SCANEX

KEY PRODUCTS AND SERVICES OF SCANEX HOLDING

PERSONAL RECEIVING STATION

SOFTWARE
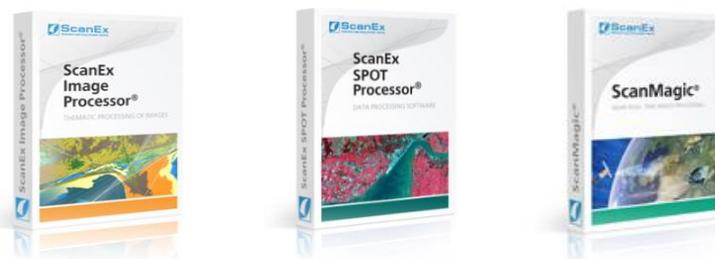
SATELLITE DATA

OPERATIONAL SERVICES

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Principle of operation

Satellite

Station

Reception terminal

Preliminary processing terminal

Data archive
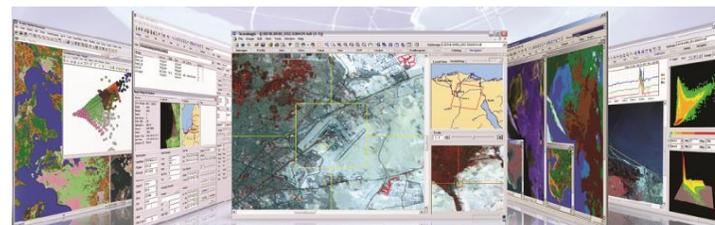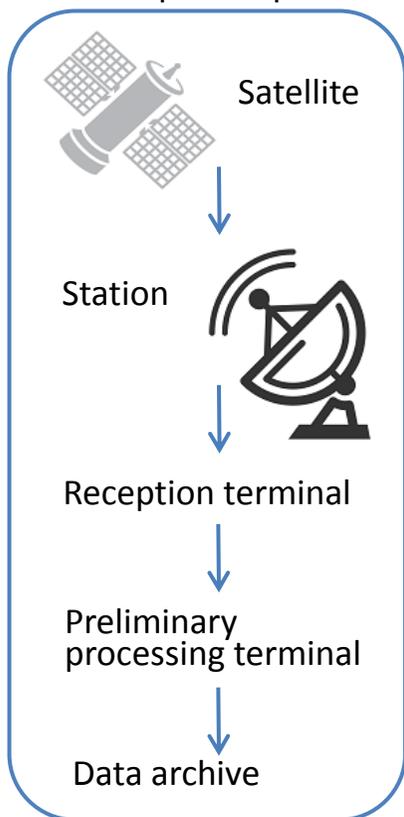
One of the key activities of SCANEX company is development and promotion of ground stations receiving and processing data from Earth remote sensing satellites.

UniScan™ - a universal hardware-software complex

- enabling to receive data in real-time within the radius of up to 2.5 thousand km both from Russian (Meteor-M, Kanopus-V, Resurs-P) and foreign space satellites (Terra, Aqua, Suomi NPP, FengYun-3, SPOT 6/7, EROS B, Landsat-8, Sentinel-1A, KOMPSAT-3, RADARSAT-2, TerraSAR-X, COSMO-SkyMed and others);

- X-band radar data with a high data rate (up to 750 Mbps in one radio channel);

- possibility of an easy adaptation of station for data reception from new satellites;

- cost of data received to the proprietary ground station is significantly lower in comparison with the standard purchase of images from a distributor or an operator.

More than 70 Uniscan ™ receiving stations are installed in Russia, Ukraine, Kazakhstan, Uzbekistan, Spain, Vietnam, the U.A.E., the United States of America...

SCANEX has been cooperating with world leading RS Operators, including DigitalGlobe, Airbus Defense and Space, E-geos, ImageSat, MDA, USGS, Satrec Initiative ...

Panda™ ground receiving stations are designed for reception of L-band data from meteorological satellites of NOAA series, MetOp, FengYun.

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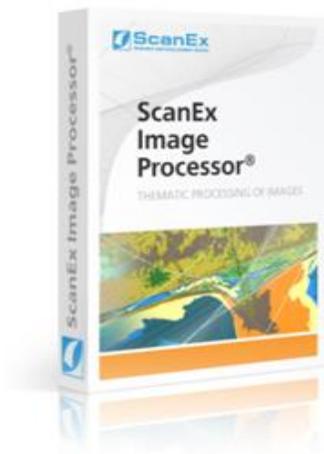
High-performance system with a wide range of possibilities for photogrammetric and thematic processing of Earth remote sensing data.   SIP modular structure gives the user maximum flexibility when choosing the appropriate configuration.

ADVANTAGES :

- Russian design from scratch.
- High performance.
- Competitive price.
- User-friendly and intuitive interface.
- Simple to learn.
- Handles popular data formats.

FEATURES:

Image processing, creating mosaicked coverages, thematic classification and interpretation, radiometric and geometric correction, hydrological modeling, processing of radar images, 3D modeling, terrain analysis, photogrammetric processing, change detection, haze removal, segmentation of optical and radar data.

SUPPLY GEOGRAPHY:

Russia, China, India, Viet Nam, Spain, the U.A.E., Turkey, the United States, Ukraine, Nigeria, Iran, Lebanon, Mongolia, Indonesia, Malaysia.

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**from geometric correction**
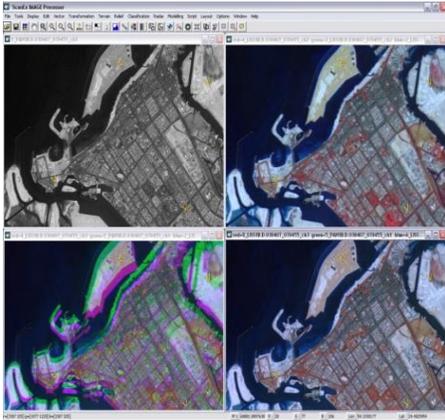
to creation of mosaics
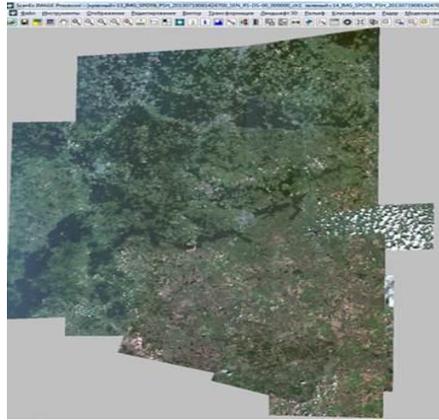
**from the automatic vectorization**
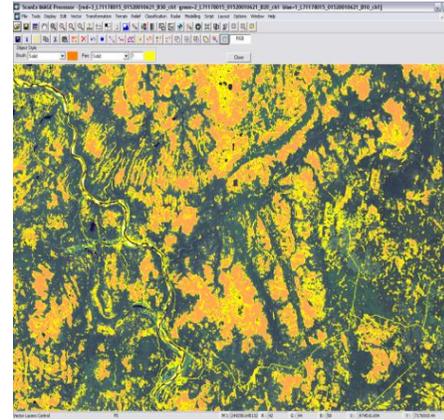
to neural network classification
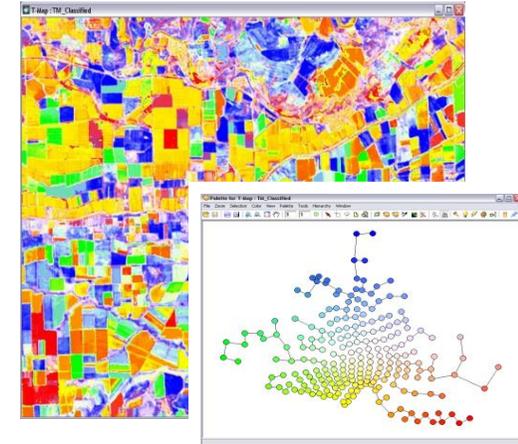
from spectral transformations
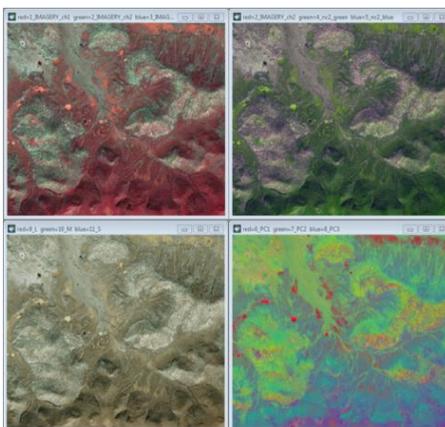
to pan- sharpening
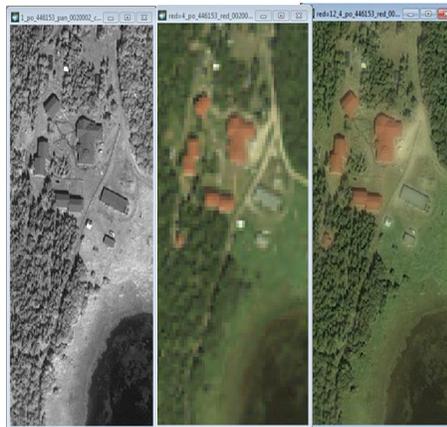
...and many more.
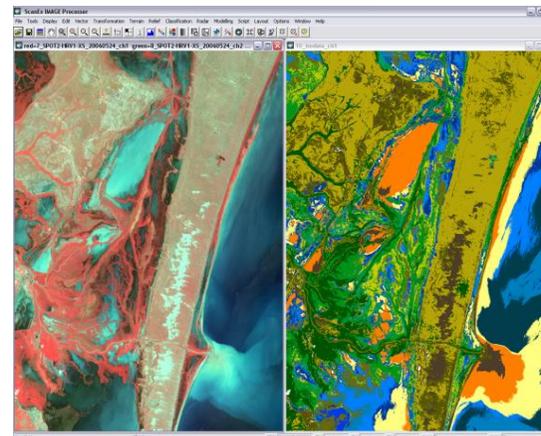
- Image classification
- Raster calculator
- Haze compensation
- Change detection, etc.
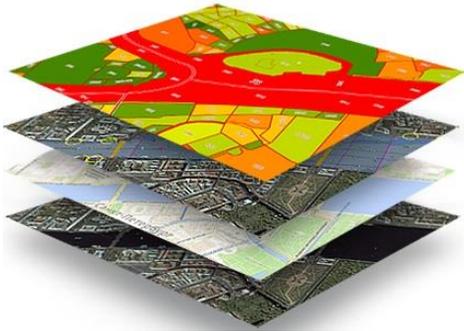
GeoMixer - a platform for development of geoinformation network solutions.

Web GIS platform of GeoMixer allows you to build and deploy GIS systems to organize, manage and work with a variety of spatial data.

GeoMixer platform provides user-friendly functionality to provide multi-user, but secure access to data from the internal corporate network or via the Internet, to organize processing of spatial data of all formats and to integrate into internal systems and DBMS of enterprises. As well as for flexible generation of applied services that resolve tasks using geolocation data.

LOCAL SOLUTIONS	CLOUD SOLUTIONS
Creation of departmental, branch and corporate GIS and geoportals	Development of geo-services and applications (user-defined, software, content, public)

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SCANEX Holding is the only company in Russia and CIS, which performs direct data reception from satellites to its own network of stations and satellite data processing based on its own technology.

Over the 28-year period a **unique archive** of satellite images covering the territory of the Russian Federation, created by ScanEx, amounted to more than 3.5 million scenes. The volume of received and stored data amounts to almost 400,000 TB. The archive contains satellite data with a spatial resolution of 0.5 to 150 meters per pixel. This library data are widely used not only in Russia, but all over the world through catalogs of international providers of satellite data.
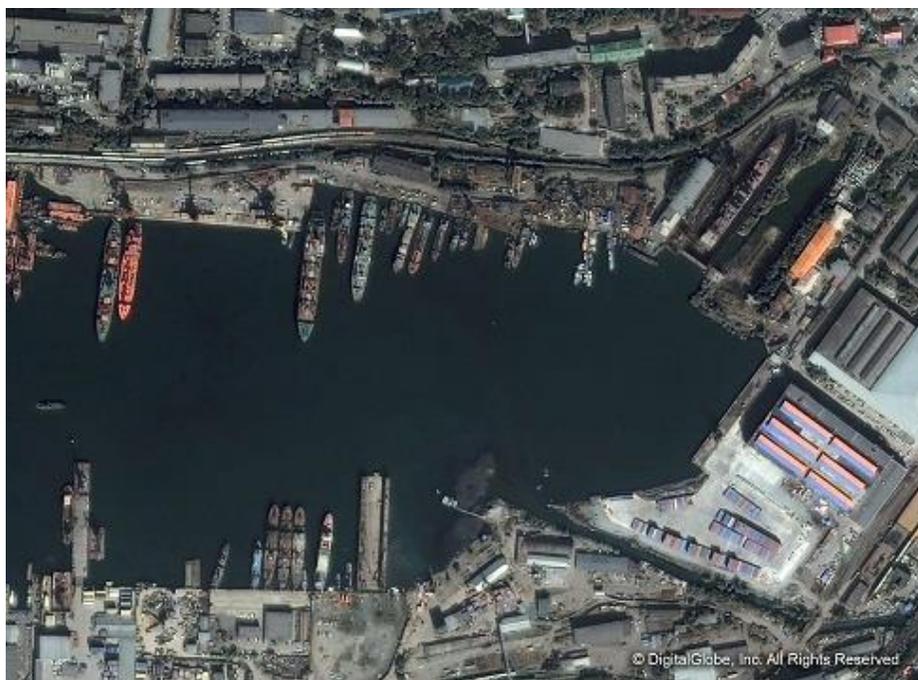
Golden Horn Bay, Vladivostok

Novorossiysk

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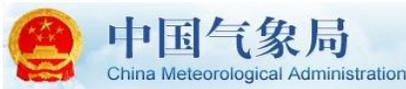
License agreements for data reception:

- Roscosmos — for **Resurs-P**
- Roscosmos — for **Kanopus-V**
- ImageSat International N.V. — for **EROS A/B** — *Exclusive*
- MDA Geospatial Services Inc. — for **RADARSAT-2** — *Exclusive*
- Airbus — for **SPOT 6/7** — *Exclusive*
- USGS — for **Terra, Aqua**
- USGS — for **Suomi NPP**
- China Meteorological Administration (CMA) — for **FengYun-3**

Archive data supply:

- Airbus — for **SPOT 2/4**
- RESTEC — for **ALOS-1**
- MDA Geospatial Services Inc. — for **RADARSAT-1** — *Exclusive*
- USGS — for **Landsat5/7**
- DigitalGlobe — for **QuickBird**

Data distribution reseller agreements:

- DigitalGlobe – for **IKONOS, GeoEye, WorldView 1/2/3**
- Airbus – for **TerraSAR-X**
- Satrec Initiative – for **Kompsat-2,3,5**
- Airbus – for **Pleiades**
- Airbus – for **Formosat-2**
- e-GEOS — for **COSMO-SkyMed1**
- RESTEC – for **ALOS-2**
- Deimos Imaging - for **Deimos -1**

- Near real-time data reception to proprietary stations

search.kosmosnimki.ru - is the interactive map with the satellite images search and order option per specified parameters, for example:
- area of interest - address, geographic coordinates, name
- imaging period
- off-nadir angle, detail, cloudiness
- satellite

Advantages:
- you may view the smaller Web version of images ("QuickLook"), multiple images and assess the overlaps.
- in the search list, you can activate images, assess the best option based on the criteria and on the image.
- an intuitive interface; you can use references or search examples.

the catalog contains archived and new tasking images of all modern commercial satellites.

![scanex]

Open "Fires Map" geo-service is intended for detection and identification of possible spots of fires (including underground peat bog fires) and fire-hazardous situations on the territory of the Russian Federation with the use of remote sensing technologies and early warning of stakeholders.

- A public map of fires, available to any user
- API - integration of maps or data about fires at the organization's website, integration into a weather report about the area of interest
- Near real-time satellite images "MODIS", Landsat
- Alerting to fires (upon satellite's pass) -

E-mail, SMS, Mobile

- Statistics of square areas and thermal spots since 2009
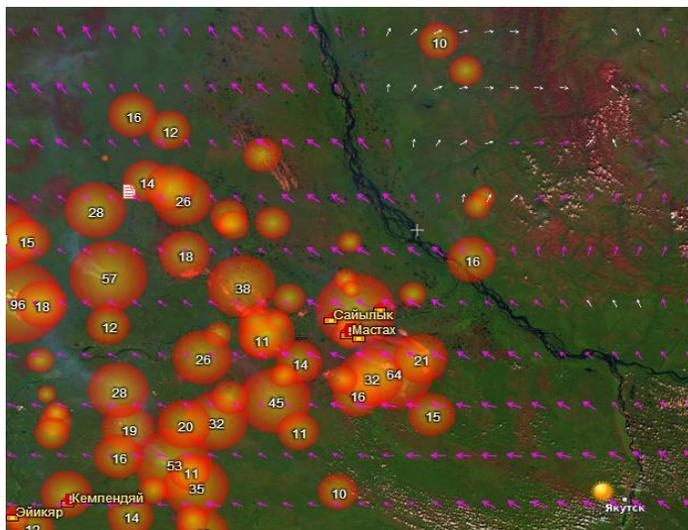
fires.kosmosnimki.ru

![scanex]
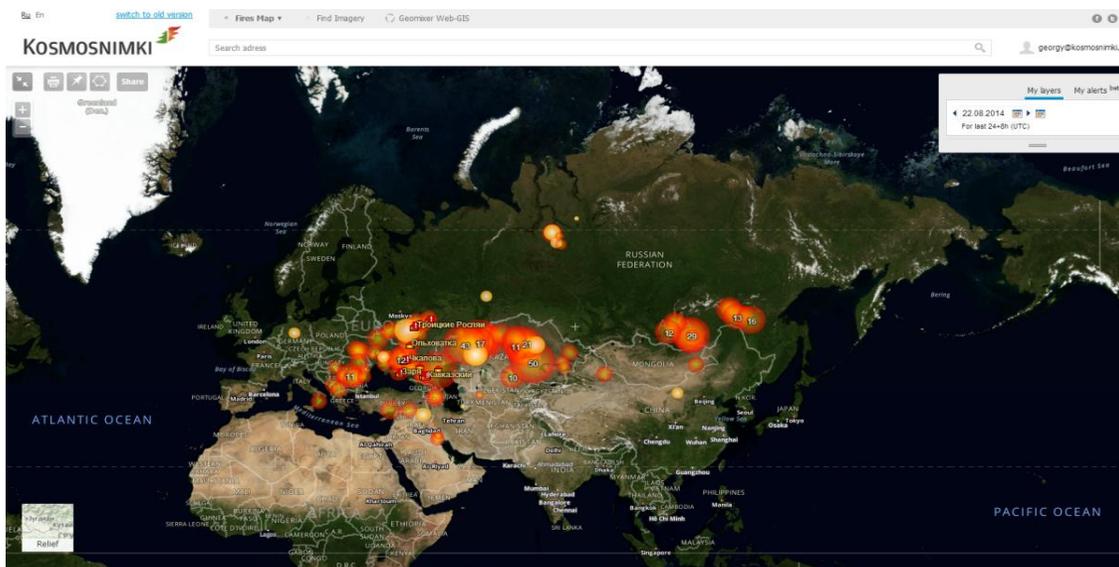
Delivery of images to geoportals, applications, desktop GIS...

"Express.Kosmosnimki" service is the first step on the way to "lease" satellite images at reasonable prices.

OpenLayers - Open GIS library

Public cadastral map

The service ensures an authorized remote access to ready products based on the images of Earth observation from space with the option of downloading them into the end user operations environment which can be a site, a geoportal or a desktop application. The coverages are constantly replenished in this service.
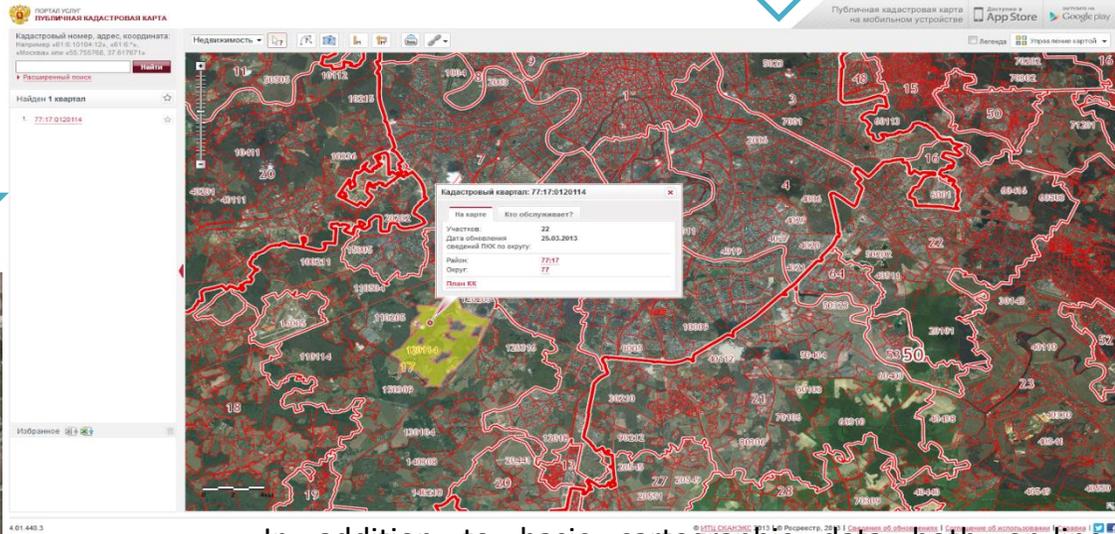
In addition to basic cartographic data both on-line monitoring data and various thematic products can be supplied in near real-time as remotely accessed data such as vegetation indexes, interpretation and satellite images analysis results, a variety of vector data, etc.

express.kosmosnimki.ru

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KosmosAgro – a on-line service to maintain spatial database of agricultural lands and to conduct near real-time monitoring of agricultural activities. Service is required to meet the challenges in the field of management, production, crediting and insurance. It provides complete information about the condition of the land and is easily integrated with other information systems.

Result: continuous monitoring of agricultural lands, the most efficient land management, products generation costs reduction.


Features:

- Access to up-to-date basic coverages of high resolution (SPOT 5.6) and very high resolution (GeoEye, WorldView-2, IKONOS) space images covering the area of interest;
- Generation of vector layers of agricultural land in interactive mode, work with the attributive information;
- Near real-time monitoring of fields based on MODIS (250 m) and 8 Landsat (30 m)* imaging systems that enable to:

   - control the timing of sowing, harvesting and other agricultural activities,

   - monitor changes in crop conditions,
   - determine the heterogeneity within the same field,

   - detect the impact of adverse factors on the crops.

- Presentation of monitoring results in the form of table and textual reports;
- Any further integration of raster and vector information into the system, photos uploading;
- Terrain analysis;
- Fire situation monitoring;
- Access to inventory data.

* It is possible to include additional data from SPOT 5, 6 and 7 and UK-DMC2 satellites.

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NDVI Vegetation Index
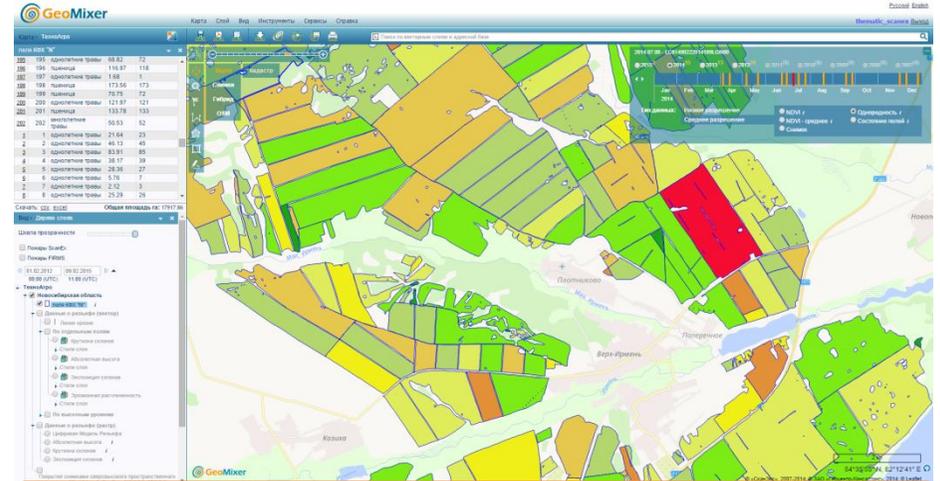
Fields homogeneity

Fields dissection by erosion
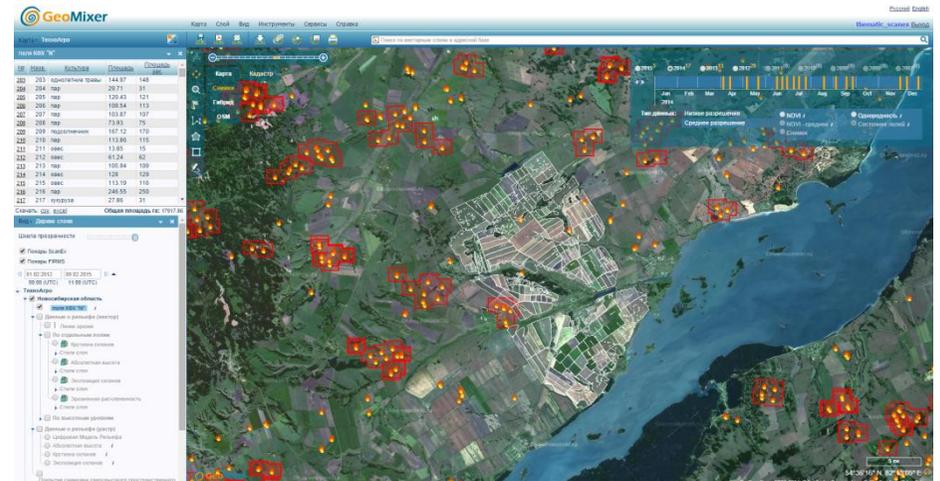
Fire condition

Monitoring of land use
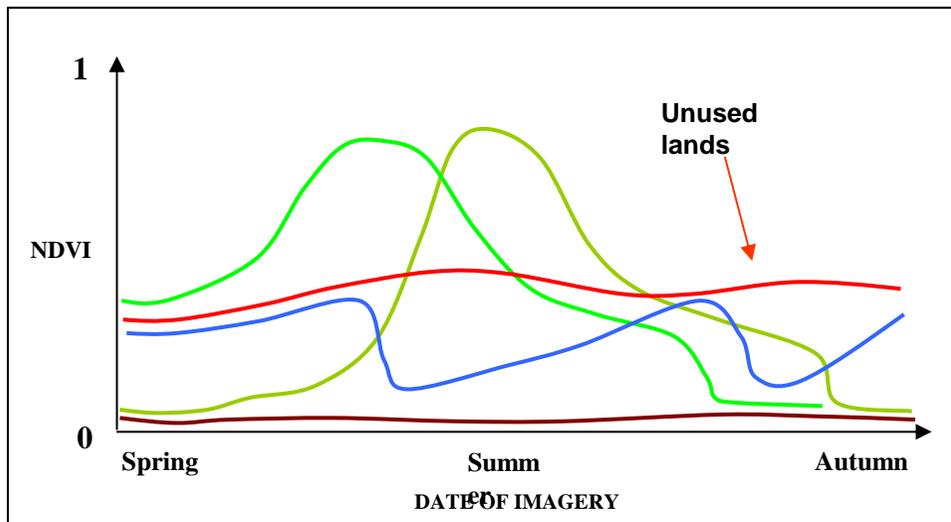
Winter crops status monitoring
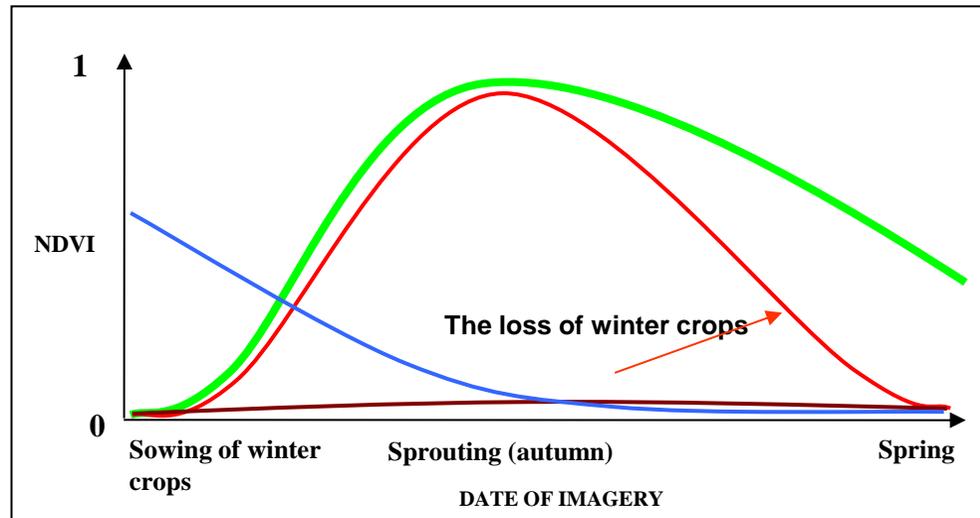
Monitoring of harvesting

Monitoring of seeds

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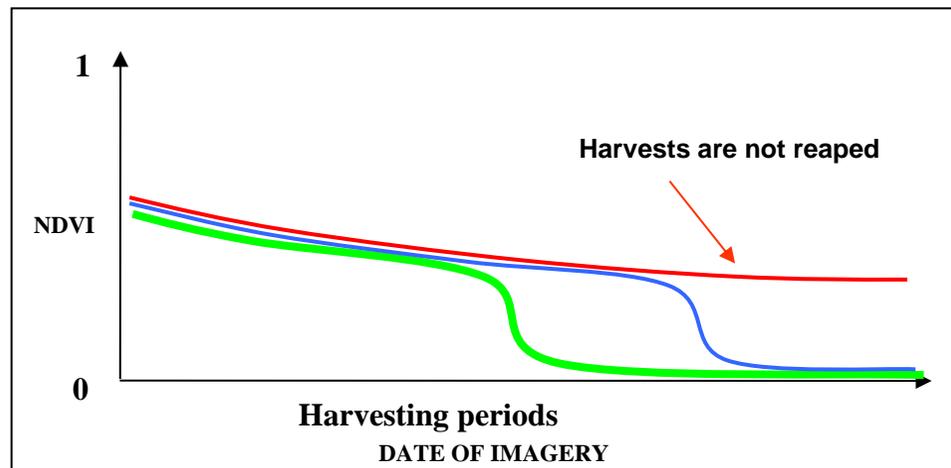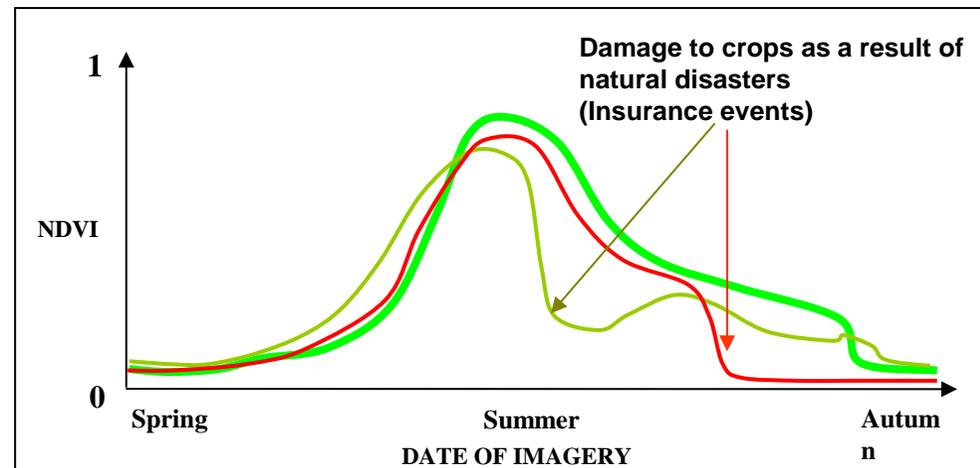
Optimize resources management

Create unique applications

Make informed decisions

Attract new customers

Google Maps API for organizations — API collection to create unique Google maps-based applications
Enables to embed interactive Google underlayers into multifunctional mobile and Web applications. Main advantages: Routes, distances and travel time computation for different types of transport (for example, to reduce fuel consumption), showing current traffic situation, tracking moving objects; geolocation using Wi-Fi and cellular networks repeaters, which is noticeably cheaper than the GPS geolocation.

API Google of addresses – API collection to use data on millions of AOIs around the world.
Enables to perform text and spatial data queries to Google maps and Google + databases, to display AOIs and their details on the map, to use the proactive search for geographical objects by keywords and categories. Easily integrated with Google Maps API to create multifunctional internal and external applications.

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API Google Maps for organizations - a collection of API
to create unique applications based on Google maps

Simplicity
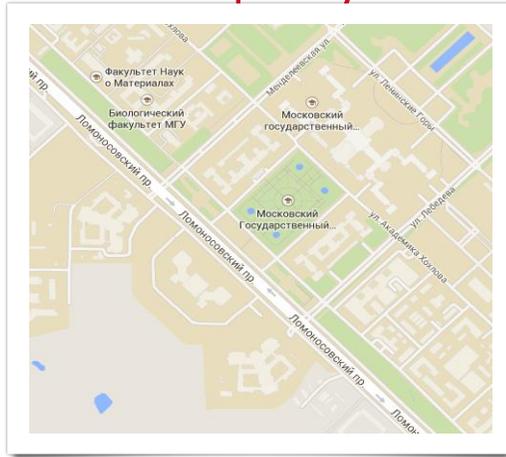
A familiar and user-friendly interface

Quality
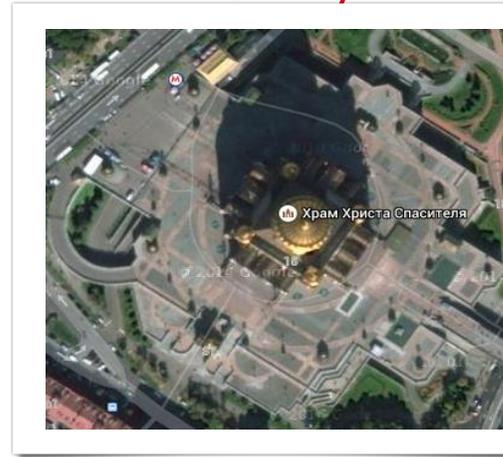
High resolution satellite images

Mobility

Access from any device
from any place in the world

- Global coverage
- Detailed images
- Routes optimization
- Geocoding
- Tracking mobile assets
- Styled maps
- Street View
- Traffic
- More than 100 million addresses on Google

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Geolocation and search for AOIs

✓ Increasing site traffic
   and sales
✓ Familiar interface
✓ Advanced options:
   - driving directions;
   -search by areas of interest;
✓ Fast results download and display
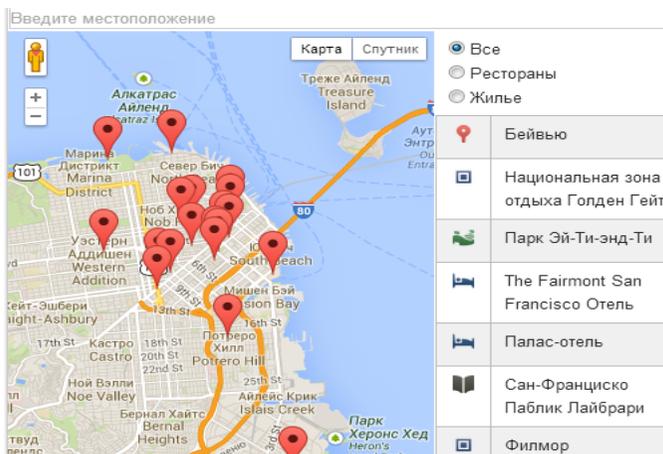
- Retail chain
- Hotel and catering business
- Tourist services
- Real estate
- Banking and financial services

Tracking mobile assets

✓ Improving efficiency
✓ Freeing resources to focus on core
   business processes
✓ Real-time analysis of information
   on the assets location
   .

- Logistics and supply chains control
- Transport services
- Health services
- Direct sales

Business in geographical context

✓ Informed decision-making
   and improving transparency
✓ Easy integration into
   existing control systems
✓ Interactive interface

- Communications
- Public organizations
- Health services
- Financial services
- Retail chain
- Real estate

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NEAR REAL-TIME MONITORING

DEVELOPMENT AND REALIZATION OF WEB-GIS

Сельское хозяйство   Лесное хозяйство   ЖКХ   Водное хозяйство   Кадастр недвижимости

IMAGE PROCESSING

MAPPING AND INTERPRETATION

EXAMINATION

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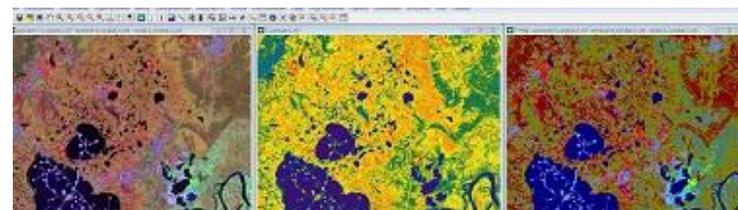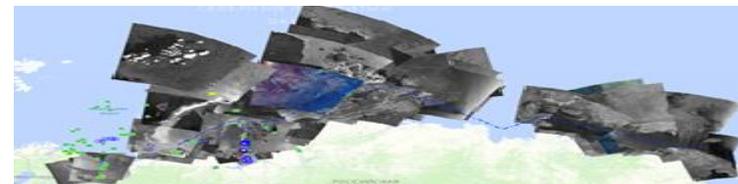
Near real-time monitoring - is a system of regular observations in 24/7 mode, of expert assessments and forecasting environmental changes based on Earth observations from space.

The system enables continuously and upon request to receive information about the qualitative and quantitative characteristics of natural and man-made sites, processes and phenomena.

Tools of planned and emergency optical and radar imaging are used, ensuring solution of an extensive list of tasks: from monitoring of forests and agricultural lands for efficient management of the territories to monitor ice and ships navigation situation, as well as to predict and respond to emergencies.

Near real-time monitoring advantages:

- unbiased and up-to-date information about the territory of Russia and adjacent areas;
- all-weather service;
- high revisit period;
- integration of radar and optical satellite data of world operators;
- data processing and supply of final products to the customer in near-real time via a web-service.

Season and flash floods

Ice situation

Ships navigation situation

Transport infrastructure

Construction work

Oil spills

Forests status

Fires

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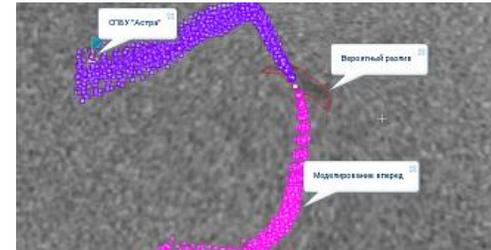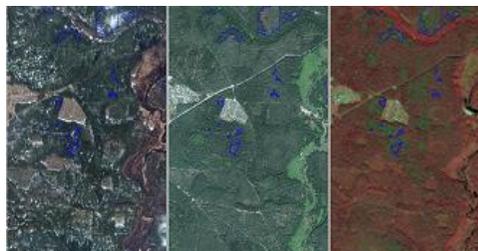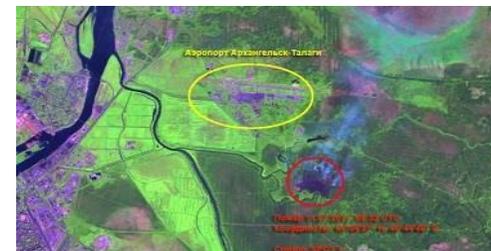
**Web-Geoinformation system (Web-GIS**) - is a multifunctional network information system, designed for collecting, processing, modeling and analysis of spatial data, their display and use when solving computation tasks, preparation and making decisions within an enterprise/organization.

GeoMixer Web-GIS platform enables to create geographic information analytical systems to work with various spatial and business data, different in their degree of complexity and application areas.

SCANEX offers introduction of integrated products and implementation of complex solutions — from development of the design (GIS architecture, functionality, interface, user-defined and customized settings) before its introduction, connection of additional services and up to subsequent technical support and support of experts.

Why do we need an own Web-GIS?

- To receive data from a satellite on-line to your own PC and to be aware of the region status;
- To get an unbiased assessment of own potential and opportunities of competitors;
- To make unprejudiced decisions based on reliable information and to efficiently manage all sites and premises regardless of their location;
- To collect and analyze information in the most perceivable form;
- To monitor forest logging, agricultural lands, season and flash floods, ships navigation situation, construction, public road system, emergencies; for environmental monitoring, as well as for cadastral land evaluation, architectural and planning works, for calculation of insurance rates, etc.

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IMAGE TRANSFORMATIONS

Include: data radiometric correction and calibration, haze removal, synthesis of additional spectral bands

Atmospheric haze removal
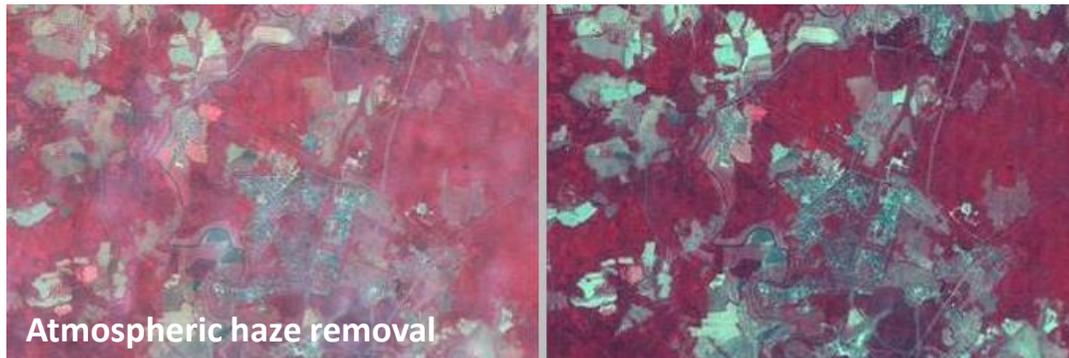
PHOTOGRAMMETRIC DATA PROCESSING

Includes: data geometric correction and ortho-transformation, creating seamless mosaicked coverages

Creating seamless coverages in natural color synthesis
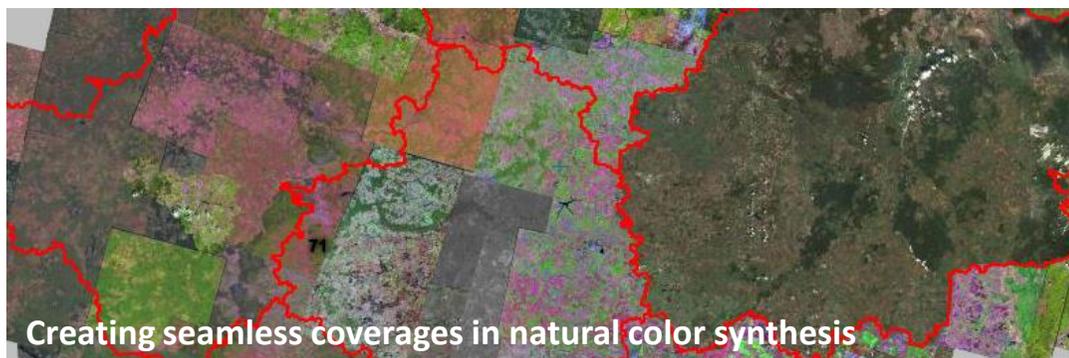
CREATING DIGITAL ELEVATION MODELS

Includes: drawing of digital terrain models, build digital elevation models, creating 3D models

DRAWING DIGITAL ELEVATION MODELS

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PIXEL-BY-PIXEL CLASSIFICATION METHODS

Include: classifications with and without calibration (with or without training), classifications using neural network analysis algorithms

Conducting neural network analysis
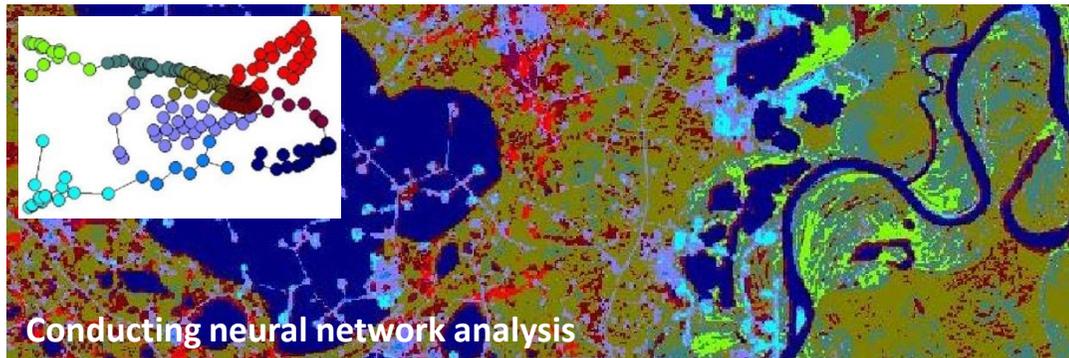
OBJECT-ORIENTED CLASSIFICATION METHODS

Include: classification applying multi-band segmentation method and segmentations of radar image, classifications using local texture analysis

Multi-band segmentation
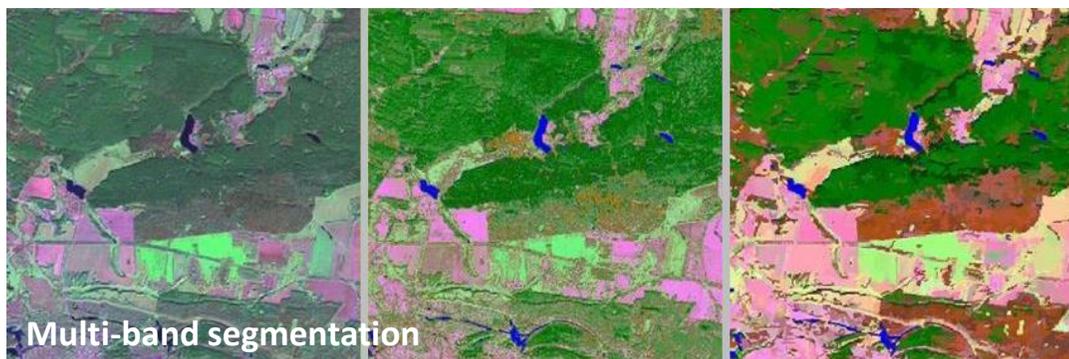
ADDITIONAL CLASSIFICATION AND ANALYSIS METHODS

Include: preparation of multi-temporal composites, analysis of the changes search, building probabilistic models, calculation of index characteristics

Calculation of index characteristics

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Thematic interpretation results are used widely:

Legend (Agriculture):
- sown winter crops
- partially sown winter crops
- not sown winter crops

Legend (Forestry):
- suitable for logging
- conditionally suitable for logging
- not suitable for logging

Legend (Water management):
- roiling zone
- maximum warm-up zone
- blooming zone
- mainstream zone
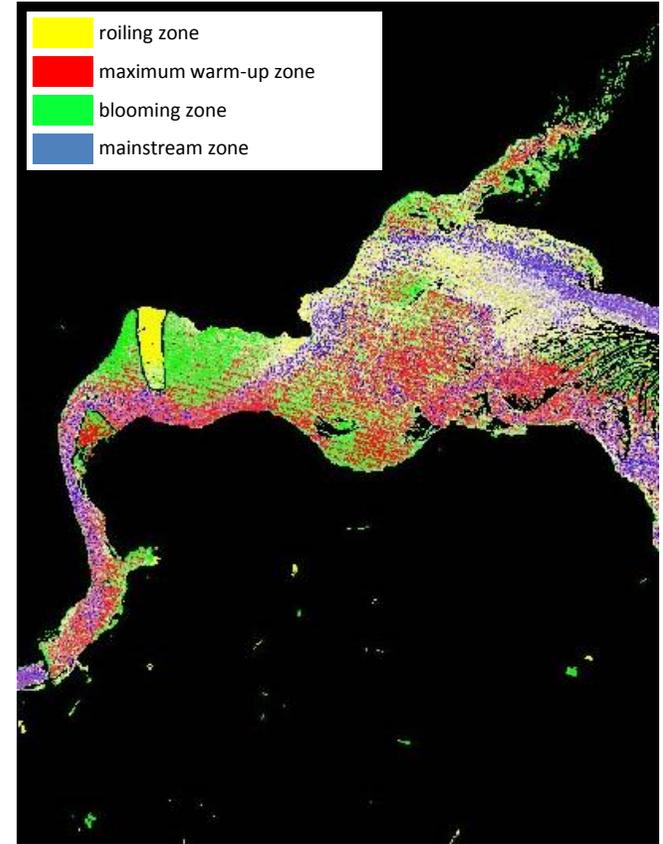
Agriculture   **Forestry**   **Water management**

IMAGE TECHNICAL PROCESSING RESULT → THEMATIC INTERPRETATION RESULT → FINAL CARTOGRAPHIC PRODUCT
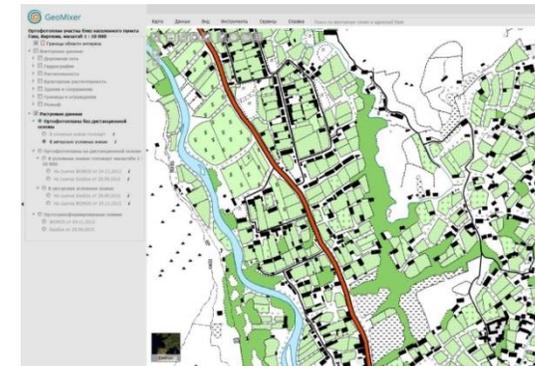
Initial data:
Ortho-rectified satellite imagery data

Interpretation process:
Expert interpretation using automation tools
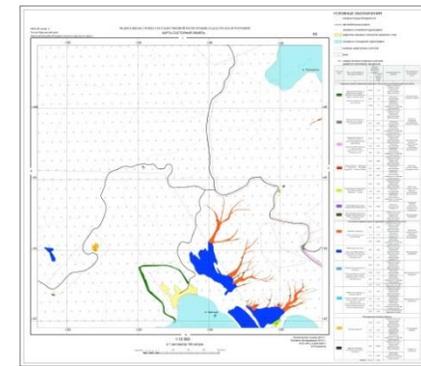
The final product:
Electronic and hard copy maps, as well as the application of geoportal technologies

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The use of satellite imagery data in the trial and pre-trial practice of claims settlement and in examinations by experts

Remote sensing data, along with other evidence, can be equally used in courts.

The company has a significant number of experts in various domains. Experts bear full, including criminal, responsibility for the studies performed by them.

- About 100 expert conclusions in different areas have been prepared (consequences of emergencies, perjury, illegal use of natural resources, environmental damage evaulation, etc.);
- Customers of these services are judicial authorities, defendants and plaintiffs;
- Expert conclusion may vary by the degree of elaboration and depth of ERS studies:
- - a cover letter that identifies all imaging parameters with attached
  printout of the space image with grid coordinates;
- a comprehensive study with the field surveys and measurements;
- preparation of the expert conclusion;
- backup in courts;
- Extensive experience with insurance companies on qualitative and quantitative assessment of various events impacts

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The use of satellite imagery data in the trial and pre-trial practice of claims settlement and in examinations by experts
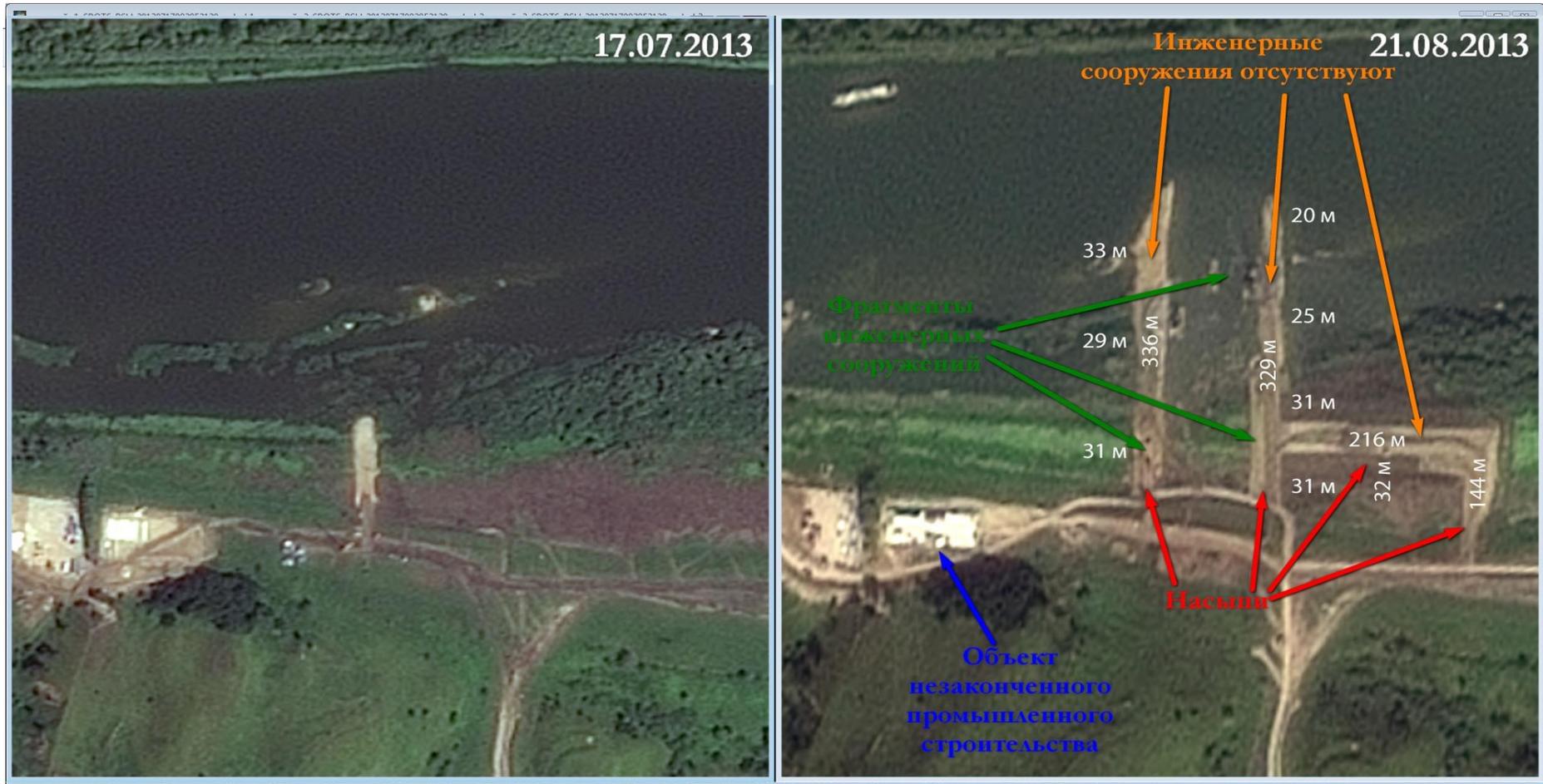
A construction company has effected insurance of a project under construction and being not enable to complete the construction activities in time it applied to the insurance company to pay for the alleged destruction of the facility as a result of the flooding, which in fact did not occur.

«KOSMOPLAN» GEOPORTAL OF EMERCOM
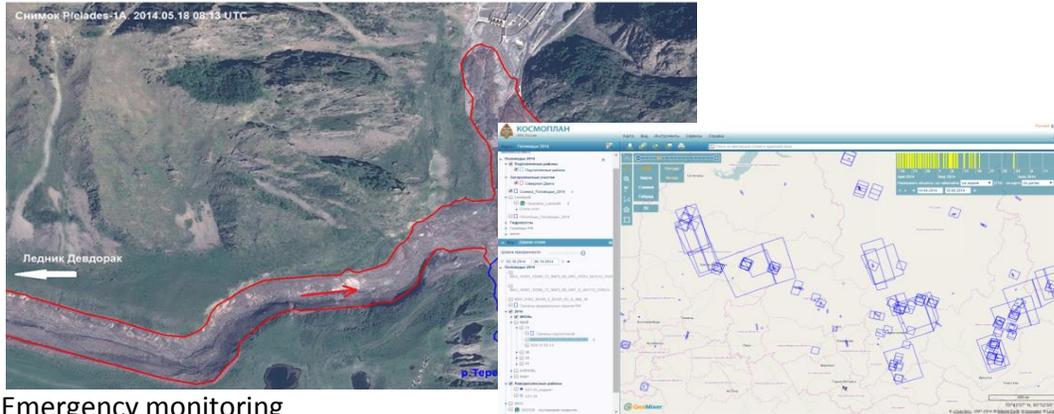
Emergency monitoring

GAZPROM NEFT GEOPORTAL
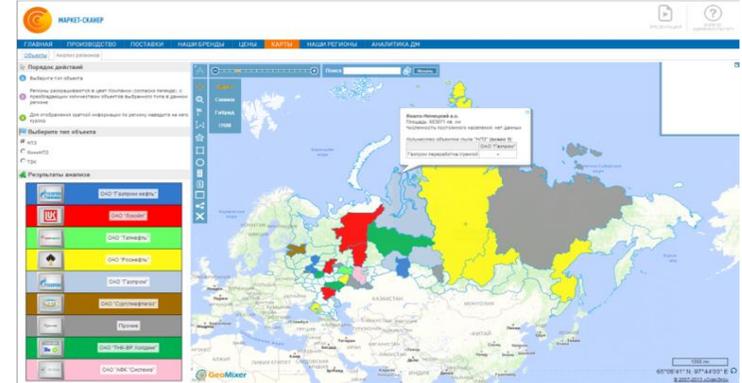
Integration with unified geomarketing system

"DEMETER" GEOPORTAL ROSSELHOZNADZOR
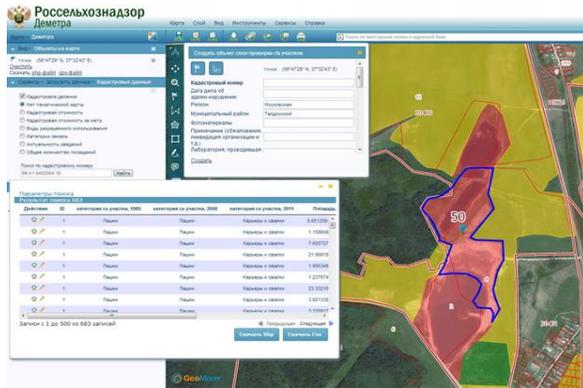
Agricultural monitoring

GIS ATOMFLOT "ONLINE SHIPS NAVIGATION MONITORING"
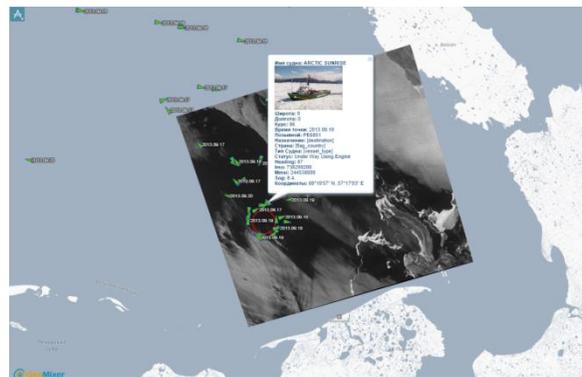
Information system of
the Northern Sea Route support

LUKOIL GEOPORTAL
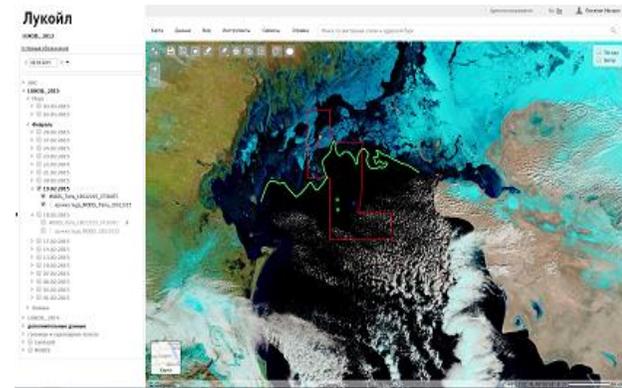
Environmental monitoring of the Caspian Sea

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Implementation of thematic projects based on space images in the field of:

- Defence and security
- Emergency situations
- Cartography
- Agriculture
- Forestry
- Cadastre and land use planning and control
- Subsoil use
- Meteorology
- Transport and navigation
- Nature conservation

Types of work:

- Photogrammetric works
- Creation of digital elevation models (DEM), 3D visualization and modeling
- Thematic interpretation and expertise
- Creation of thematic cartographic products and services
- Creation of geoportals
- Monitoring activities
- Research and development

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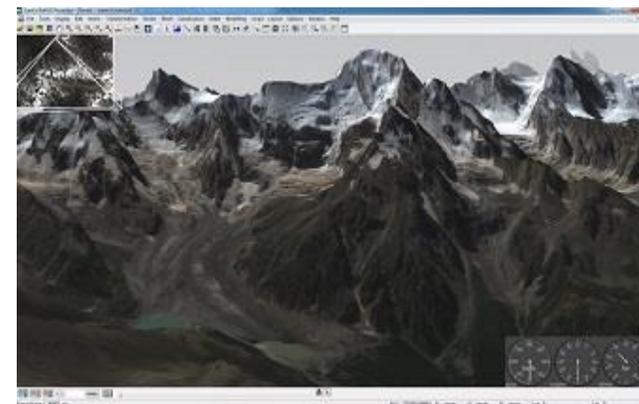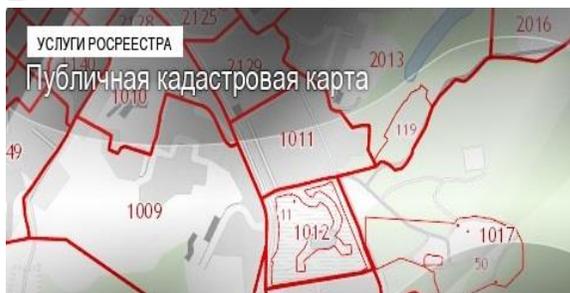
Government contract No. 157D on creation of the base map of real-estate cadastre.

The largest in the history of modern Russia geospatial infrastructure project by the request of Rosreestr (Federal Service for State Registration, Cadastre and Cartography)

Execution period: November 14, 2011 -September 2, 2012

Goal: to create a complete and trustworthy database of real estate sites.
Objectives:
- Reducing the time costs of accounting and information provision from the state real estate cadastre;
- establishment of a public access information infrastructure to the state real estate cadastre.
Results:
- satellite images of the entire territory of Russia at the spatial resolution of 0.5 m were prepared.
- recalculation and quality assessment of all cadastre data was carried out;
- a multiscale topographic digital map for the state cadastre of real estate was created.

In year 2009 the "RZhD geoportal" project was implemented. The correlation of geospatial information presented in the global geodetic coordinate system and in the linear operational coordinates used in rail transportation was implemented in the geoportal.
In addition, danger assessment of exogenous impacts on railway infrastructure was carried out for Russian Railways, dangerous areas were highlighted and recommendations with respect to protective measures given.

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EMERCOM OF RUSSIA

- Contract for new tasking and delivery of radar data in processing within 30 hours of EMERGENCY areas (COSMO, RADARSAT-2 and TERRASAR-X satellites)
- A contract for the supply of high resolution optical imagery data, received by us (SPOT-6/7 and EROS-B satellites).
- A contract for the modernization of their receiving stations to receive our national satellites - Canopus-V and Resurs-P.
- By the order of the Ministry of Emergency Situations the "KOSMOPLAN" multiportal resource was created, containing different types of maps and complex data sets for real-time monitoring of season and flash floods, fires, for search of facilities in distress, for situational analysis of an emergency consequences (e.g. oil spills).

ATOMFLOT

 In 2011-2012,   ScanEx Satellite conducted satellite-based monitoring of the Arctic and freezing seas.   Data were obtained on the ice and ship navigation situation,
on the spatial distribution of floating ice hummocks (*stamukha*) and icebergs along the Northern Sea Route; ships in distress in the Bering Sea and the Kuril Islands were monitored, as well as fishing boats-offenders in the Sea of Japan and the "*Prirazlomnaya*" drilling platform transportation and installation in the Barents Sea.

In 2010-2014   the portal service of operational radar monitoring was used
for the ice-breaking operations of "Atomflot". Of particular interest in terms of analysis and forecasting of ice conditions along the Northern Sea Route paths is to ensure trans-Arctic flights when you want to receive satellite imagery throughout the route: from Novaya Zemlya to the Bering Strait.

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"Demeter" geoportal of Rosselkhoznadzor

Within the framework of "Demeter" mosaics were created from highly-detailed satellite images, more than 200 thousand agricultural polygons were vectorized and changes in land use for the periods from 1985 to 2011 have been identified in Moscow, Leningrad, Kaluga, Ryazan and Tula Regions.

Information and analytical system of Rosselkhoznadzor unites and integrates information about the state of agriculture of the Russian Federation.

Sampling data: by request of the user, who enters the ID number of interested cadastral units or blocks, a list of carried out samplings within the limits of this allotment and their laboratory characteristics are issued.

Types of land plots: "Demeter" system integration with database of land surveillance of agricultural plots condition (land plots audits). Each cluster is a group of individual audits, localized on cadastral plots. Balloon helps give all attribute information about such audits, including links to photo materials.

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In 2001, the "Yandex" company signed the contract on delivery of high-resolution satellite images covering 10 million square kilometers of the Earth surface. This territory is comparable with almost 2/3 of the Russian territory. Thanks to this Yandex.Maps service could update satellite images for a number of regional centers of Russia.

Updated and expanded coverage with high resolution satellite imagery enables users to:
- get a more complete and detailed picture about infrastructural sites and facilities;
- identify new buildings, roads, bridges, etc.;
- get information on vegetation cover degradation, violation of the soils and other important characteristics of natural and man-made sites.

Since 2010 in the framework of a Unified Marketing Information System Gazprom Neft company has been implementing the possibility of carrying out in-depth geo-marketing analysis using web-mapping tools of GeoMixer. Contracts for annual maintenance support and data delivery have been signed.

GeoMixer platform enables to:
- visualize:
- Gazprom-Neft gas stations layer (over 20 thousand sites) and the competitors' gas station layer
- infrastructure facilities
- administrative boundaries
- spatial measurements on the map
- color thematic maps based on target indicators
- integrate interactive maps into corporate portals

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Unigeo

SCANEX participates in the creation and development of a network of space monitoring centers based on geoportals at universities. There area 26 Earth remote sensing centers created at the universities in Russia, Spain and Kazakhstan. SCANEX is the "UNIGEO" Consortium member.

The purpose of the Consortium creation is to combine (integrate) intellectual resources and cutting-edge technologies of Russia higher education institutions in the field of remote sensing and geo-informatics to improve the education quality and promote public access to new knowledge and technologies of using remote sensing data.

MSU

In 2010, the MSU Geoportal was created - the geo-information complex, which includes hardware ("UniScan-24" complex, data processing terminals, terminals to work with the geoportal, computer room, server of MSU's geoportal); software (software products designed to work with Earth remote sensing data), as well as a databases of satellite images and maps, which are regularly replenished with new imaging materials.

The project participants are biological, geographical, geological, economic departments of MSU, Department of Soil Science, High School of Social Sciences, High School of Innovative Business and other departments of the Moscow State University.

Schools

At the Moscow School No. 354 a centre with special equipment and GeoBox 3D software, being a virtual interactive model of the Earth, was established as part of the Kurchatov project, which is aimed at upgrading the education process. The main objective of the Center is the introduction of space technology into the learning process while studying geography and other subjects: ecology, history, natural science, physics.

An Alice-SC™ station was installed on the roof of the gymnasium No. 1584 receiving meteorological images in a real-time mode, whereas centres of geoinformation technologies, in which students and teachers have access to information acquired from satellites, have been created at other 37 schools. They can explore the change of seasons, explore various natural objects, create realistic visual and thematic projects.

Thus, SCANEX technology can foster the establishment of a holistic educational system in the area of using the space activities results.

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SCANEX Holding - **is the sole company in Russia and CIS with a unique process flow:** direct reception of data from remote sensing satellites to its proprietary network of stations, processing of satellite data applying its own technology and providing access to satellite images and data products applying proprietary geoportal services that guarantee low data cost to the customer and delivery operability.

National technology and personal experience underpin all the key developments of SCANEX Holding, thus providing complete **import substitution** in satellite-based monitoring of the Earth, starting from the data reception and processing and up to the generation of integrated products.

ERS advantages:

- economic expediency (the costs to obtain information applying Earth remote sensing are significantly lower than those for ground surveys and office operations);
- opportunity in the short term to receive information on the large surface area of the Earth;
- high data processing accuracy due to the use of advanced information technologies for image processing;
- high information content (application of multispectral, infrared and radar imagery to view details not visible on usual images);
- possibility to obtain three-dimensional elevation and terrain models;
- possibility to have regular observation the territory of Russia and CIS countries in near real-time at different spatial resolution.

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