ЦЕНТР ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ
INNOVATIVE CENTRE

IMAGE MEDIA CENTER

Z PRINCIPLE

IN GEODATA APPLICATION

Speaker : Vyacheslav Lobzenev

ЦЕНТР ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ
INNOVATIVE CENTRE

IMAGE MEDIA CENTER

Innovative Centre Company's scope

IMAGE MEDIA CENTER software development

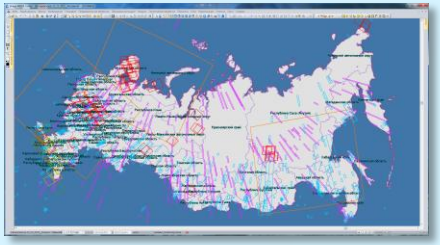

РОССИЙСКАЯ ФЕДЕРАЦИЯ

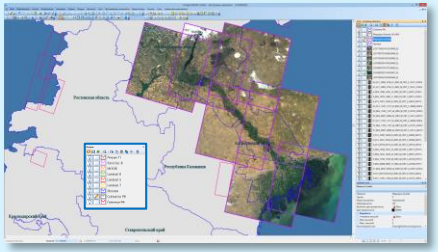
СВИДЕТЕЛЬСТВО

№ 2007612107

«Image Media Center»

Data storage and catalogization





Remote sensing data processing GIS development


IMAGE
MEDIA
CENTER
Spain, Kanopus-V

Remote sensing data acquisition automation

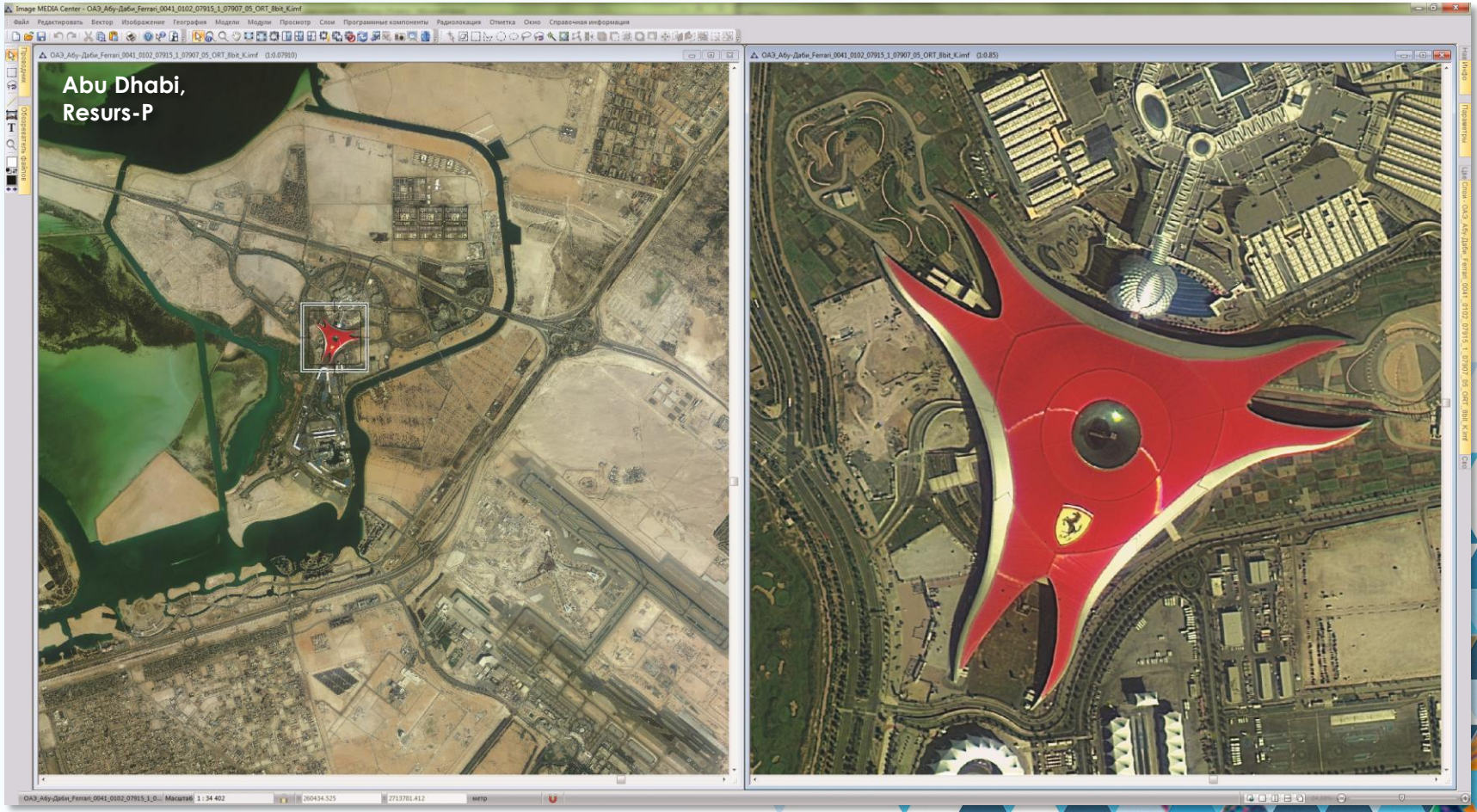
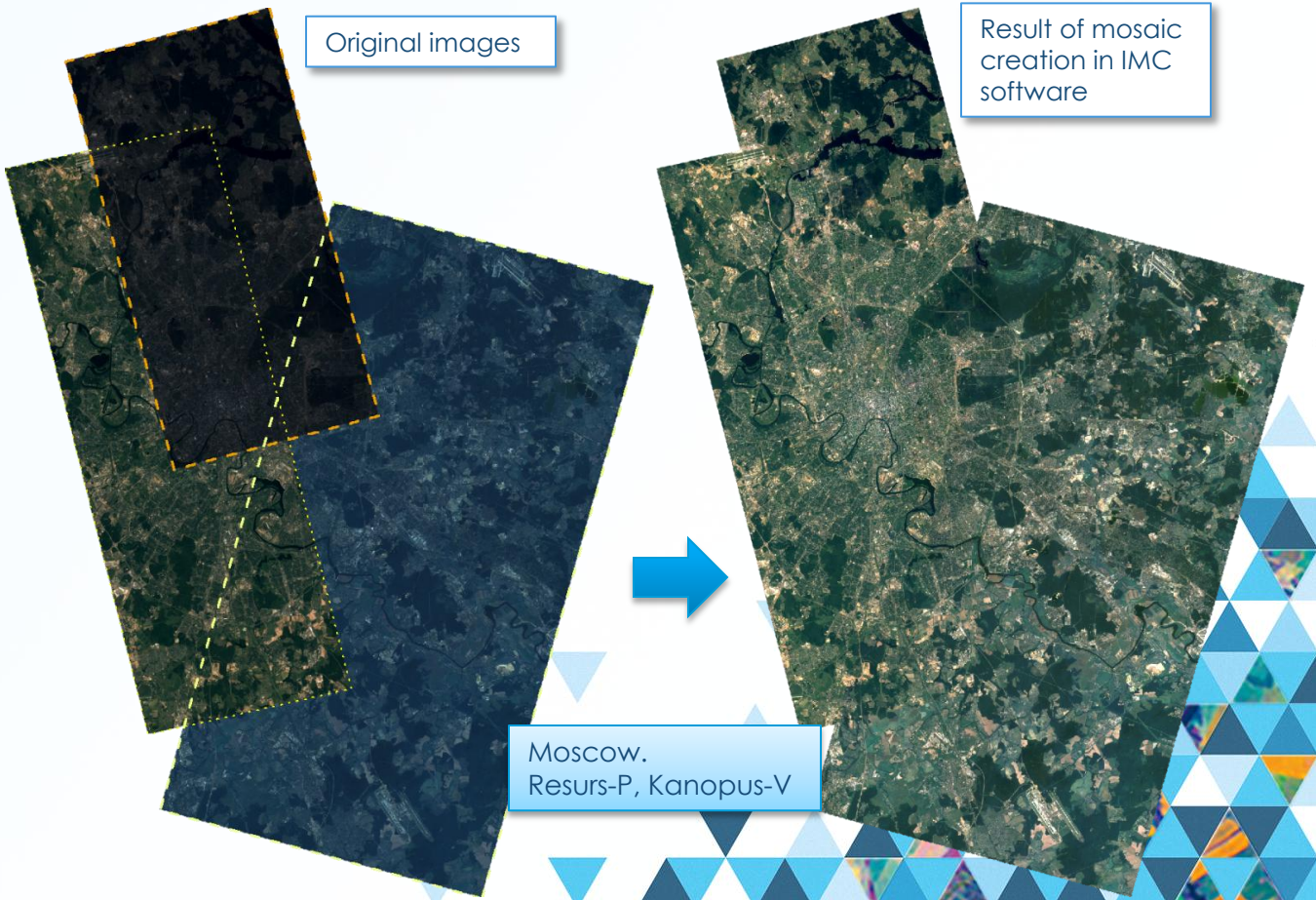



IMAGE
MEDIA
CENTER
Realmadrid
Realmadrid
Spain, Resurs-P

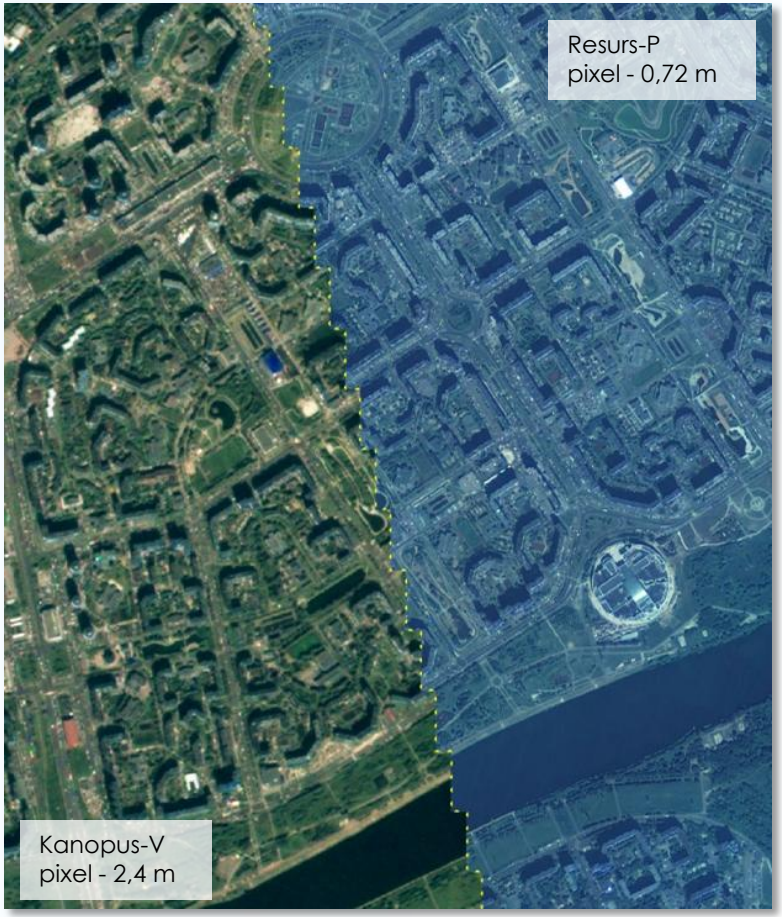
Seamless mosaic creation

1. Contour detection
2. Alpha-channel edges blurring
3. Pixel projection unification
4. Georeferencing
5. Brightness adjustment
6. Seamline creation
7. Seamless raster mosaic creation
8. Area of interest masking
9. NoData value
10. Vector borders of the area with metadata saving



Seamless mosaic

Seamless mosaic automated creation



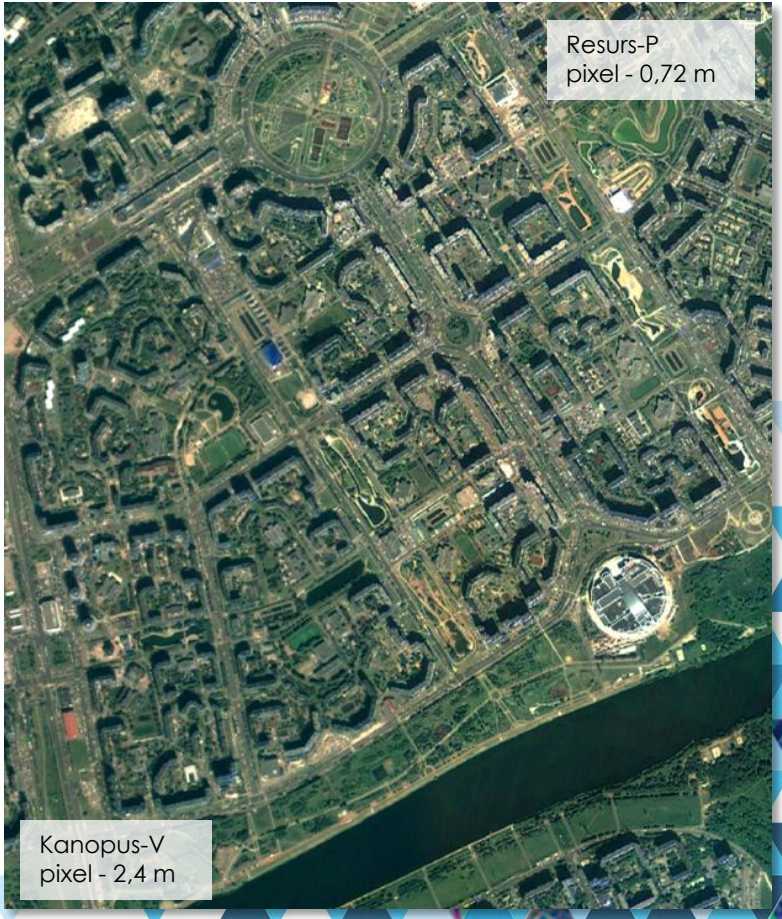
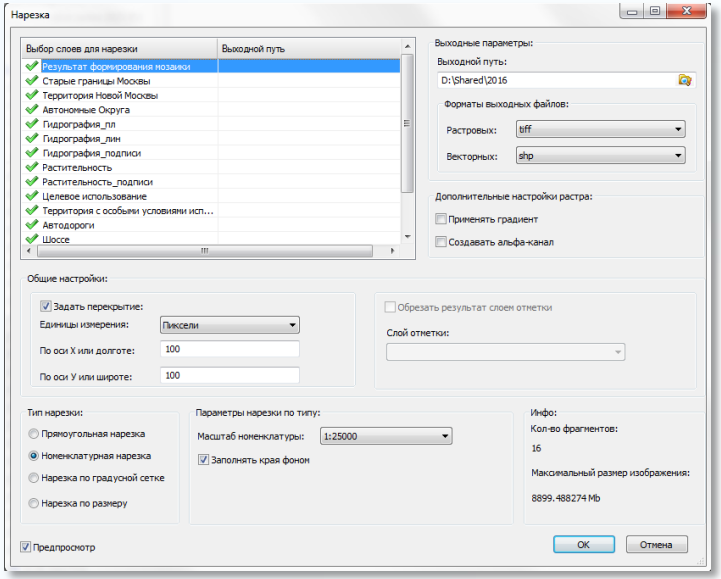
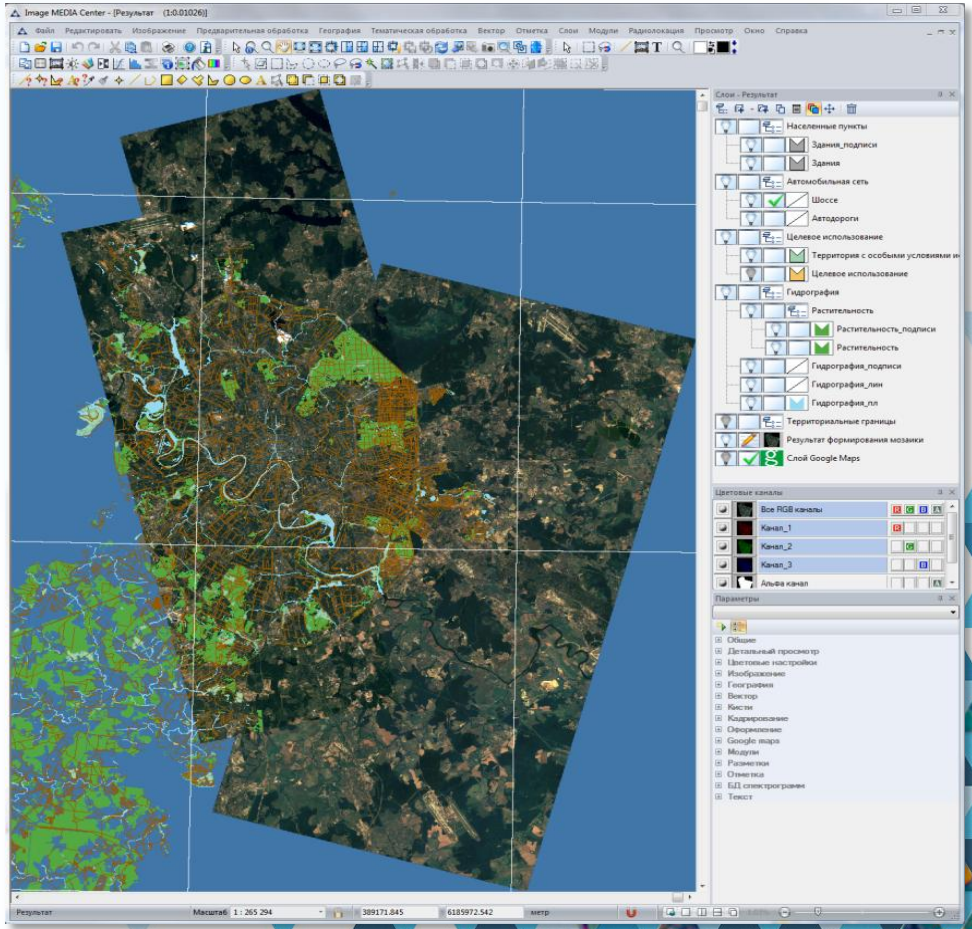


Image cutting

Cutting types:

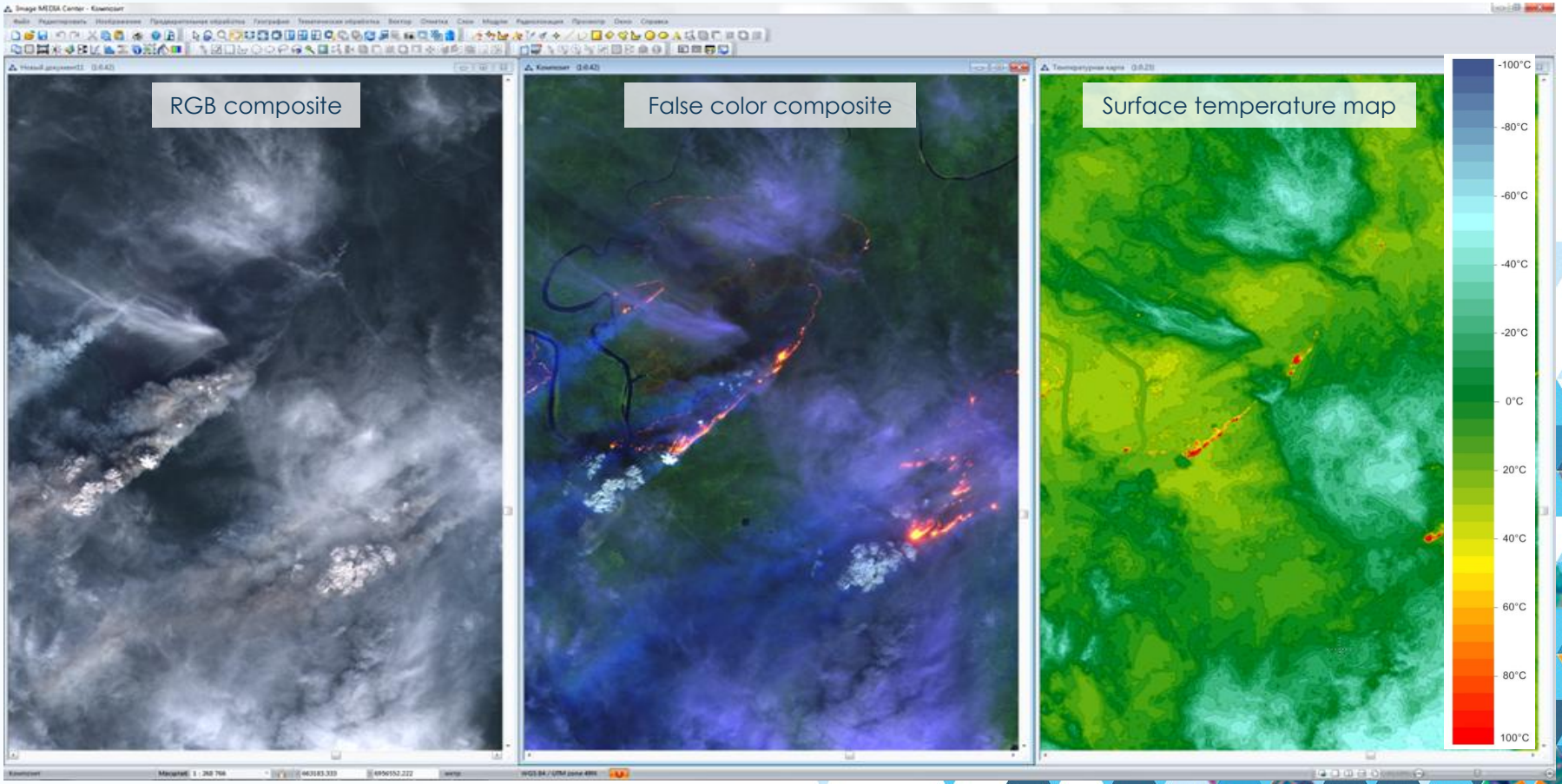
1. Rectangular grid.
2. Nomenclature sheets.
3. Grate grid.
4. Size of the tile.
5. Arbitrary shape.





Wildfires monitoring

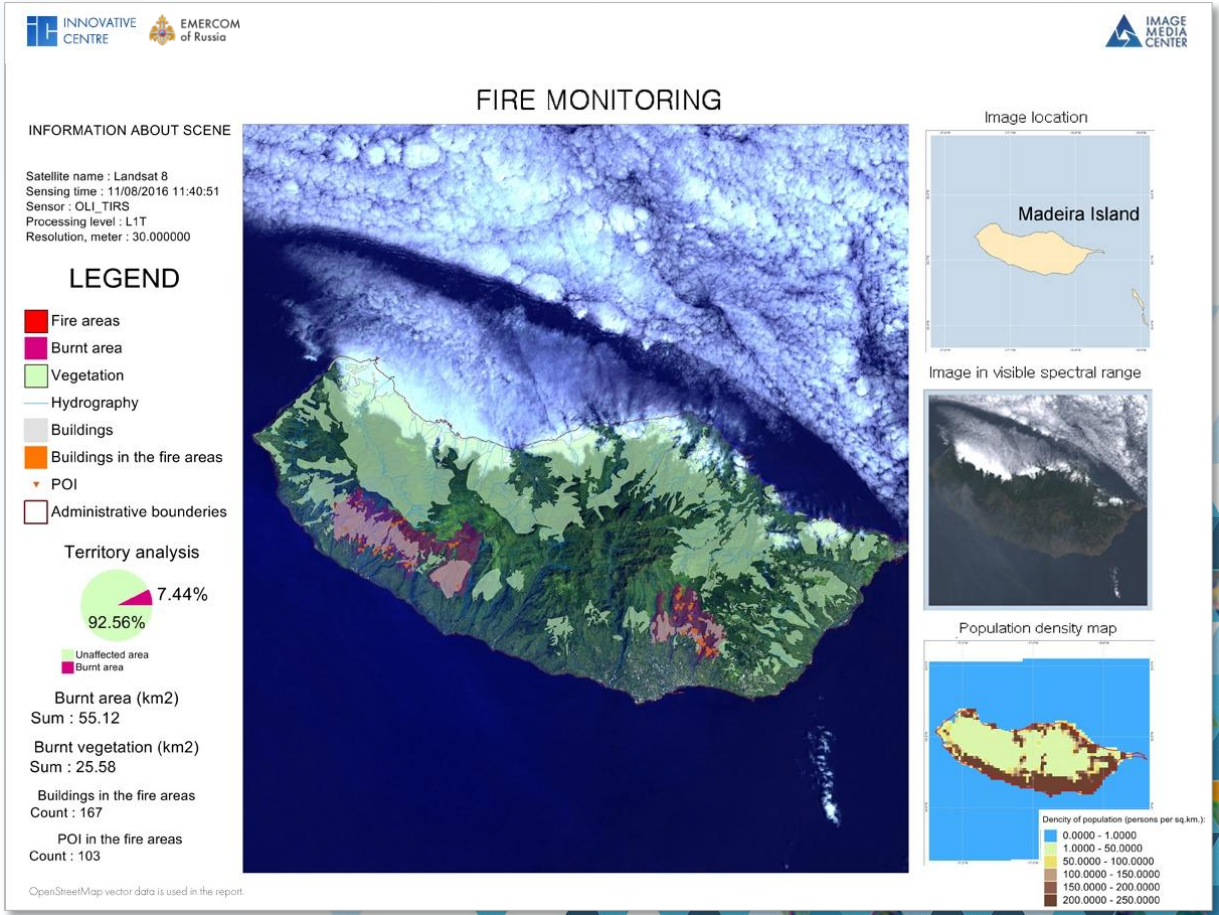
Open fire detection. Russian Federation, Landsat-8



Wildfires monitoring

As a part of cooperation with Ministry of Emergency Situations (Russia) Innovative Centre Company performed a monitoring of fires on the Portuguese island of Madeira.

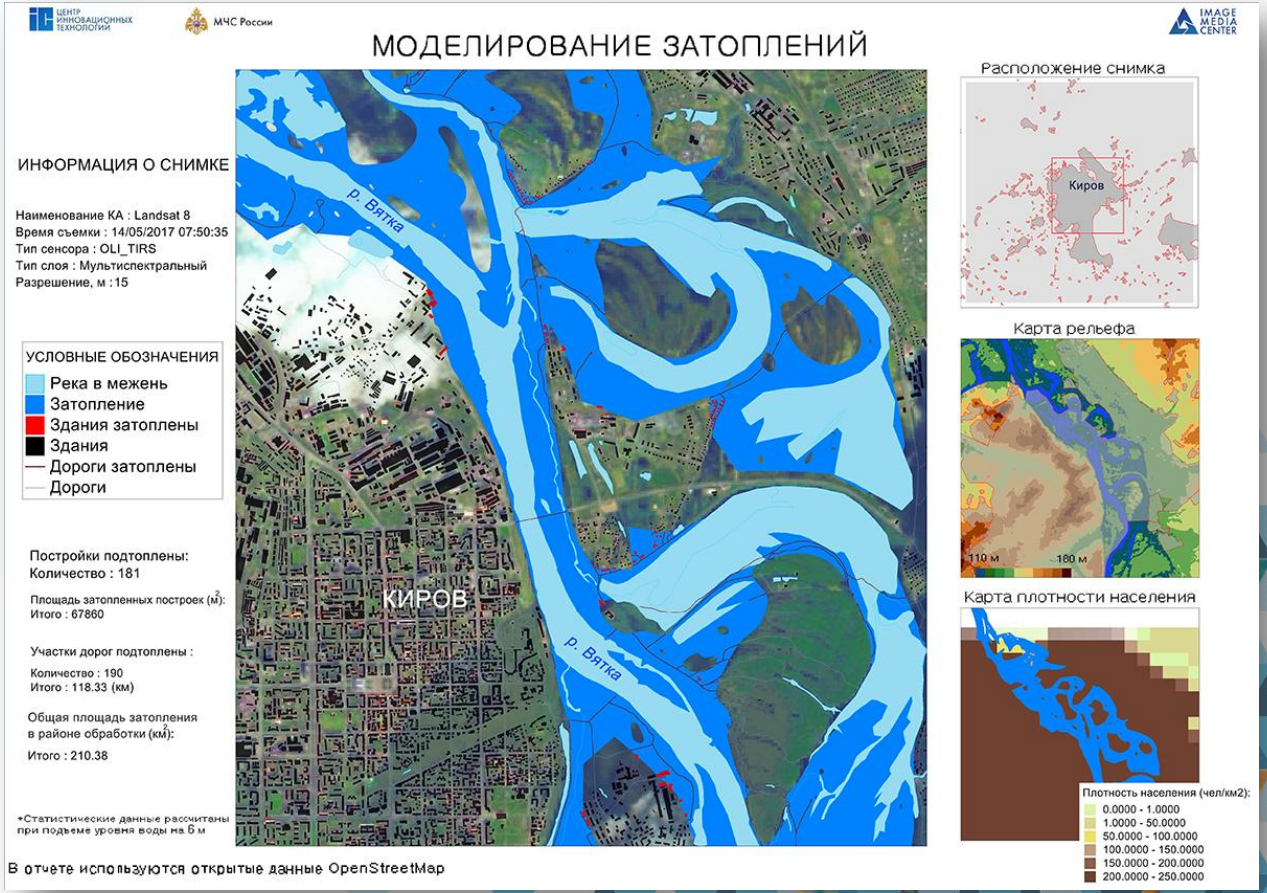
Monitoring was performed in IMAGE MEDIA CENTER software based on the Landsat 8 data received on the August 11, 2016.



Flood monitoring

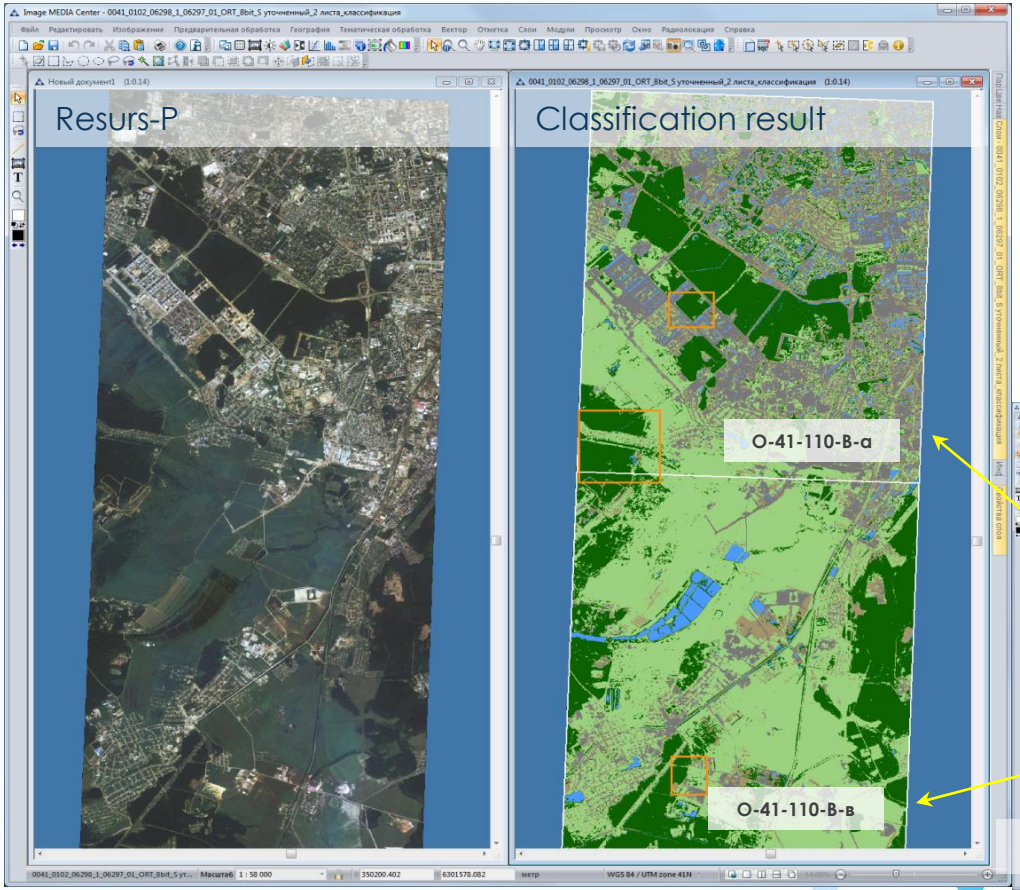
As a part of cooperation with Ministry of Emergency Situations (Russia) Innovative Centre Company performed a flood monitoring in Kirov on 14.05.2017.

As a result of the flood four districts are flooded. Houses and streets are flooded, water reaches entrances of the buildings.



High resolution data processing

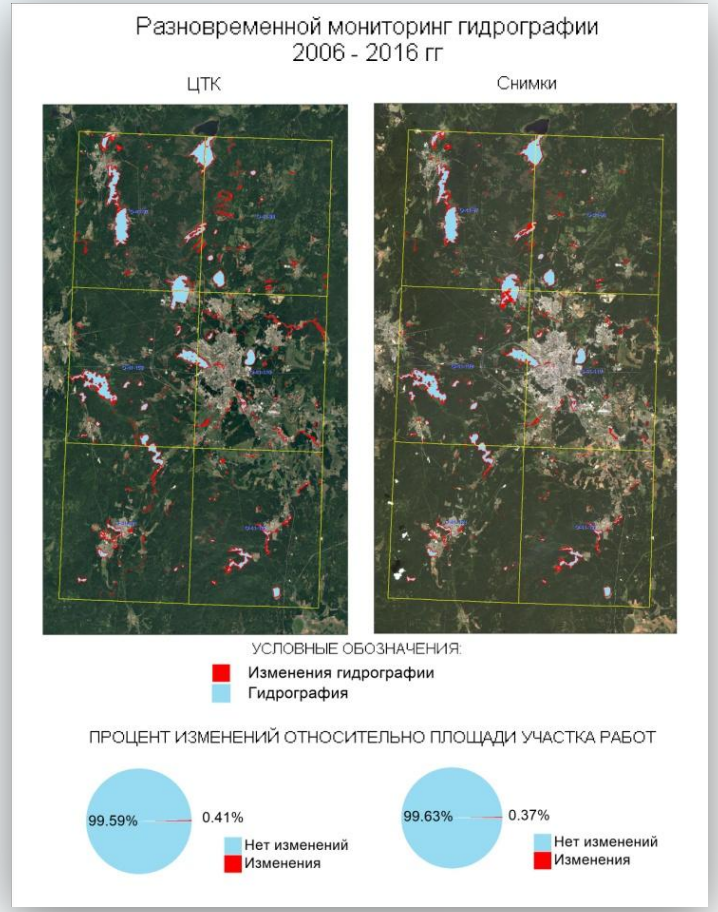
Image classification



- Forest vegetation
- Grassland vegetation
- Man-made objects
- Water
- Soil

Change detection areas

Change detection verification
Digital topographic map 1:100 000



Hydrography

DTM comparison 2006 – 2016

Hydrography change percent according to DTM 2006-2016.

0,41 %

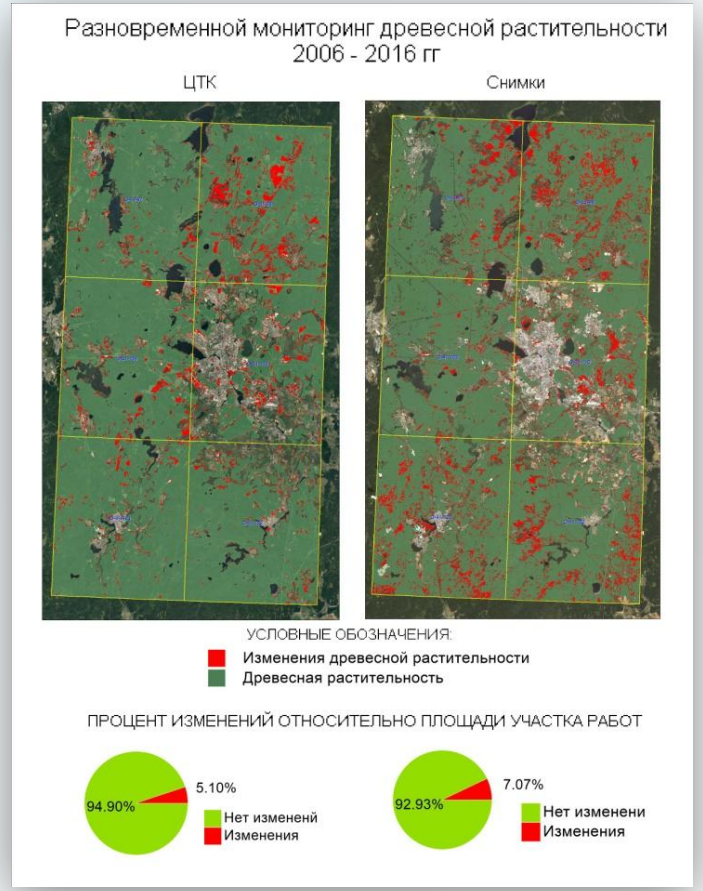
RS comparison 2006 – 2016

Hydrography change percent according to Landsat 2006-2016

0,37%

Note:
Territory – Sverdlovsky district
Processed area– 6792 km2
Hydrography change area according to DTM 2006 - 2016 – 28 km2
Hydrography change area according to Landsat 2006 - 2016 – 25 km2

Change detection verification
Digital topographic map 1:100 000



Forest vegetation

DTM comparison 2006 – 2016

Forest vegetation change percent according to DTM 2006-2016.

5,10 %

RS comparison 2006 – 2016

Forest vegetation change percent according to Landsat 2006-2016.

7,07 %

Note:
Territory – Sverdlovsky district
Processed area– 6792 km2
Forest vegetation change area according to DTM 2006 - 2016 – 346 km2
Forest vegetation change area according to Landsat 2006 - 2016 – 480 km2

Remote sensing data acquisition and application development tendencies

Data sources

Aist-2D; ALOS-3; ALOS/PRISM, AVNIR-2; AlSat-2A,2B; Aqua/MODIS; ASNARO-1; BKA; BlackSky Pathfinder; Cartosat-1 (IRS-P5); Cartosat-2, 2B, 2C, 2D, 2E, 3; CBERS-4; Deimos-2; DMC; DMC-3/TripleSat Constellation-1, 2, 3; DubaiSat-2; Earth-i (EiX2); EgyptSat-2; EO-1/Hyperion, ALI; EROS-A ; EROS-B; Formosat-2; Formosat-5; GeoEye-1; GF-1, 2, 4; Göktürk-1A; Ikonos; Ingenio; IRS-1C, 1D; Kanopus-V; Kanopus-V-IR; KazEOSat-1; KazEOSat-2; Kompsat-2; Kompsat-3, 3A ; Landmapper-BC; Landmapper-HD; Landsat-5; Landsat-7; Landsat-8; Meteor-M 1, 2; Miranda VRSS-1; Monitor; Nigeriasat-2; NuSat -1, 2; Obzor-O; OmniEarth; OptiSAR ; OrbView-3; PerúSAT-1; Resurs-P 1, 2, 3; PlanetScope; Pleiades-1A, 1B; QuickBird; RapidEye; Resourcesat-1 (IRS-P6); Resourcesat-2,2A; Sentinel-2A, 2B; SkySat; Spot-2, 4; Spot-5; SPOT-6, SPOT-7/Azersky; SSOT; Suomi NPP; SuperView-1; TeLEOS-1; Terra/ASTER; TH-1-1, TH-1-2, TH-1-3; THEOS; UrtheCast: Iris, Theia; VNREDSat-1A; WorldView-1; WorldView-2; WorldView-3; WorldView-4; ZY-3; ALOS-2; ALOS(PALSAR); Cosmo-SkyMed 1, 2, 3, 4; Envisat; ERS-1, 2; GF-3; Iceye; Jilin -1; KOMPSAT-5; NovaSAR-S; RADARSAT Constellation 1 2, 3; RISAT-1; Sentinel-1A, 1B; TerraSAR-X, TanDEM-X; ...

Number of solvable tasks

Efficiency of data acquisition

Satellite constellation growth

High-resolution satellites number increase

Archive imagery amount and demand increase

Tasks

Agriculture

Forestry

Ecology

Transport

Mining

Emergency situations and military tasks

Other

Remote sensing data acquisition and application development tendencies

Data sources

Software

- Federal GIS
- Regional GIS
- Municipal economy GIS
- Urban development GIS
- Agriculture GIS
- Forestry GIS
- Water management GIS
- Ecology GIS
- Oil & gas industry GIS
- Railway GIS
- Healthcare GIS
- Flood monitoring GIS
- Wildfire monitoring GIS
- Mining GIS

X Y Z generation theory

In 1991 two people started talking about the distinctive features of age differences for the first time; they were US researchers Neil Hove and William Strauss. They developed a theory based on differences in values of different generations of people.

The age theory includes three main components (generations X, Y and Z) and one additional (baby-boomers).

X Y Z generation theory

Baby-boomers (1943-1963). They are good team workers. They are active and carry on self development, as they have a huge interest in learning something new. Their whole life is devoted to work.

Generation Y (1983-2003). Scientists also call them a «thumb generation» because of their habit to type SMS with their thumbs holding phone in one hand. They are also known as the «Millennials», «Next generation», «Network generation». Their main features are passionate involvement into digital technologies, high level of education, fast decision-making. They are oriented on immediate results, patience is unacceptable.

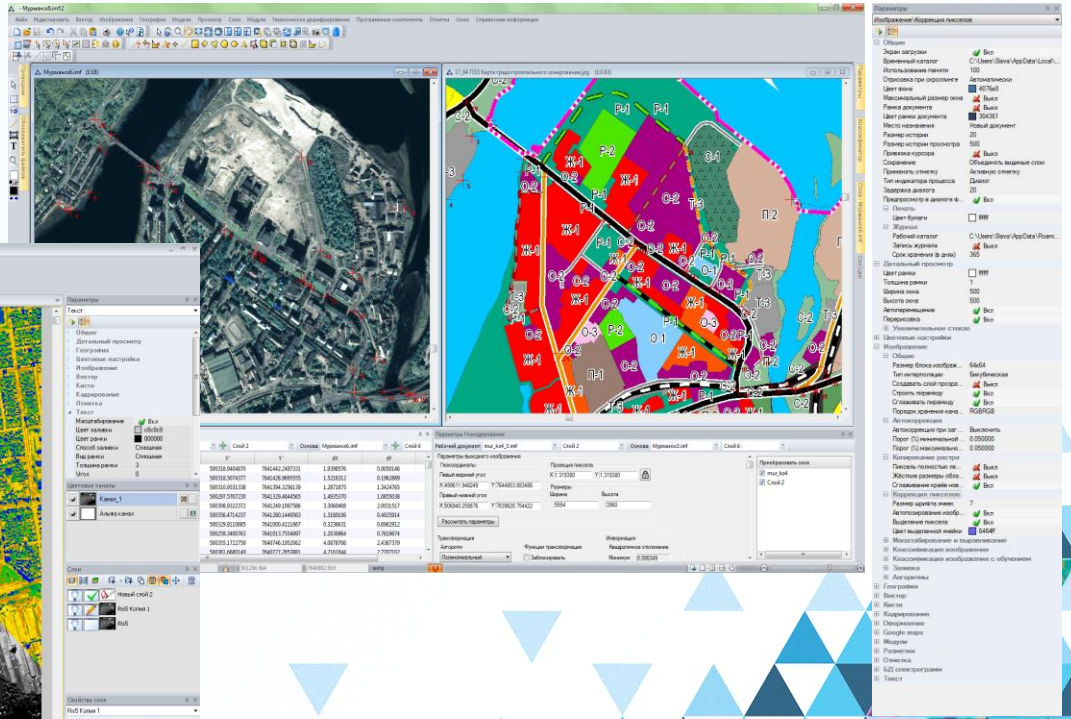
Generation X (1964–1984). Their distinctive features are hyper-responsibility, out of box thinking, broad knowledge base, desire to choose and change. These people are individualists and tend to depend only on themselves. They are hard workers and success-oriented people.

Generation Z (after 2003). They have attention span of 8 seconds, highlighting the affects of an increasingly digitalized lifestyle on the brain. They cannot concentrate on a single task for a long time. The «8 second filters» developed because the X generation was raised in the world with unlimited opportunities and not enough time for all of them.

Image Media Center user interface

Software structure (2007):

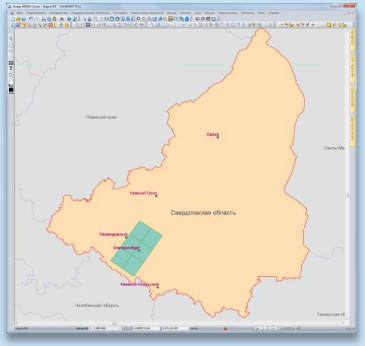
- Over 150 software modules.
- Over 1000 menu items.
- Over 300 settings.



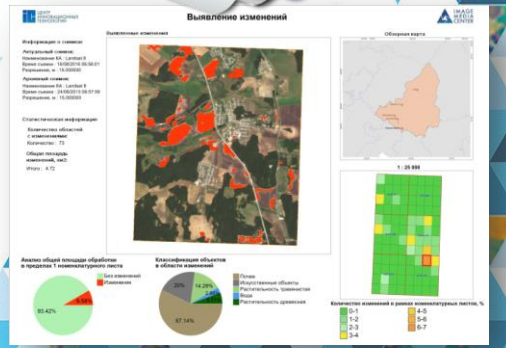
Tasks management in a single informational system

Spatial data processing service

Area selection



Task selection



Spatial data automated processing technology

Surveying task selection


Agriculture

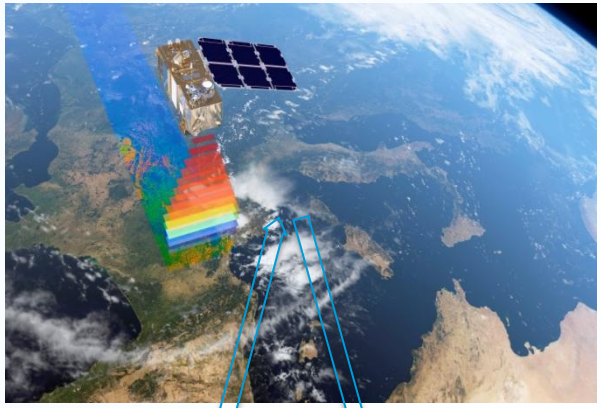

Forestry


Ecology


Mining


Emergency situations and military tasks

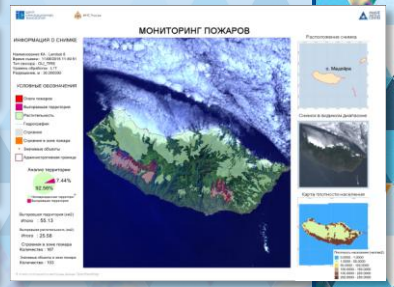

Other



Spatial data processing service

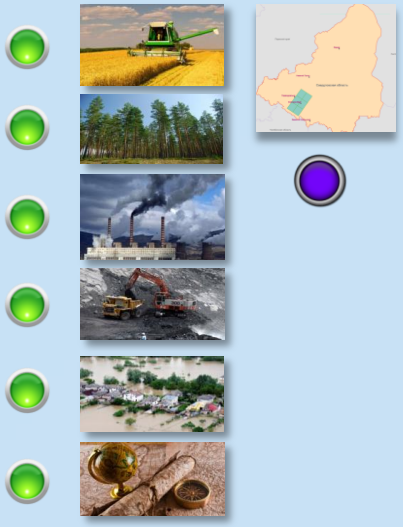
Obtained data processing according to a task algorythm

- Agriculture
- Forestry
- Ecology
- Mining
- Emergency situations and military tasks
- Other



Spatial data processing service

Data input



Spatial data processing service

Processing request

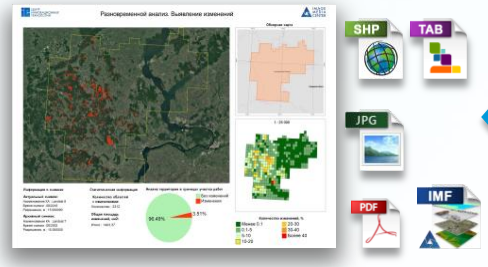
- Database data search and selection
- Algorithm selection
- Distributed computing resource manager
- Image Media Center server

Data acquisition

IMC

Server mode processing

Results generation

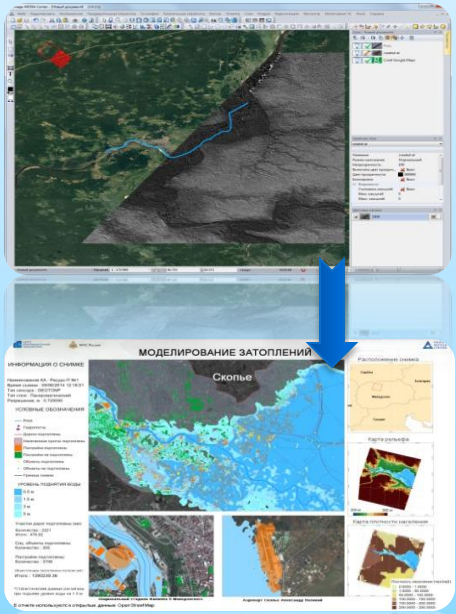


Thematic processing cycle

Remote sensing data processing in IMAGE MEDIA CENTER

Processing stages

- Preliminary processing (atmospheric correction, mosaic creation, resolution improvement).
- Thematic processing (classification, indices, analysis).
- Results vectorization (attribute information, styles).
- Report generation (statistics, diagrams, description)



Data storage

Satellite images

Resurs-P; Kanopus-V; BKA; GeoEye-1; Landsat-5,7,8; GeoEye, Pleiades, WV-2,3; TerraSAR-X, TanDEM-X; Radarsat-2; Sentinel-2A, 2B etc

Vector maps

Road network; urban infrastructure; meteorological data; floristries; protected areas; agricultural lands; crops; water bodies, etc

Remote sensing data processing results

- Image quality improvement.
- Vector maps and thematic vector layers.
- Forecasts and models.
- Statistical data.
- Graphic and text reports.

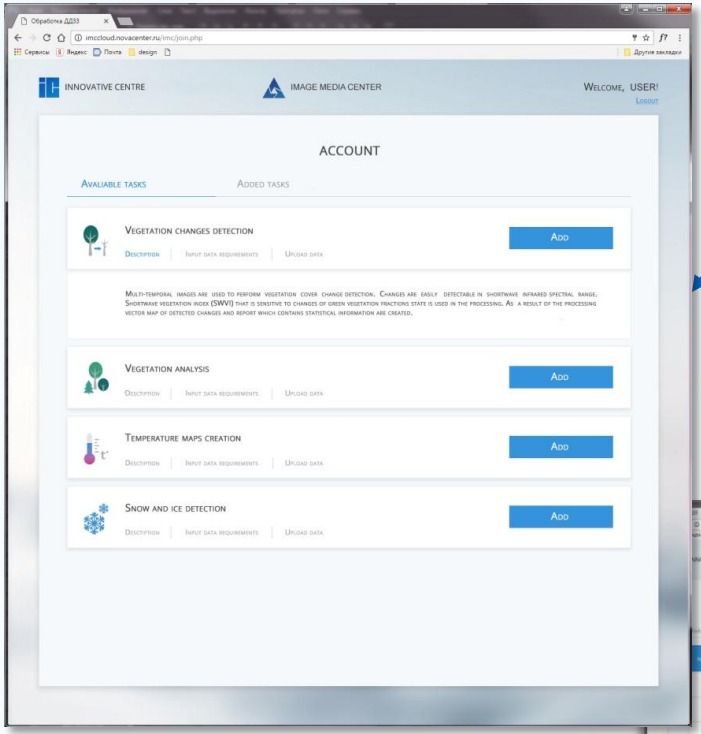
ЦЕНТР ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ
INNOVATIVE CENTRE

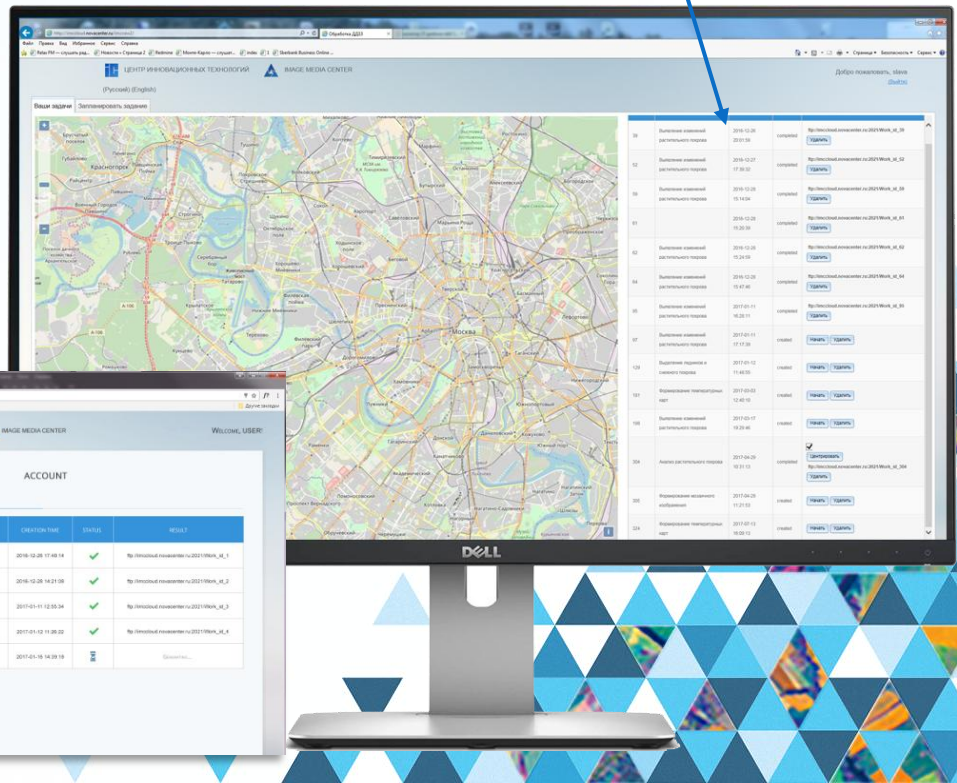
IMAGE MEDIA CENTER

WEB-service application

Tasks log

Upload materials requirements





Select necessary category of tasks

ЦЕНТР ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ
INNOVATIVE CENTRE

IMAGE MEDIA CENTER

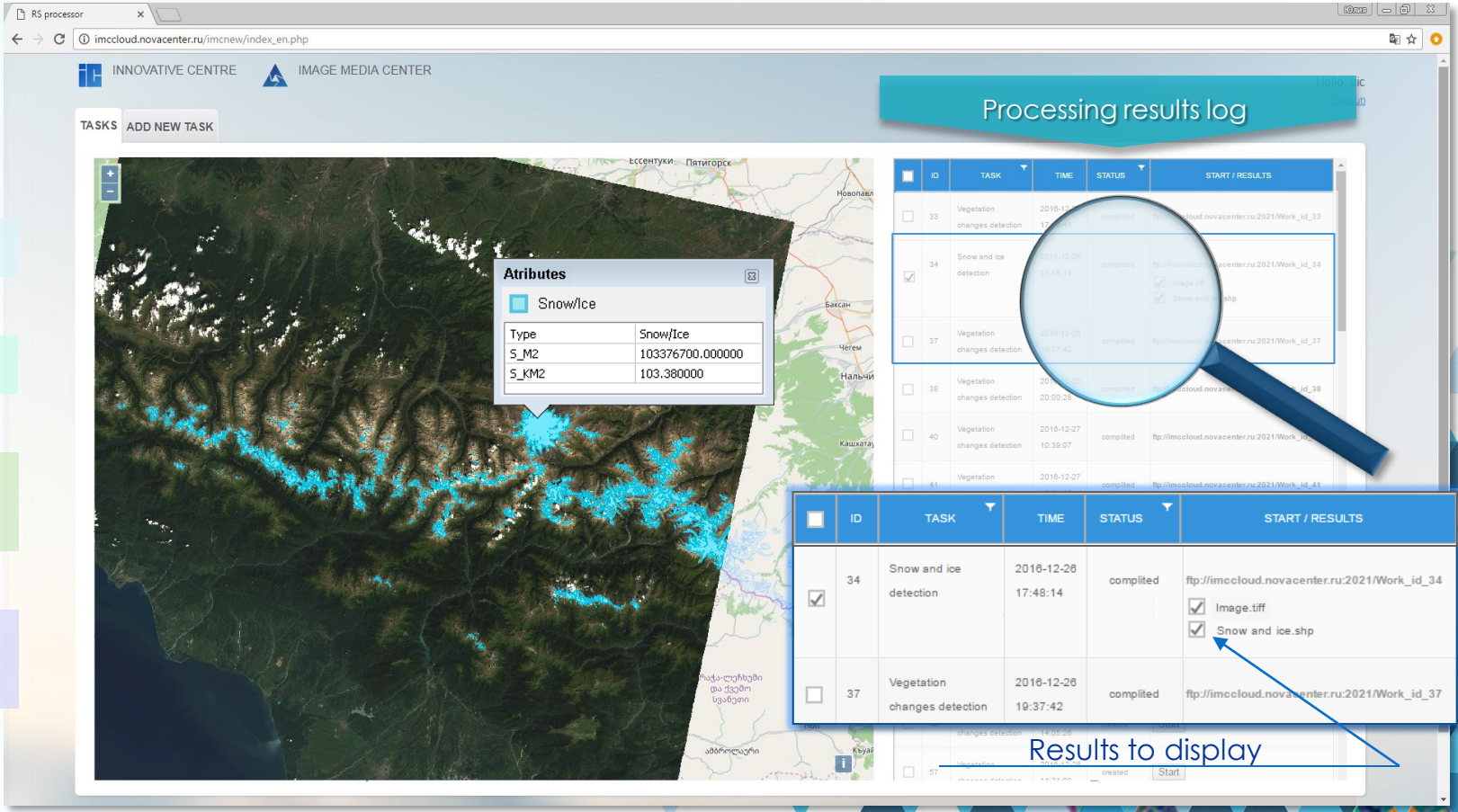
Processing results visualization on geoportal

Image

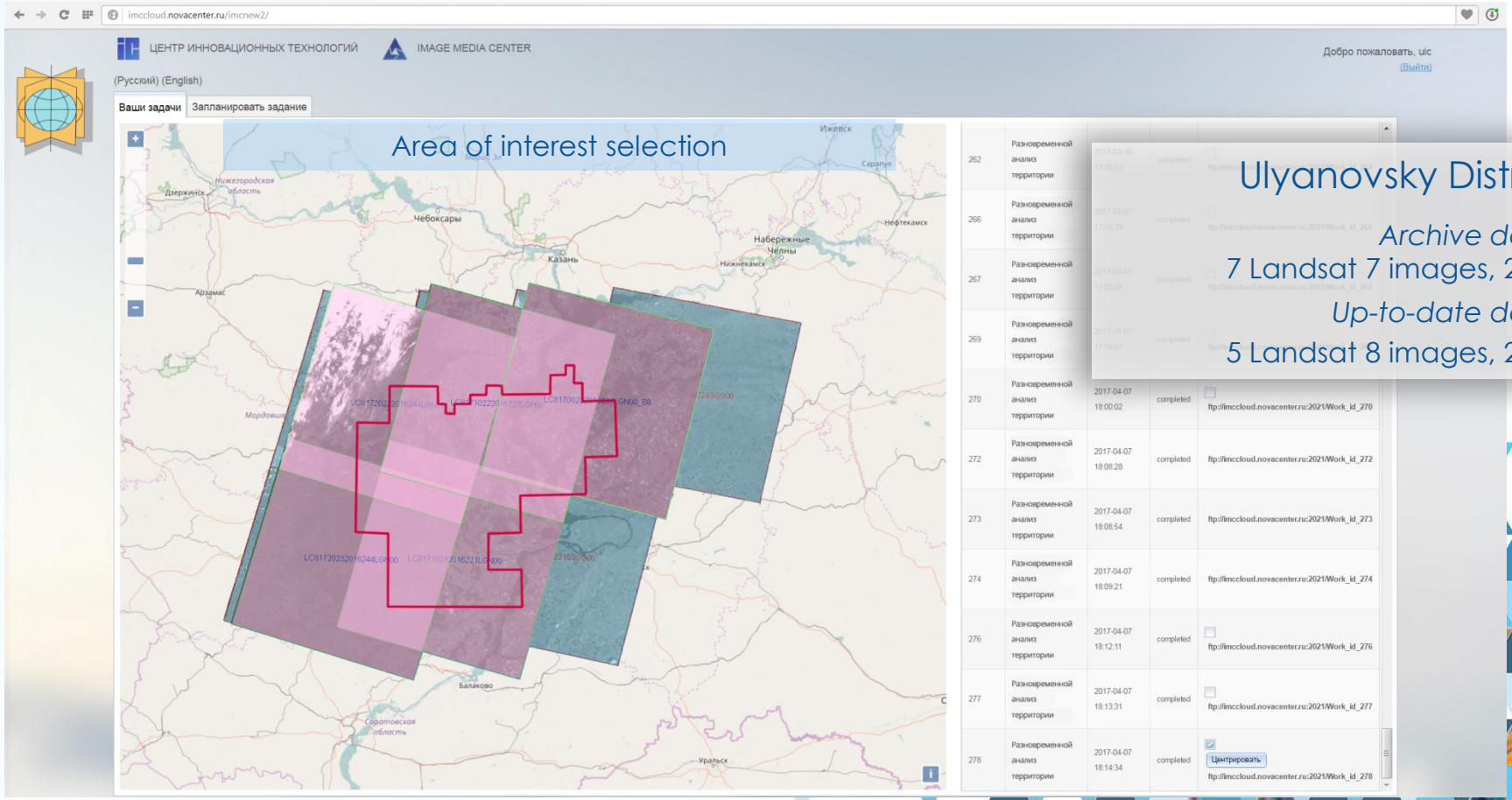
Vector data

Attribute information

Background map



Multi-temporal analysis cloud service

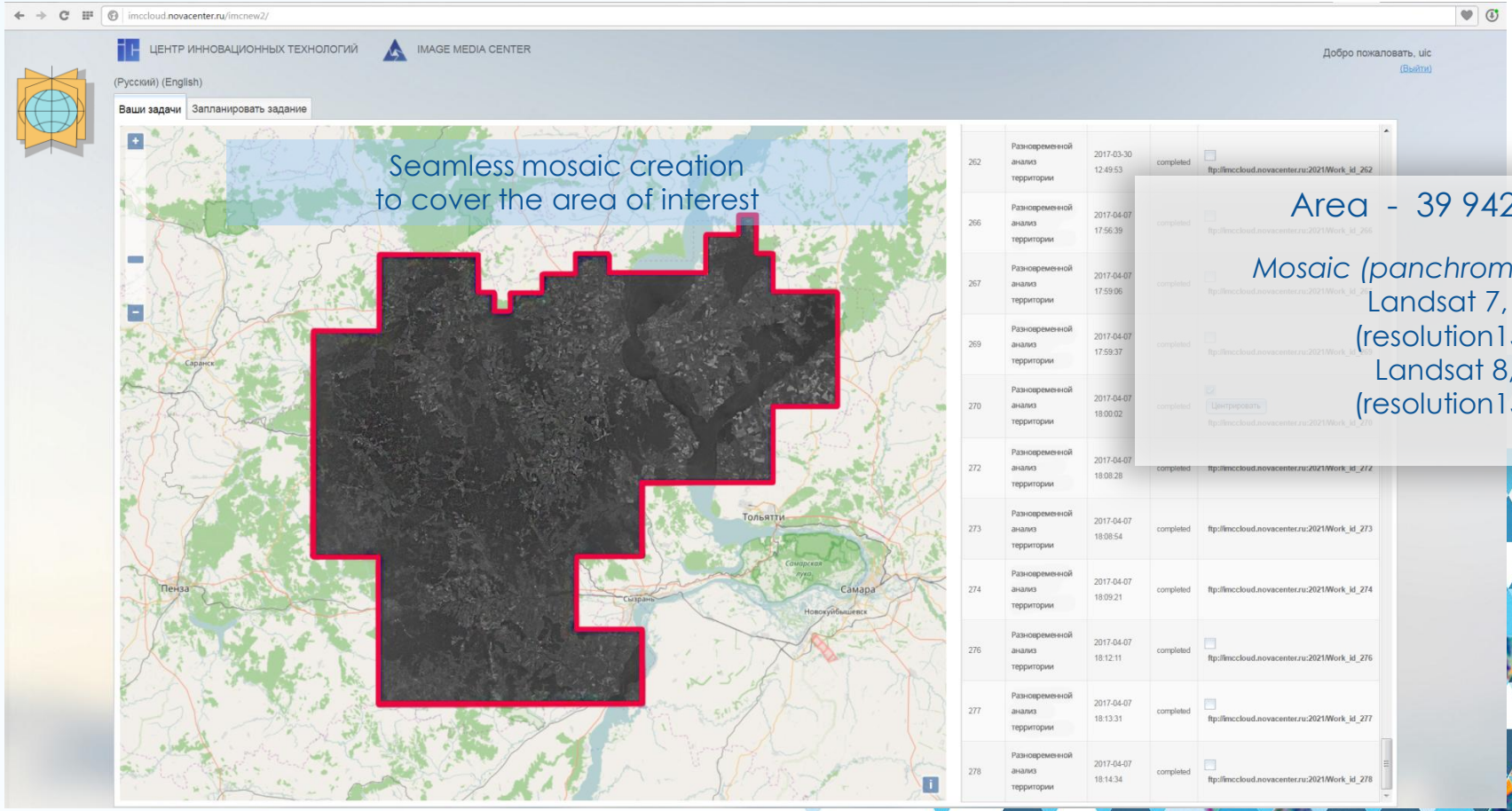


Ulyanovsky District

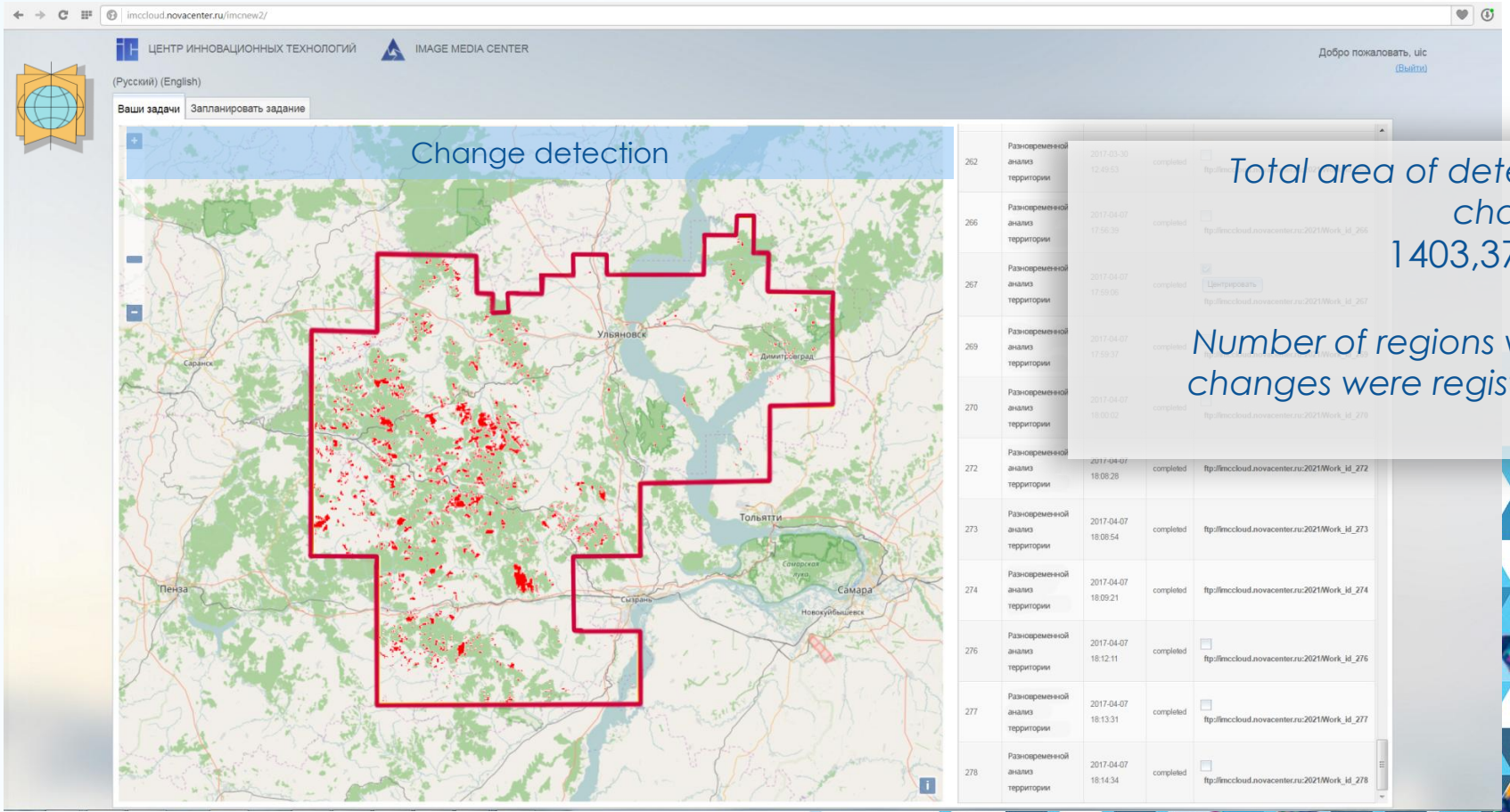
Archive data:
7 Landsat 7 images, 2002

Up-to-date data:
5 Landsat 8 images, 2016

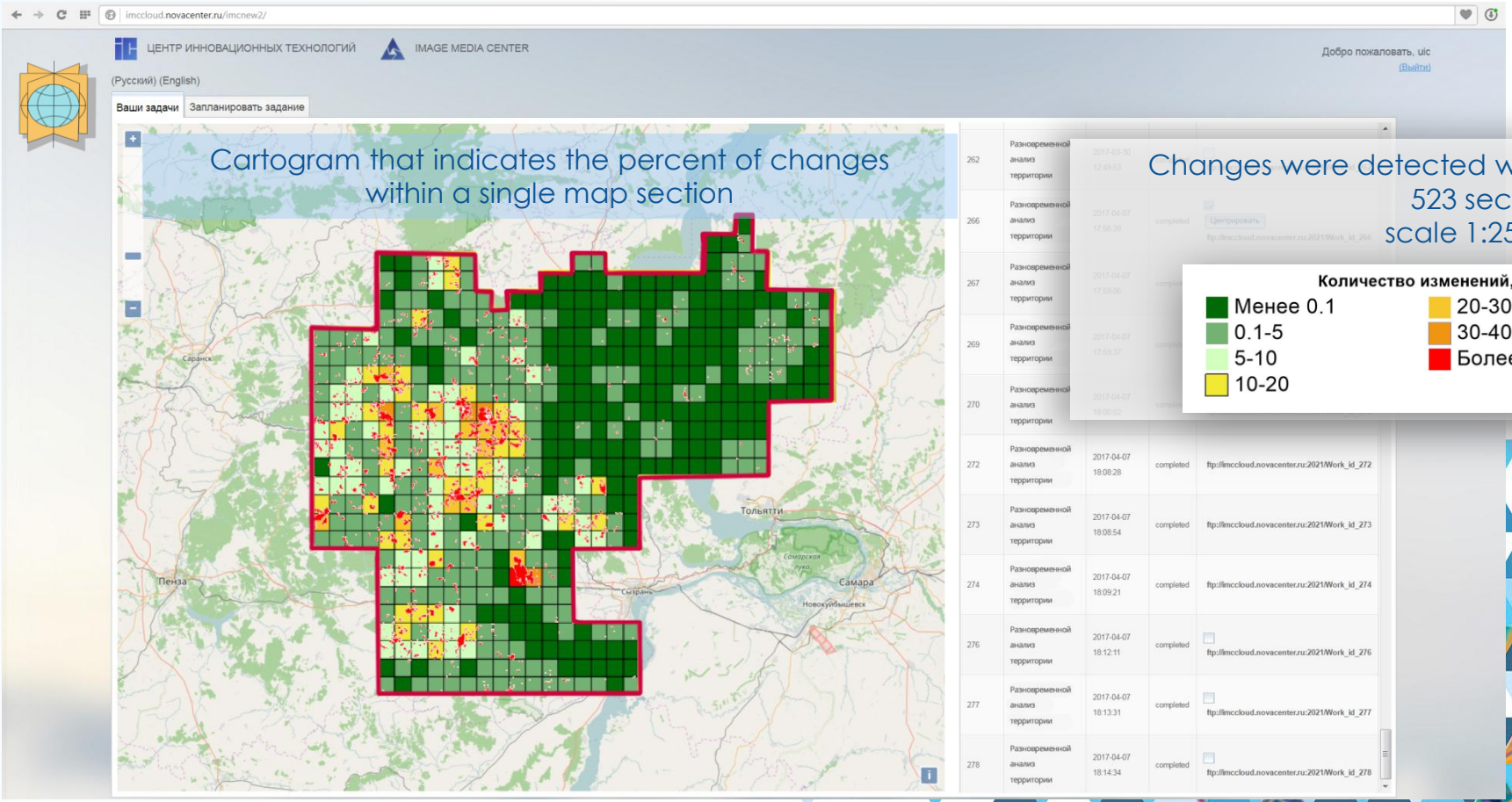
Multi-temporal analysis cloud service



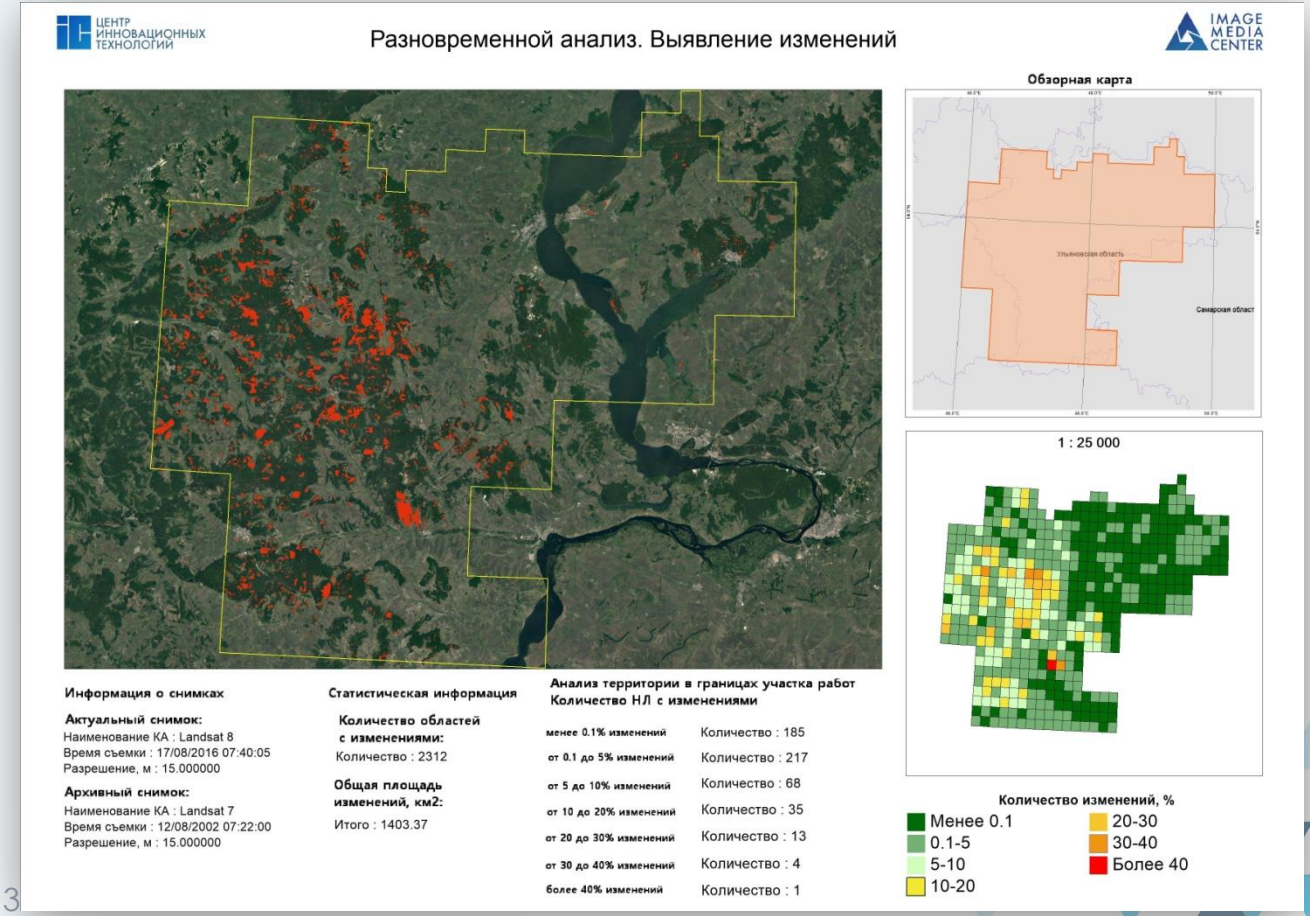
Multi-temporal analysis cloud service



Multi-temporal analysis cloud service



Change detection report



ЦЕНТР ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ

Разновременной анализ. Выявление изменений

IMAGE MEDIA CENTER

Обзорная карта

Ульяновская область

Самарская област

1 : 25 000

Количество изменений, %

Менее 0.1
0.1-5
5-10
10-20
20-30
30-40
Более 40

Информация о снимках

Актуальный снимок:
Наименование КА : Landsat 8
Время съемки : 17/08/2016 07:40:05
Разрешение, м : 15.000000

Архивный снимок:
Наименование КА : Landsat 7
Время съемки : 12/08/2002 07:22:00
Разрешение, м : 15.000000

Статистическая информация

Количество областей с изменениями:
Количество : 2312

Общая площадь изменений, км2:
Итого : 1403.37

Анализ территории в границах участка работ
Количество НЛ с изменениями

менее 0.1% изменений	Количество : 185
от 0.1 до 5% изменений	Количество : 217
от 5 до 10% изменений	Количество : 68
от 10 до 20% изменений	Количество : 35
от 20 до 30% изменений	Количество : 13
от 30 до 40% изменений	Количество : 4
более 40% изменений	Количество : 1

Report is generated **automatically** and contains following data:

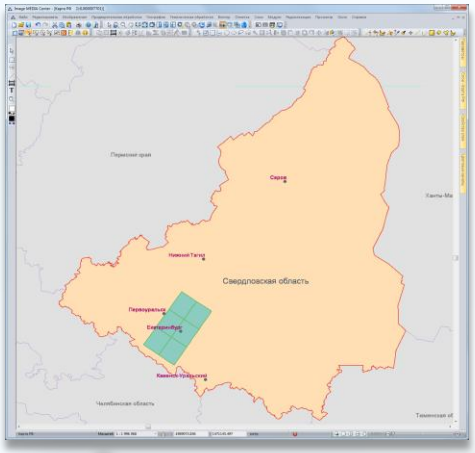
- ✓ raster image and vector layers
- ✓ area of interest location
- ✓ statistical data on detected changes(number, area)
- ✓ Information about map sections where changes were registered

Multi-temporal area analysis

Landsat 8
2016 Pansharpened image, 15 m.

Resurs-P
2014 Multispectral image, 4 m.

Area of interest selection



Manual work: 5 min per 1 km^2.

Processing type:
- -change detection;
- -change classification;
- -vectorizing the result.

Operator's work schedule:
40 hours per week, 1 month - 20 work days.

Total area:
194 800 km2.

Processing time:

16 233 hours,
2029 work days,
405,8 work weeks,
101,5 months,
8,5 years.

Total area:
7 200 km2.

Processing time:

600 hours,
75 work days,
15 work weeks,
3,75 months.

Area of interest automatic processing

Statistics

Overall area:
194 800 km2

Map segments number (scale1:25000): 2 771

Landsat 8 images number: 15

PC characteristics

Operating system:
Windows 7

OS type: 64-bit

Processor unit:
Intel Core Processor (Haswell) 3.4 GHz

RAM: 64 Gb

Drive type: SSD, 1 Tb – 4 pieces.

Processing time

20 min — Cloud mask creation

Seamless mosaic image creation

25 min — Panchromatic images

75 min — Pansharpened images

2 days — Change detection

ЦЕНТР ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ
INNOVATIVE CENTRE

IMCCloud WEB-service application for spatial data processing

IMAGE MEDIA CENTER

ЦЕНТР ИННОВАЦИОННЫХ ТЕХНОЛОГИЙ
INNOVATIVE CENTRE

IMAGE MEDIA CENTER

Thank you for attention

Innovative Centre
129329, Russian Federation, Moscow, Vereskovaya st., 10
Phone/Fax: +7 (499) 189-61-66
E-mail: contact@novacenter.ru
Website: www.novacenter.ru