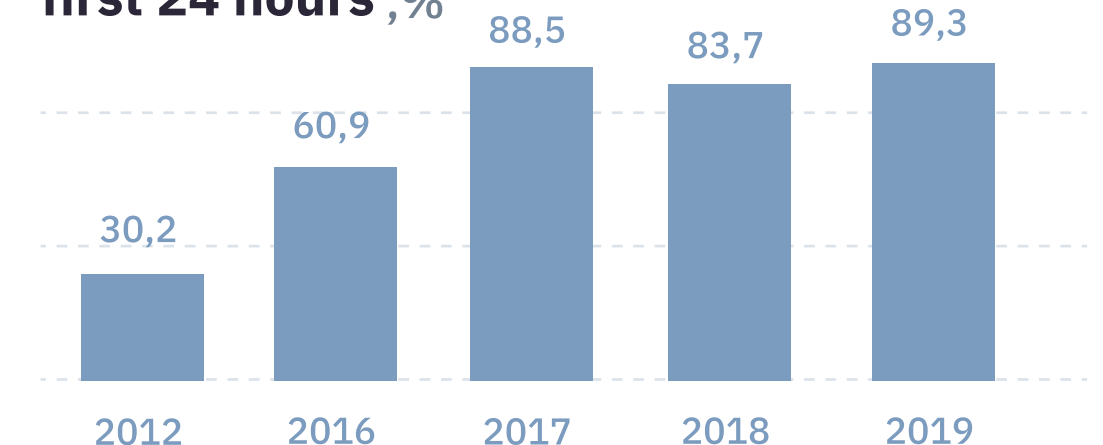
Dynamics of fires ,ha



Average area per fire ,ha



Efficiency of fire extinguishing within first 24 hours ,%



FEDERAL SYSTEM

Information system of remote monitoring of the Federal Agency for Forestry (Rosleshoz)

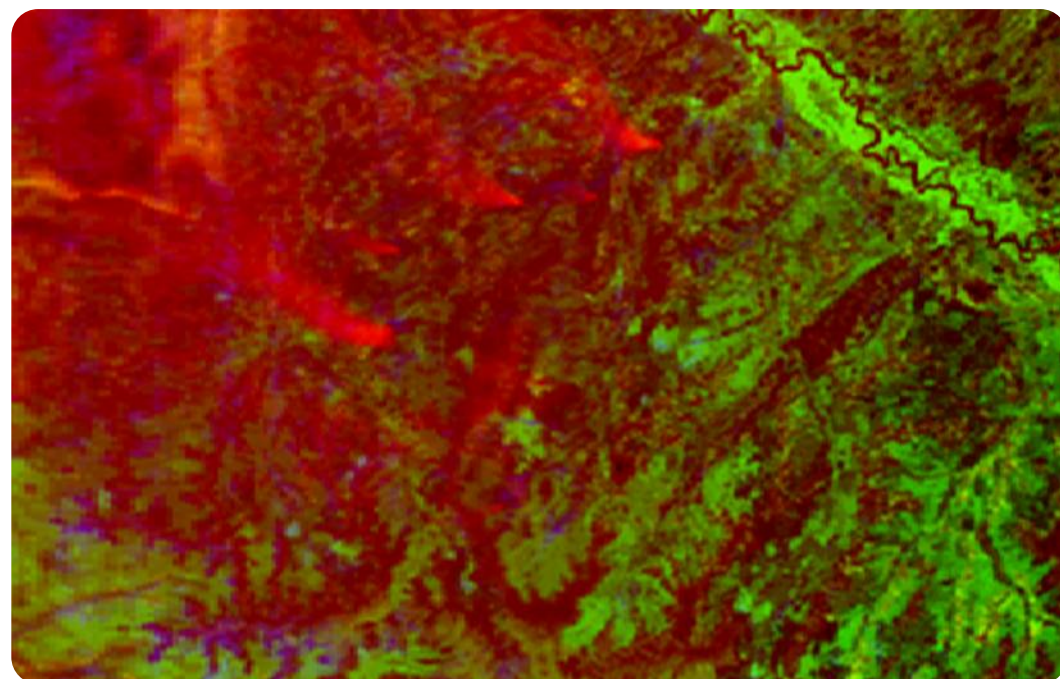
System of forming and analyzing of forest districts' fire extinguishing plans as well as comprehensive plans of Russian regions

Early Forest Fire Detection in Tomsk Area Atmospheric Correction (Institute of Atmospheric Optics SB RAS)

Matvienko G., Afonin S., and Belov V. "Early Detection of Forest Fires from Space", New York: Nova Science Publisher, 2011

Station for Receiving Satellite Information

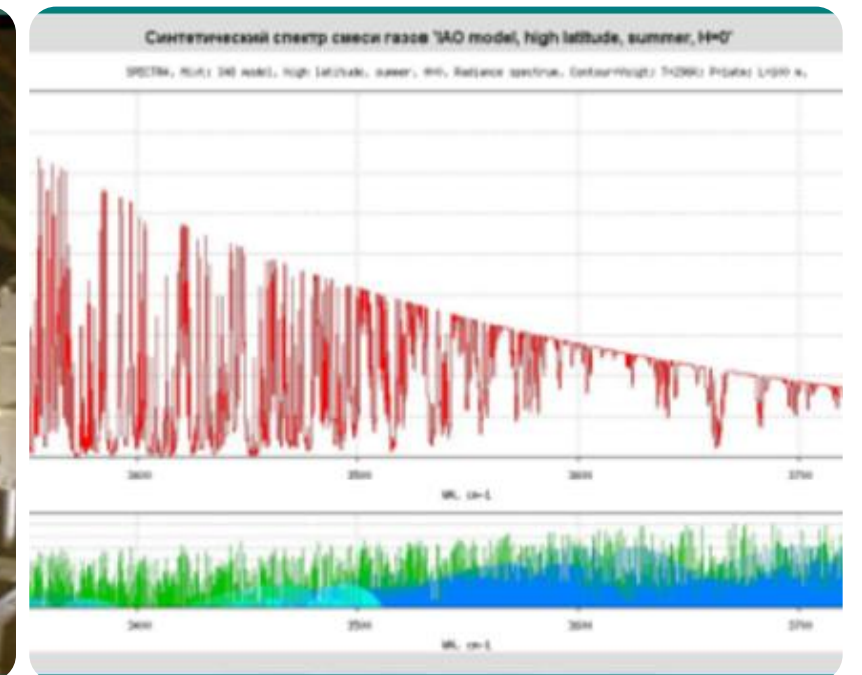
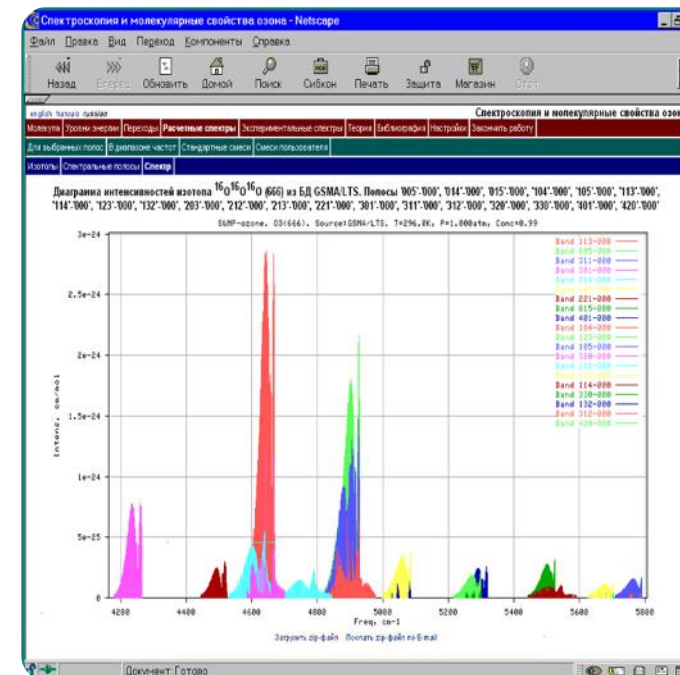
Early on-line forest fire detection based on satellite information and atmospheric correction



Forest fires. Tomsk area (summer 2012)

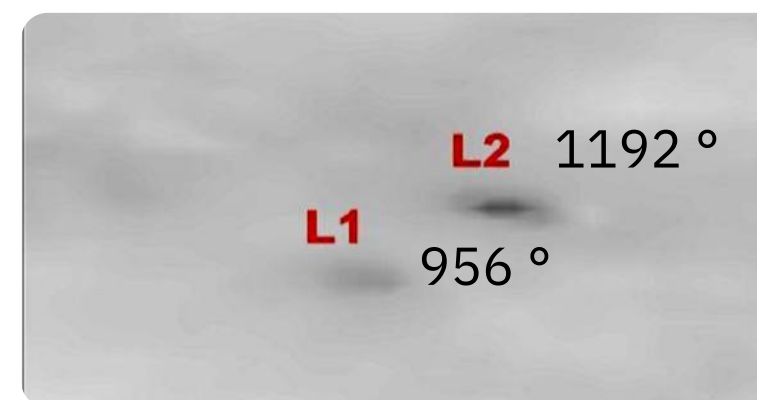
International Molecular Spectroscopy Center

with the modern spectroscopy database

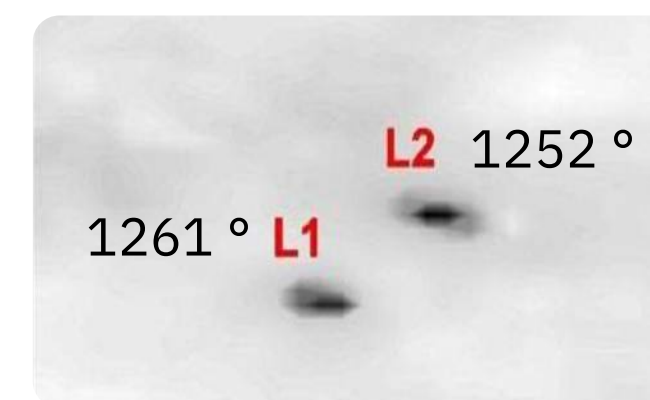


Retrieval of the temperature of two fires shaded by semitransparent cloud

Standard NASA algorithm (left), IAO SB RAS algorithm (right)



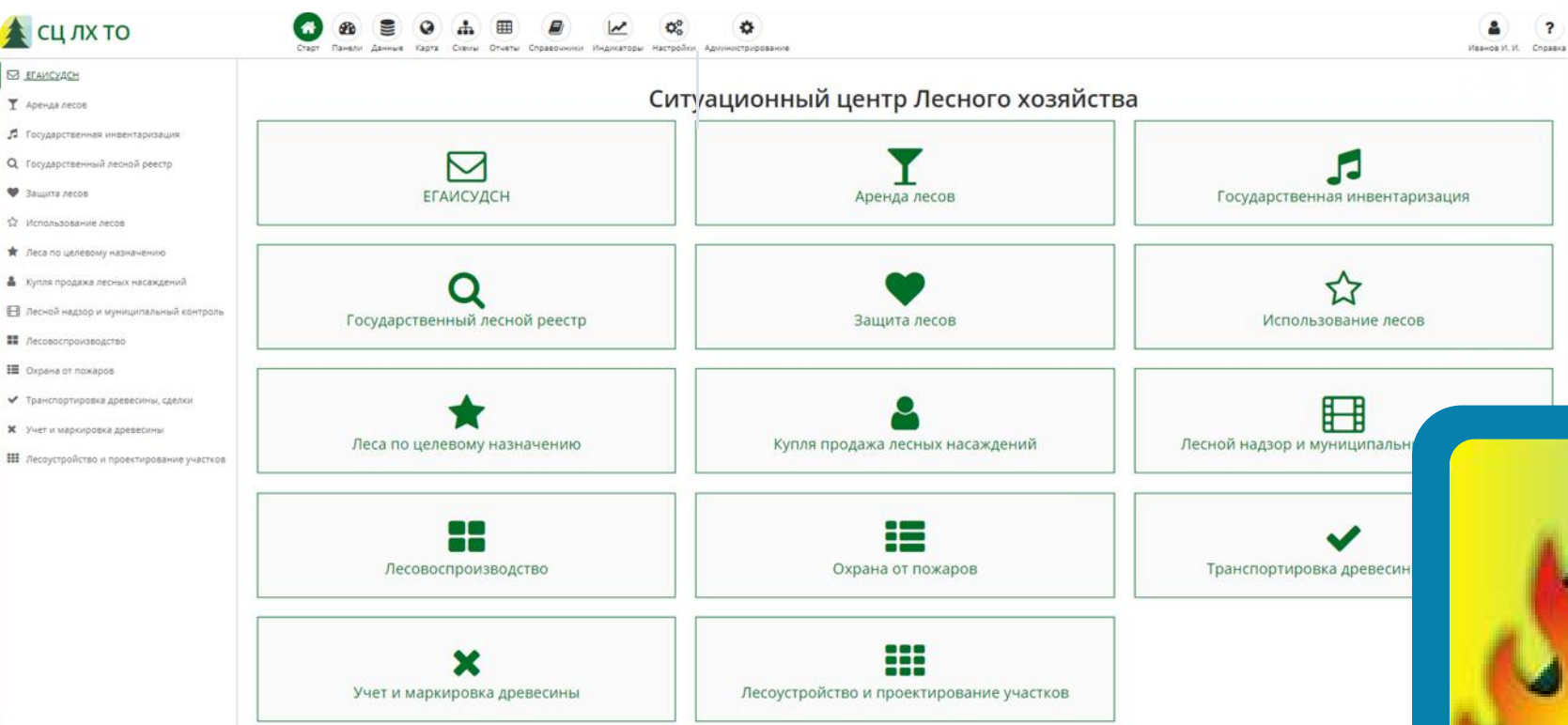
Standard retrieval



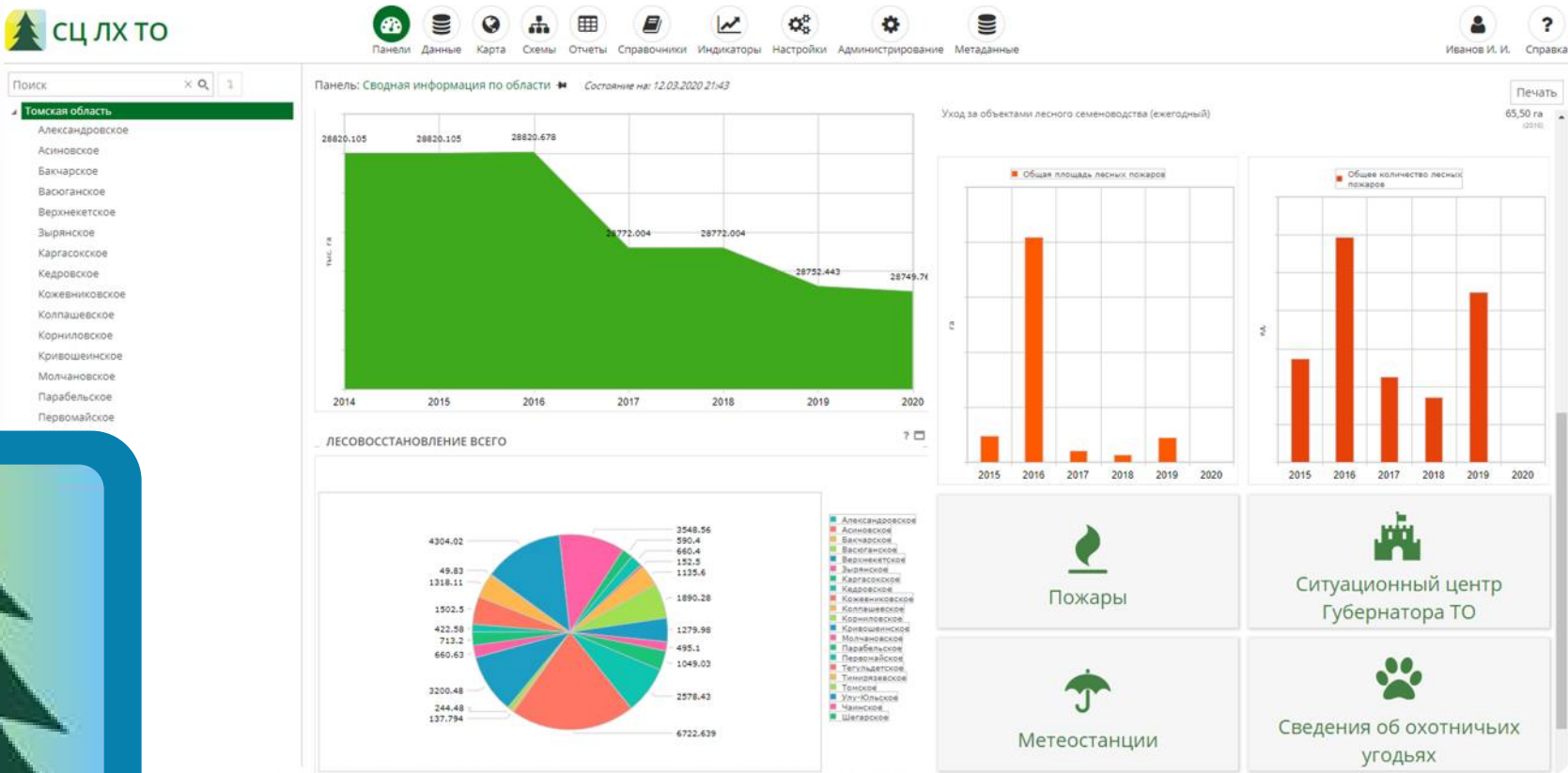
With atmospheric correction

Development of AI Technologies

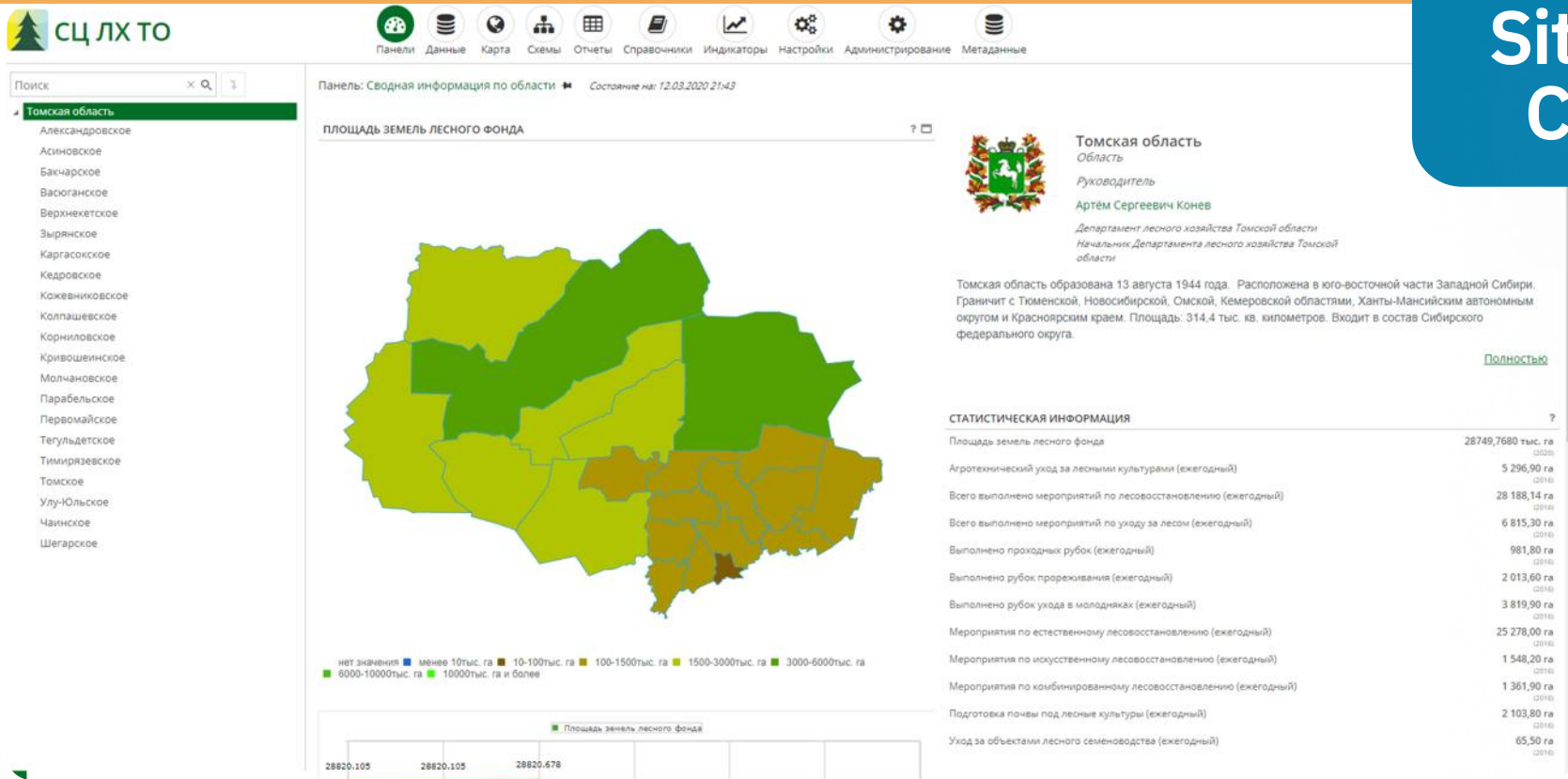
Efficient forestry management



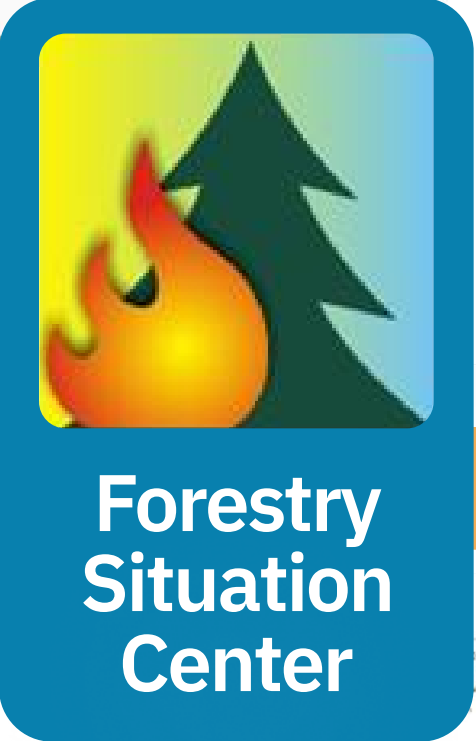
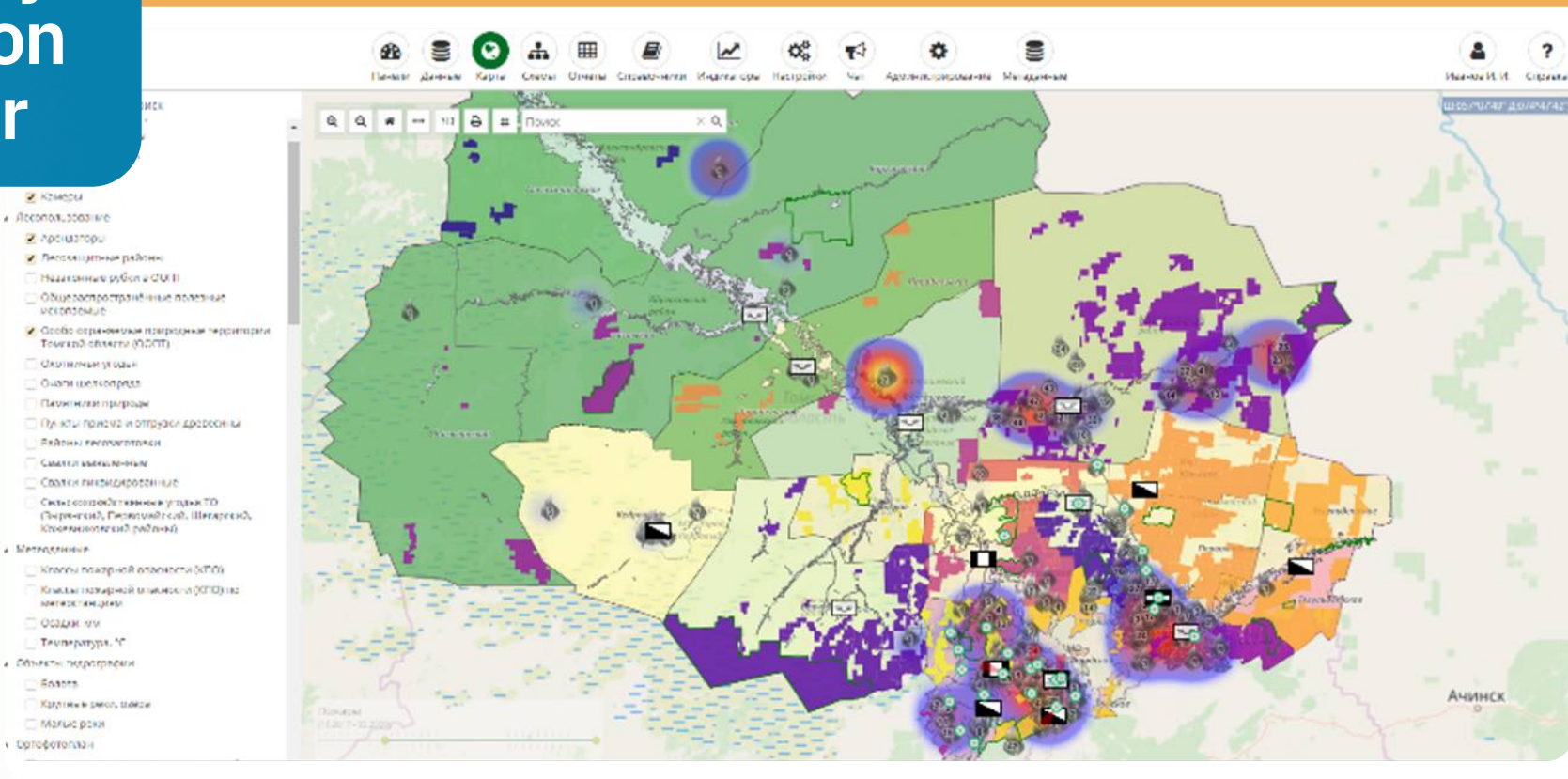
Growth in operational efficiency and quality of decision-making



Facilitation of information exchange



Greater openness for population and business

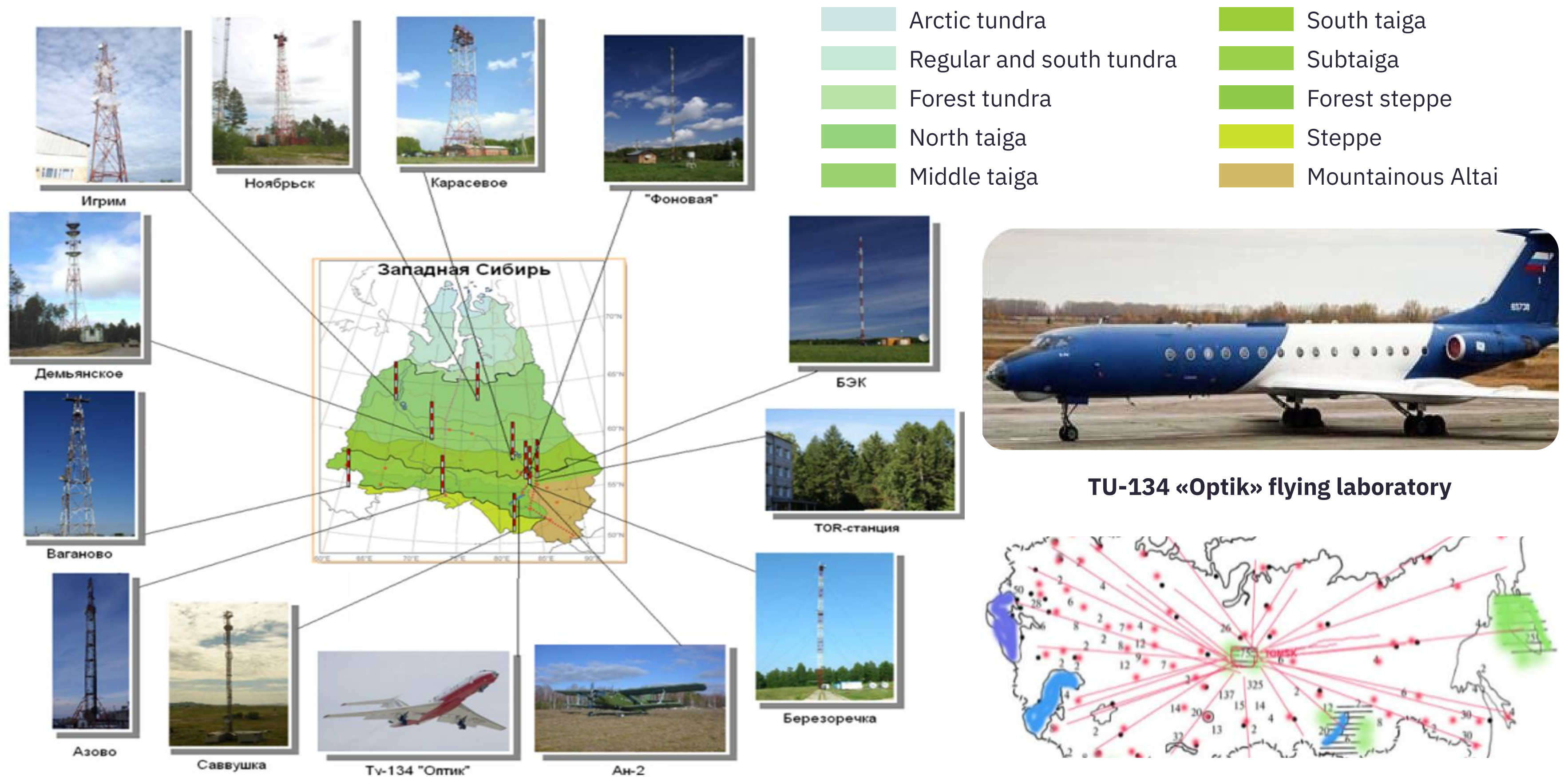


Forestry
Situation
Center

2. Science Intensive Technologies

Monitoring of Atmospheric Composition (Institute of Atmospheric Optics SB RAS and NIES, Japan)

Unique Multilayer System for Green Gases Monitoring (suits to the WMO Requirements)



Complex Investigation of the Troposphere of Russian Arctic using the Tu-134 “Optik” Flying Laboratory



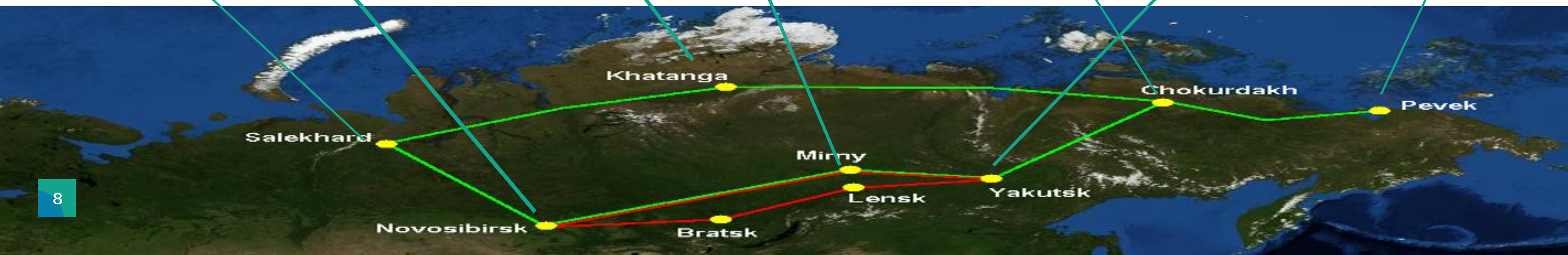
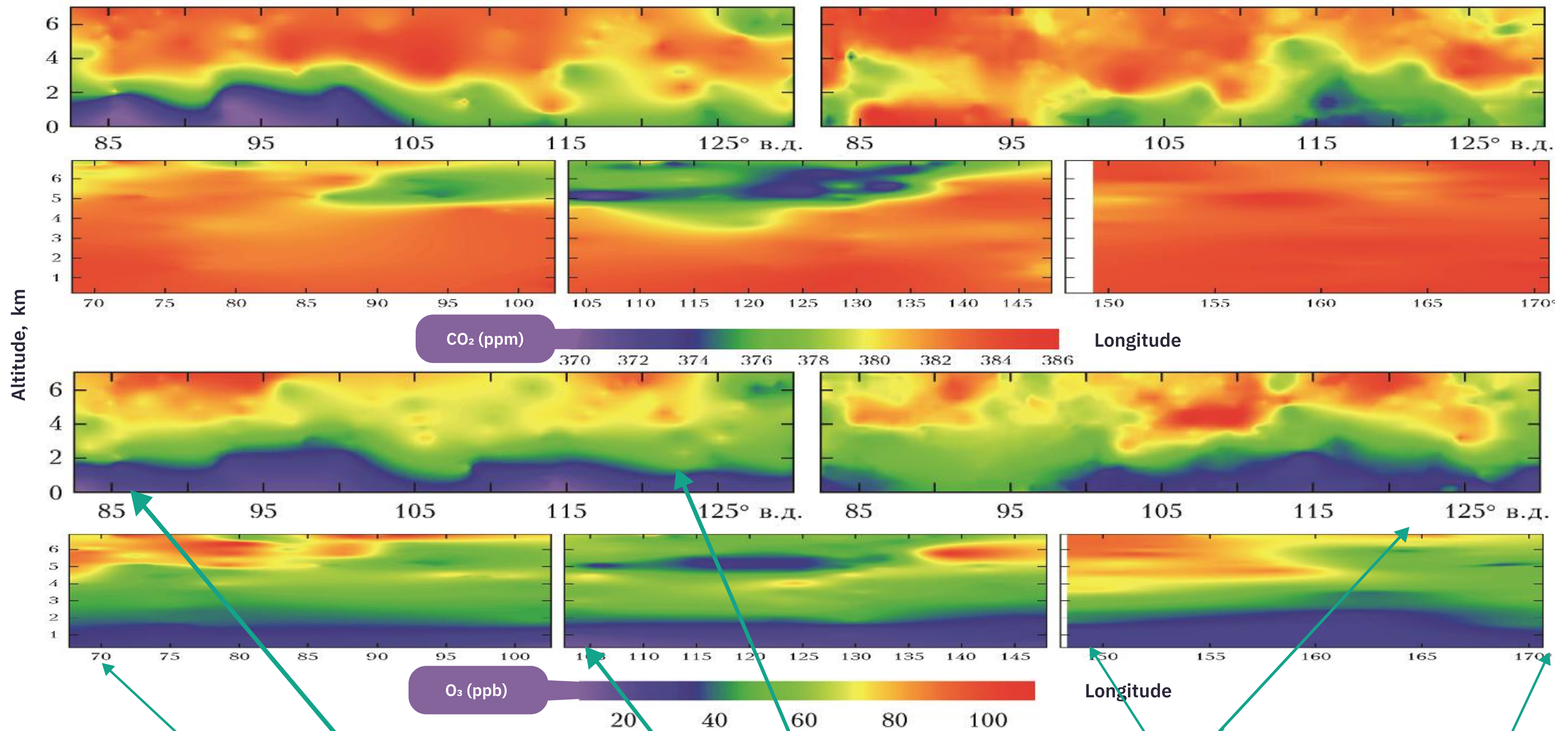
Topical Issues:

- 1) Vertical profiles of green gases and aerosol, meteo-parameters
- 2) Verification of satellite data that have large uncertainty at surface layer
- 3) Comparison with the foreign part of Arctic
- 4) Search for methane (CH₄) exits from the Arctic shelf (gas-hydrates)

V.E. Zuev Institute of Atmospheric Optics SB RAS

Transects of the Atmosphere over Siberian Region

Antokhin P. et al. // Atmos. & Ocean. Optics, 2014, V. 27, n. 3, 232 and J. Geophys. Res.: Atmospheres, 2018, V. 123, n. 4, 2285



Proposal

Global Changes of the Earth and the Quality of Life

Scientific Consortium: National Research Tomsk State and Tomsk Polytechnic Universities, Moscow State University, MIPT, Skoltech etc.

Leading scientists: I. Semiletov (RF, h=42), O. Pokrovsky (France, h=53), O. Gustafsson (Sweden, h=64)

Instrument: Complex Investigation of the Troposphere of Russian Arctic using the Tu-134 “Optik” Flying Laboratory

Subject area: Studying of geodynamic processes and accompanying dangerous natural phenomena happening in the Arctic in active transition zones from oceans to continents, methods of forecasting of earthquakes, landslides, emissions of methane bubbles.

Expected results

An integrated network of comprehensive observation in the ground - shelf Arctic system will be developed to provide the understanding of the climate-ocean-cryosphere-carbon system's functioning

Potential partners: Business Partners, Other Research Organizations.



Thank you for your attention

