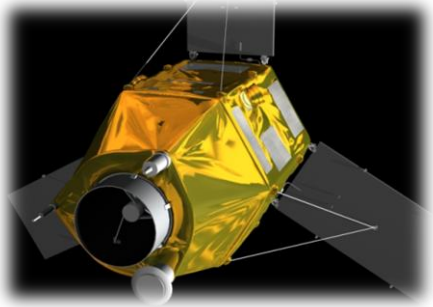
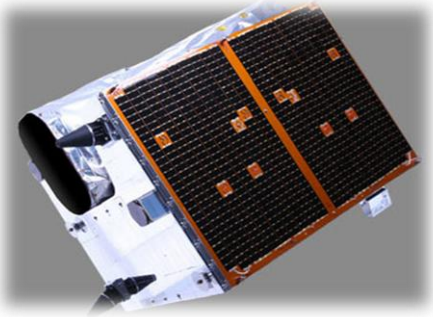
JOINT STOCK COMPANY
«National company«**KAZAKHSTAN GHARYSH SAPARY»**

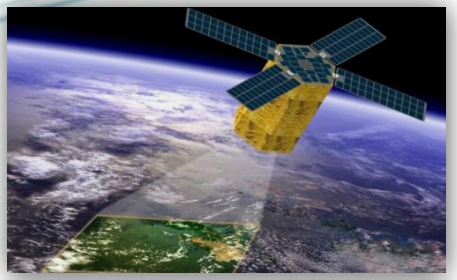
THE RESULTS OF SPACE TECHNOLOGIES USAGE IN AGRICULTURE RESOURSES MANAGEMENT OF THE REPUBLIC OF KAZAKHSTAN

K. Baktybekov, G. Kabzhanova, A. Aimbetov, G. Kabdulova, B. Rahizhanov, A. Zelenovskiy

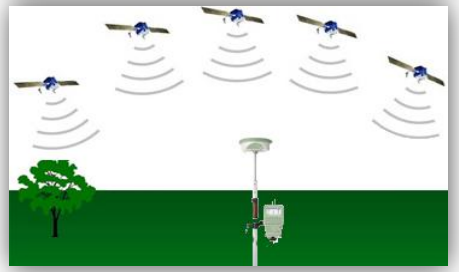




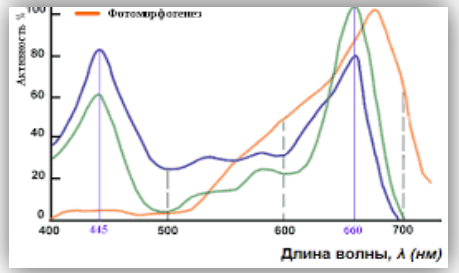
Applied technologies in space monitoring of agricultural resources



Space system of Remote sensing and others satellite systems



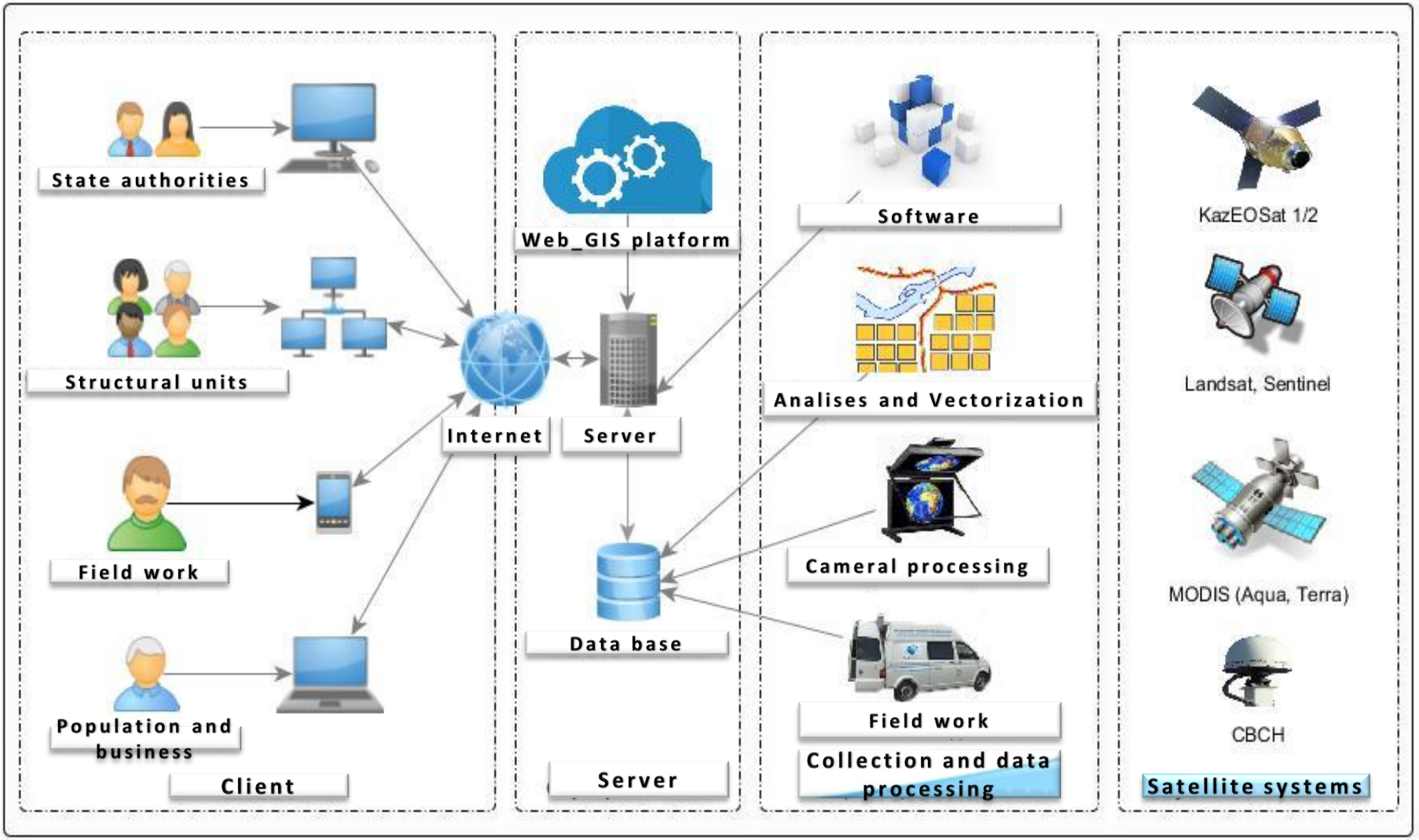
The system of high-precision satellite navigation of the Republic of Kazakhstan



Analysis and prediction methods based on remote sensing data

Modern geoinformation technologies

Principle scheme of services rendering by National operator



RBP 010 «Space infrastructure using safeguarding and expanding» subroutine 102 «Services for the provision of space images to government agencies and organizations, obtained from the Earth's remote sensing satellite system» for Agricultural Ministry

Agriculture Department

- Cultivated areas assessment;
- Crop condition assessment;
- Grain crop yields satellite forecast ;
- the harvesting pace monitoring;

Animal breeding

- Pasture lands monitoring;
- Pasture lands productivity assessment;

Forestry and Wildlife Committee

- Satellite assessment State Forest Foundation KR;
- Forest fire monitoring;
- Deforestation development assessment;
- Wild ungulates fodder assessment;
- Fish farming mapping;
- The Caspian sea oil pollution monitoring;

Water resources Committee

- River systems monitoring;
- Lakes and large reservoirs monitoring;
- Water facilities monitoring;
- Hydraulic constructions level of safety assessment;
- Irrigation territories monitoring;

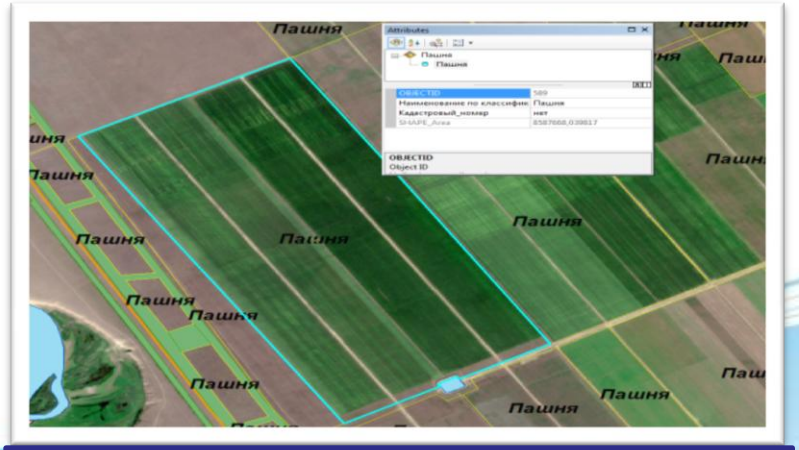
Trans-border rivers Department

- Formation of additional water tanks in the territory of neighboring states detection;
- Irrigation areas assessment of river basins on the territory of neighboring countries.

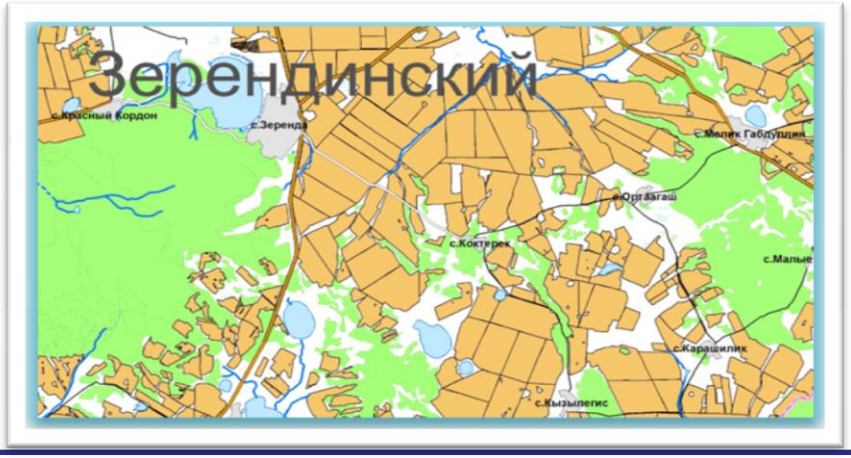
Agriculture lands space monitoring

Agriculture lands accounting

KazEOSat-2 ERS datas analysis
from May till September 2018 year



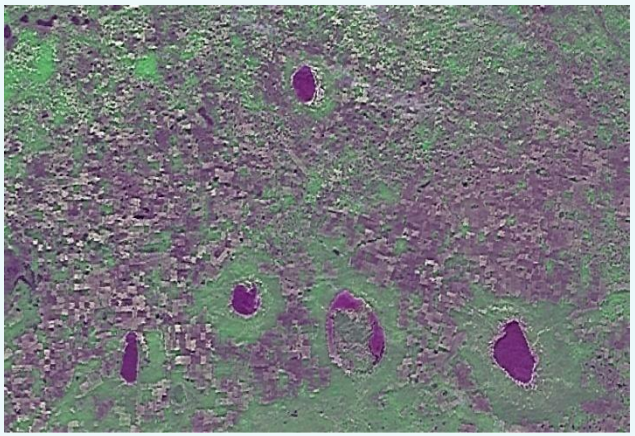
Agriculture land structure
based on the ERS datas



Actual agriculture lands map
based on KazEOSat-2 ERS datas

Agricultural production space monitoring

- crop acreage assessment based on actual remote sensing data;
- rapid monitoring of the timing of agrotechnological operations (sowing, harvesting);
- the state and degree contamination of crops assessment;
- yields of grain crops prediction.



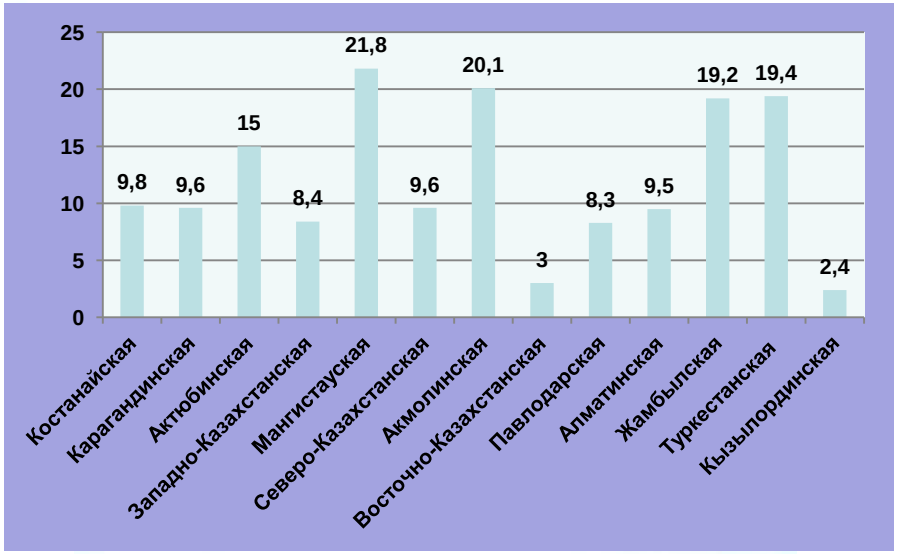
Daily images from MODIS (250 m) sensor

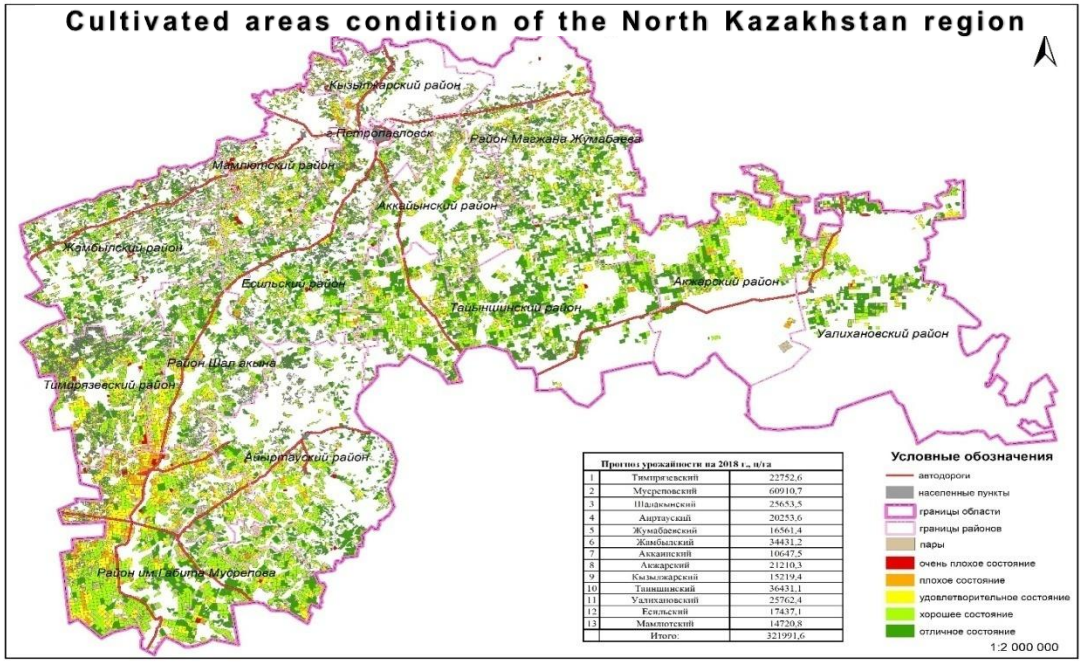
Landsat 7,8 (30m) images

KazEOSat-2 (6,5 m) images

Agriculture crops condition satellite assessment

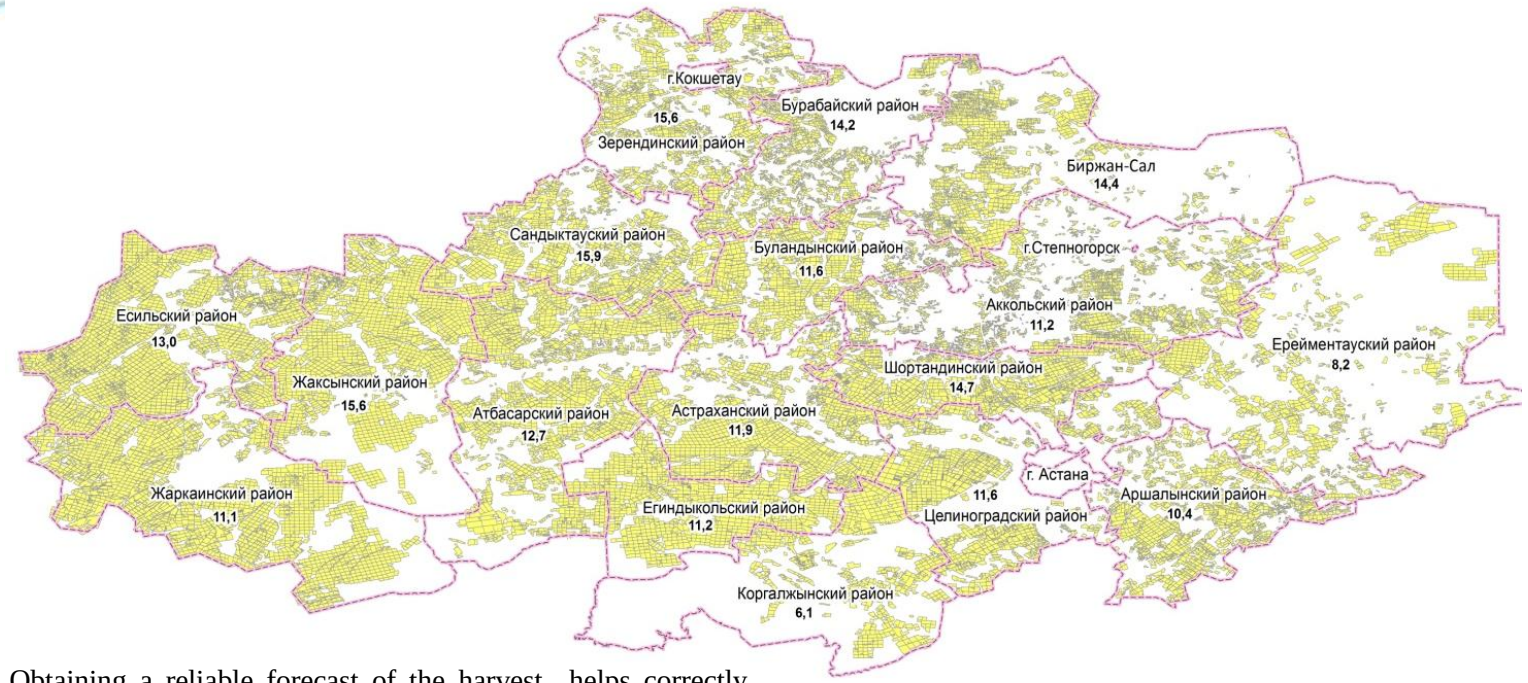
Due to 2018 remote sensing data of stream areas assessment





Satellite Assessment of the State of Spring Crops in the North Kazakhstan Region

Yield of cereal crops forecast based on the regression model



Obtaining a reliable forecast of the harvest helps correctly solve the problems:

- ✓ reserve food funds formation,
- ✓ availability of necessary capacities for storage of the obtained crop presence,
- ✓ an adequate and effective foreign trade policy construction.

Indexes of vegetation

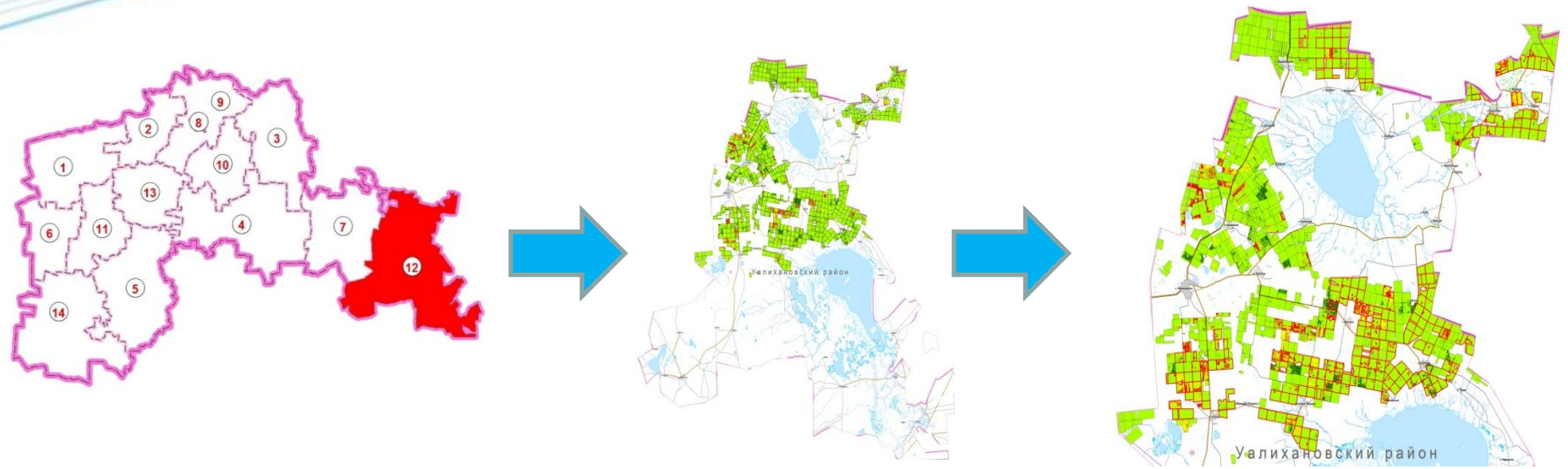
1. NDVI (Normalized Difference Vegetation Index)
2. VHI (Vegetation Health Index)
3. TCI (Temperature Condition Index)

Productivity formation factors

Farming culture level

Meteorological factors

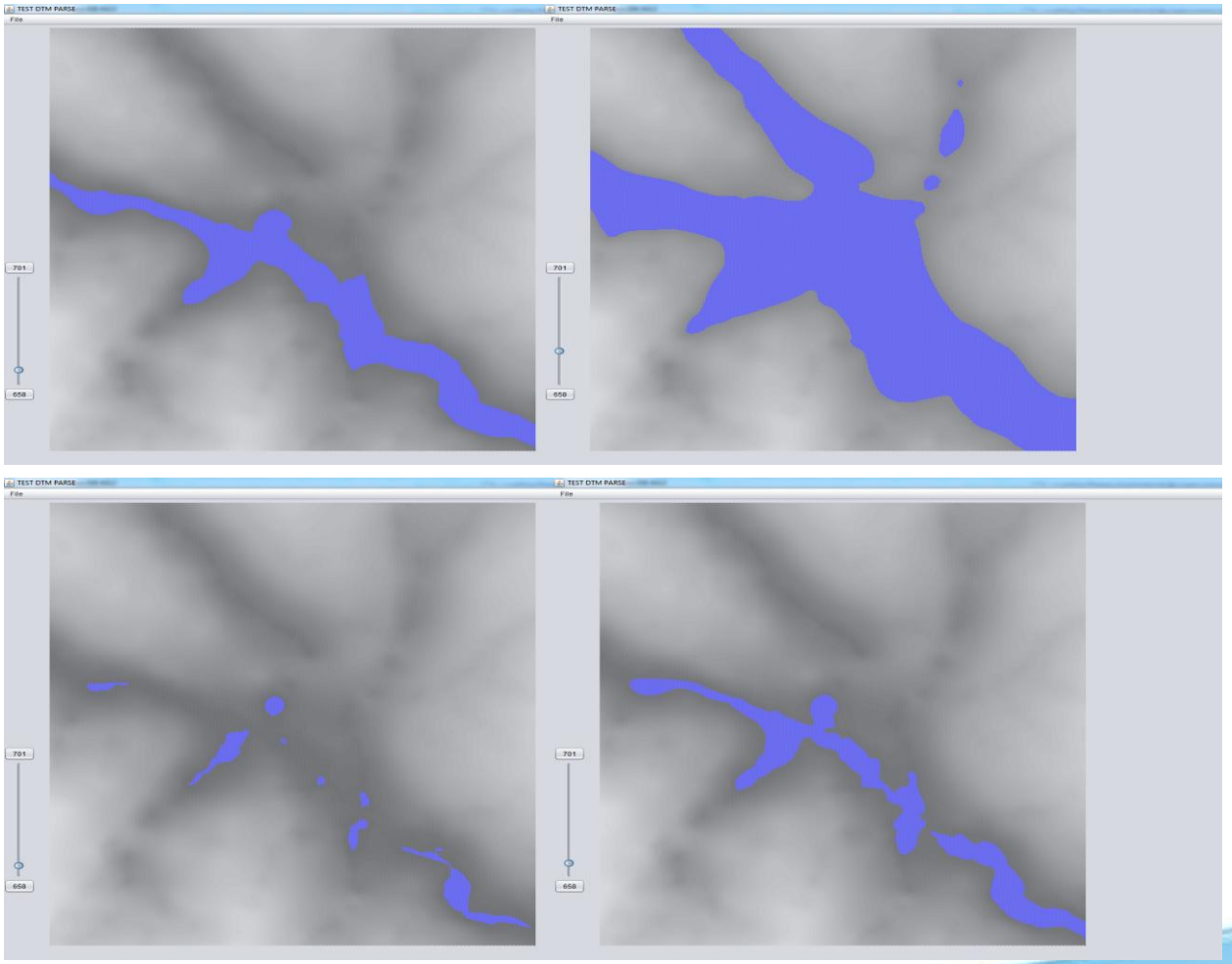
The Republic of Kazakhstan plant growing monitoring



North Kazakhstan region **Ualihanovskiy district** **LLP AF «Kyzyltu –NAN»**

- Digital map of the Republic of Kazakhstan agricultural ground has been created;
- When integrating with AIS State Land Cadastre data, it is possible to obtain information for each field, for each farm;
- The principles of exact farming (heterogeneity of fields) are used;
- There are used datas from KazEOSat – 1,2 native satellite to digitalize agriculture lands;
- Agrotechnological operations monitoring with updating data in geoportal every 3-5 days (sowing, harvesting).

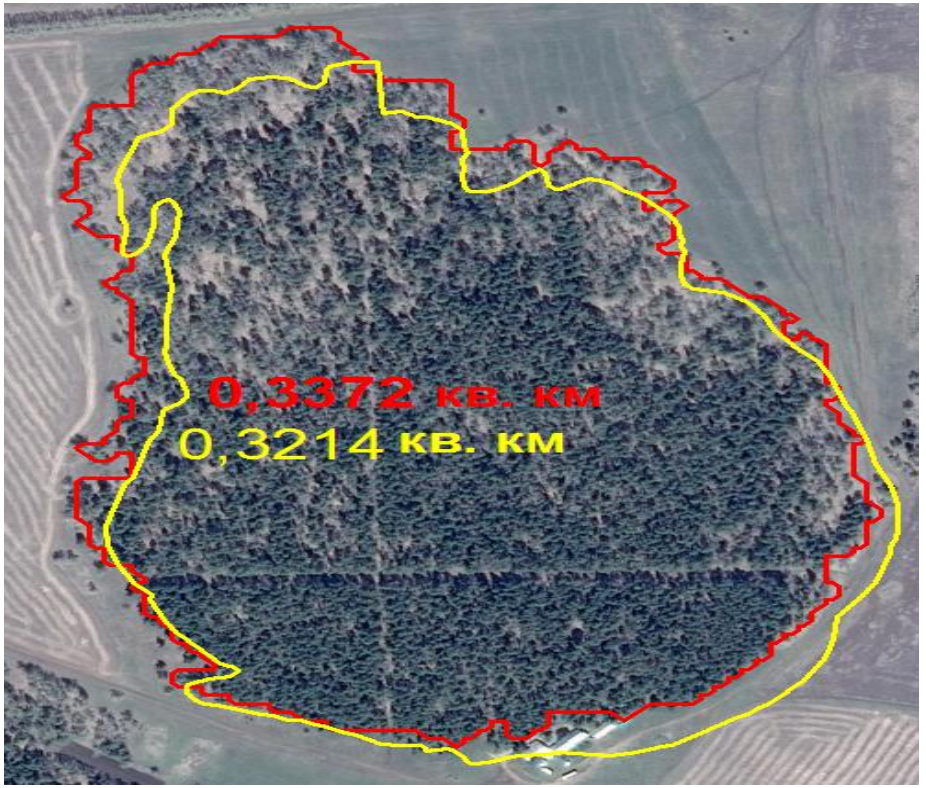
Precision farming system elements intercalation



Precision farming system should consider heterogeneity of sowing areas, including relief difference. Digital models of relief are used to determine relief heterogeneity gained by field shooting or optic and radar shooting

Software console Open GL

The Republic of Kazakhstan territory forest resources monitoring

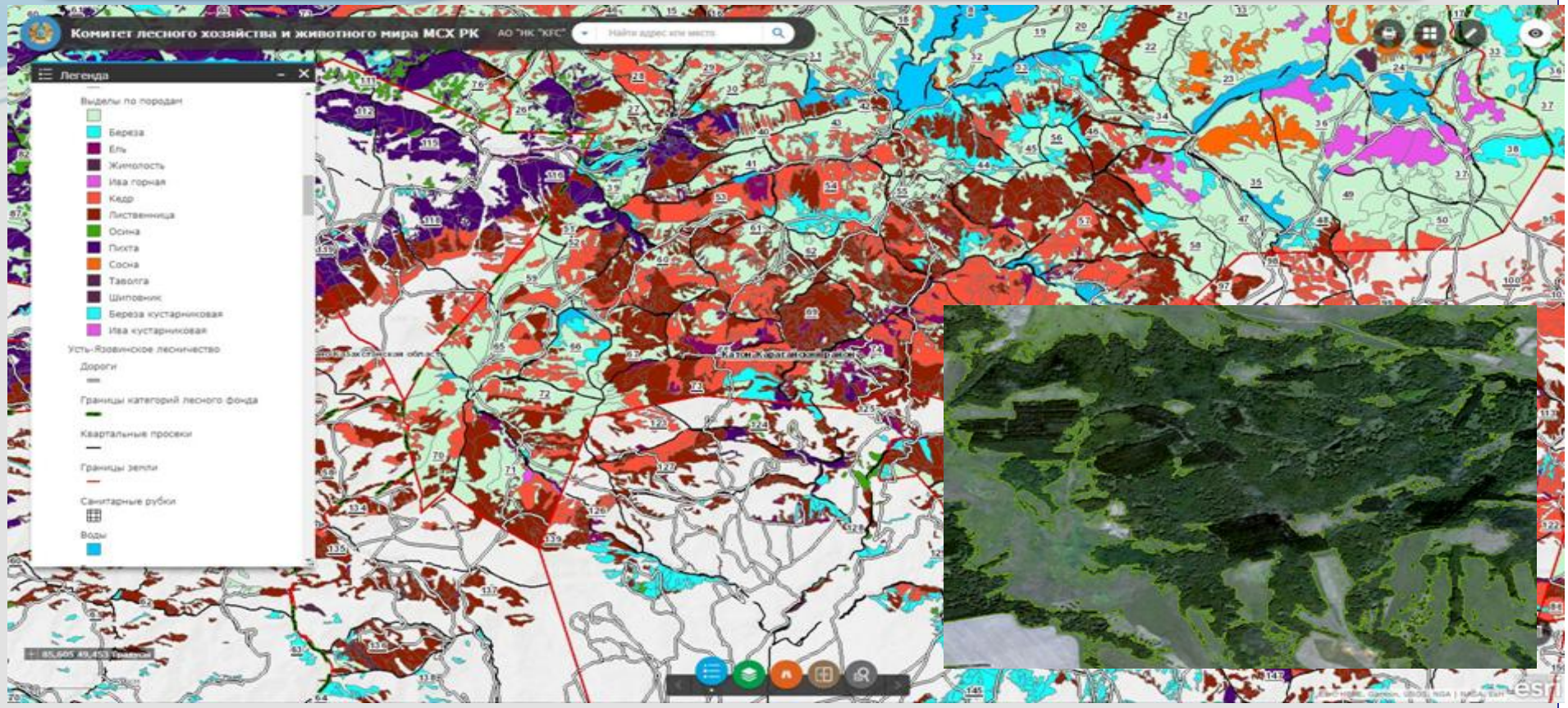


Forest boundaries

According to the ERS datas of Forestry and Wildlife Committee

- Digital map of state forest foundation (SFF) of the RK;
- Integration with RSUC «Kazakh forest company», forestry datas;
- Kazakhstan forest fire daily monitoring;
- Datas of KazEOSat-1,2 native satellites and foreign images are used to digitalize and mapping state forest found;

The Republic of Kazakhstan territory forest resources monitoring

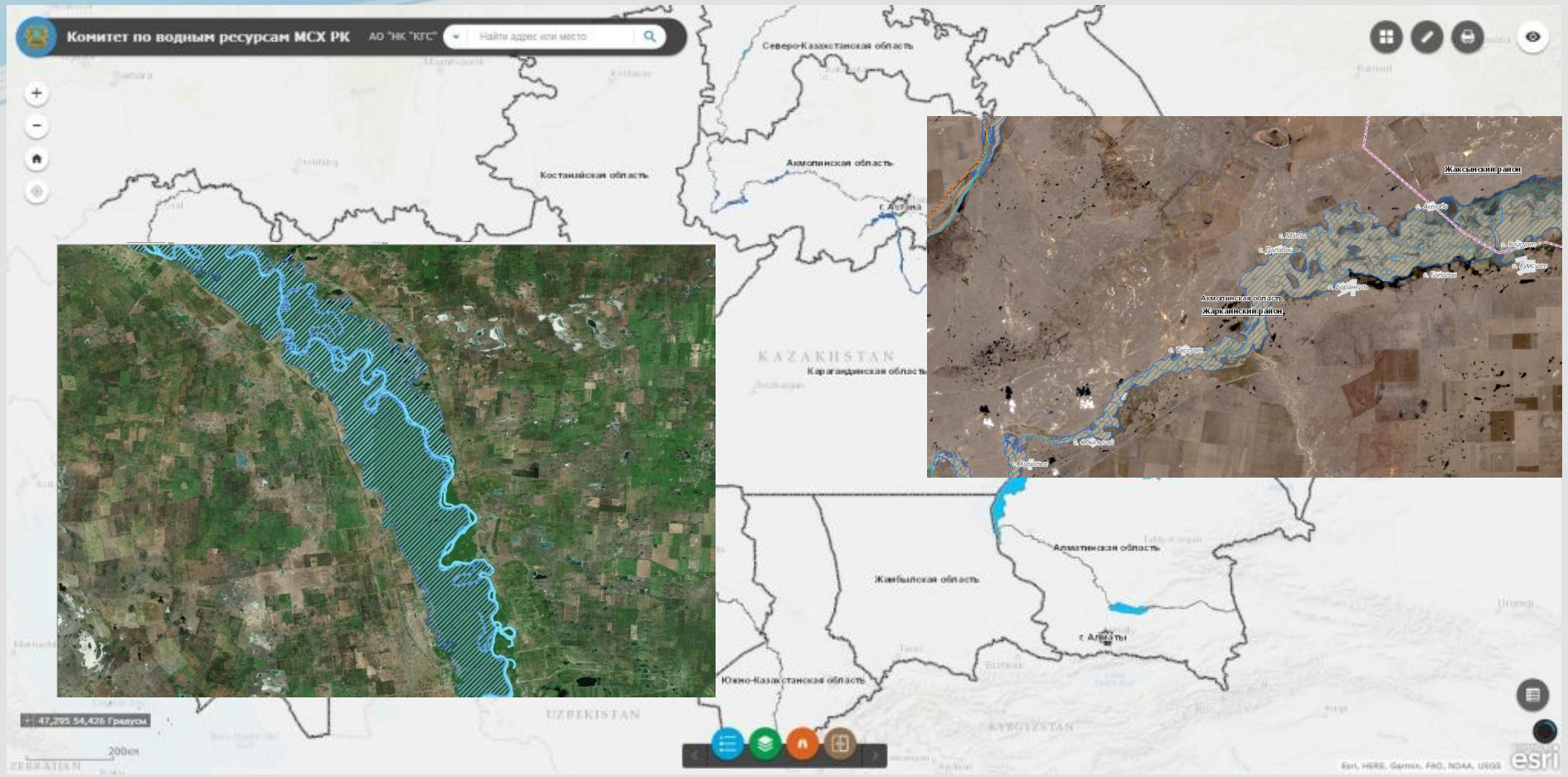


• Databases for 226 forest areas have been created in the Akmola, Almaty, Aktyubinsk, East Kazakhstan, Karaganda and Zhambyl regions of the Republic of Kazakhstan, according to the Committee of Forestry and Wildlife MA data ;

• Digital vector layers of forests have been created on the territory of Akmola and Karaganda, and in the process of completing processing there are 8 regions (Atyrau, Almaty, Aktyubinsk, East Kazakhstan region, Pavlodar, Kostanay, Zhambyl regions of the Republic of Kazakhstan);

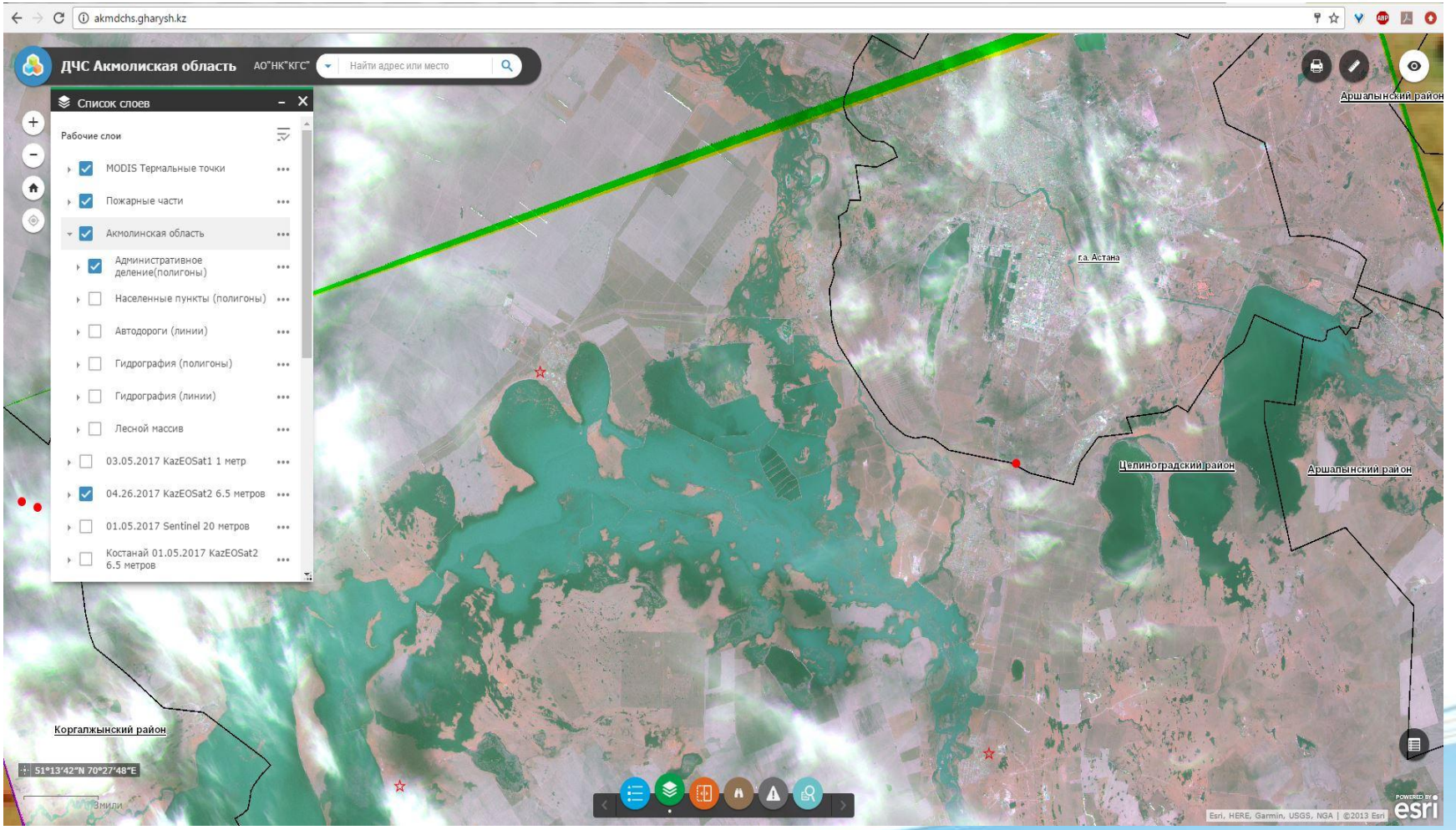
• Fire centers, burnt out territories, fire hazard forecasting maps-schemes are displayed daily on the geoportal .

The Republic of Kazakhstan water resources monitoring



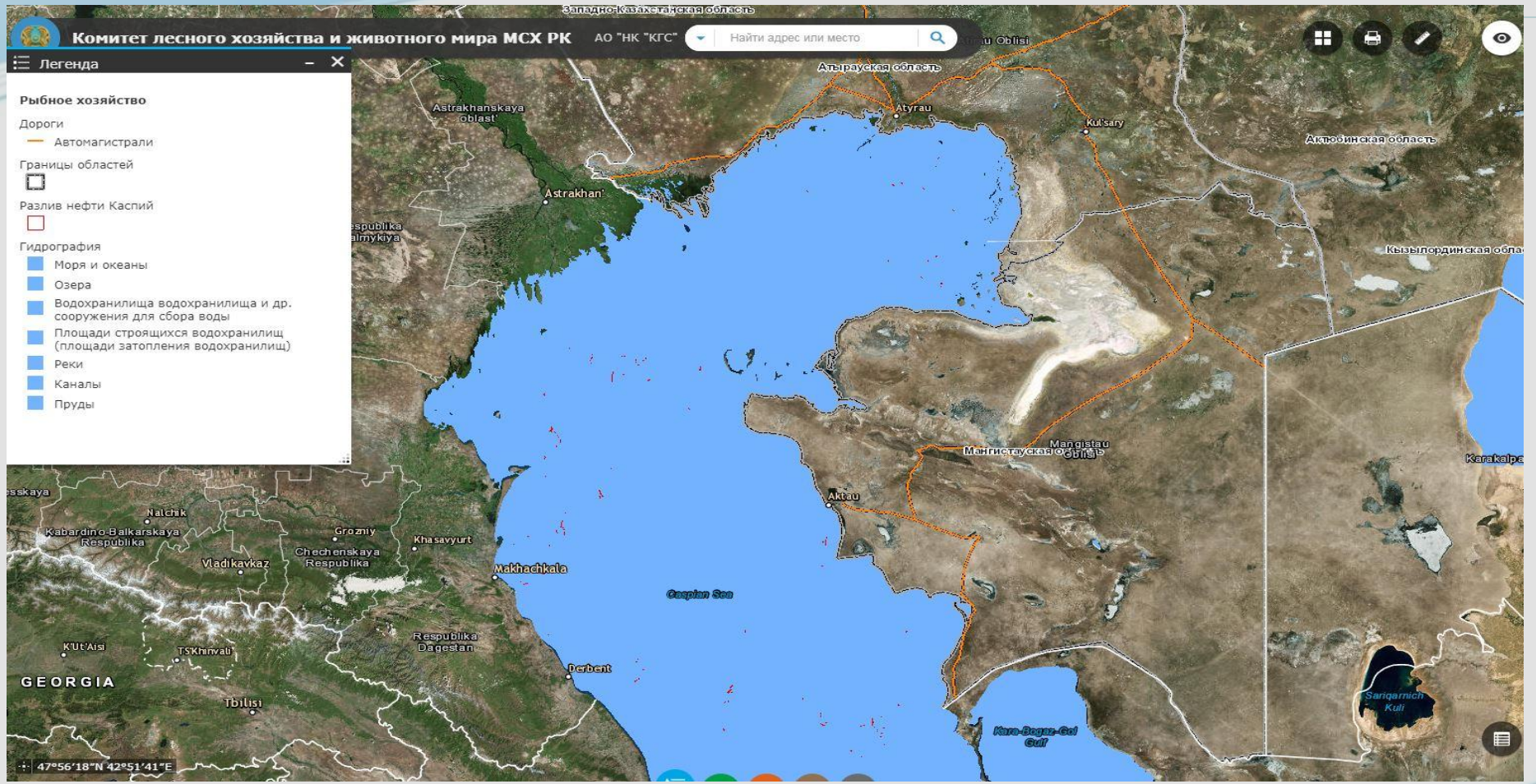
- There were created digital vector maps of river beds.
- A satellite assessment of the flood situation was done along the riverbeds on the territory.
- A hydrographic network inventory was carried out according to the current ERS data.

The Republic of Kazakhstan water resources monitoring



Flood situation along the riverbeds satellite assessment based on the remote sensing data

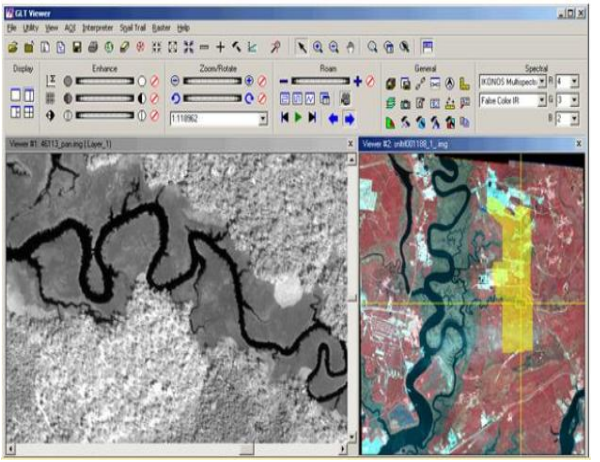
Caspian sea oil pollution monitoring of Kazakhstan territories

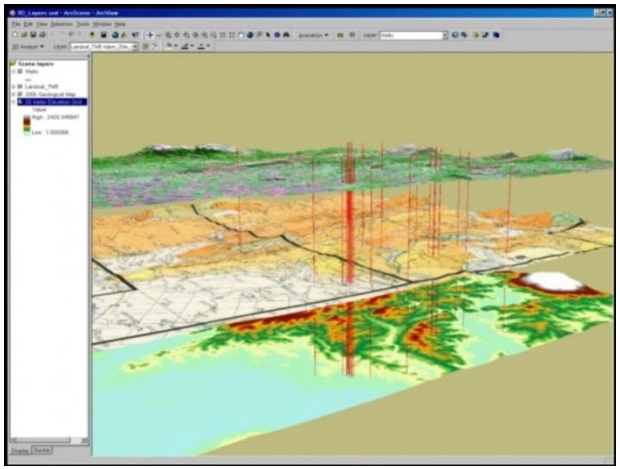


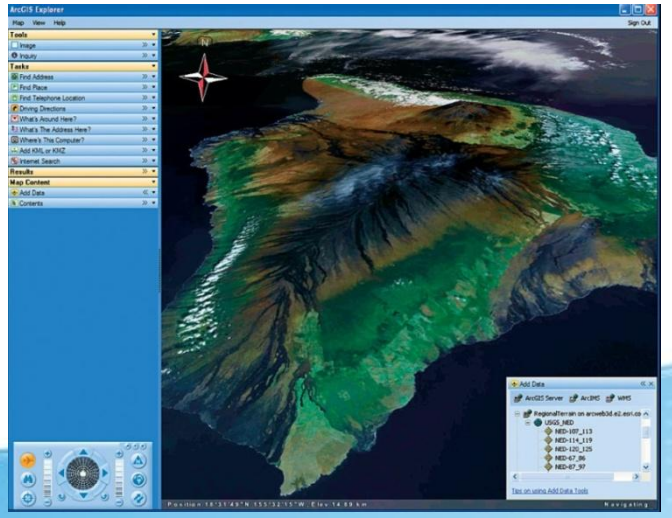
Sentinel - 1 A / B radar data is used to determine the locations and boundaries of oil pollution in the water area of the Kazakhstan sector of the Caspian Sea

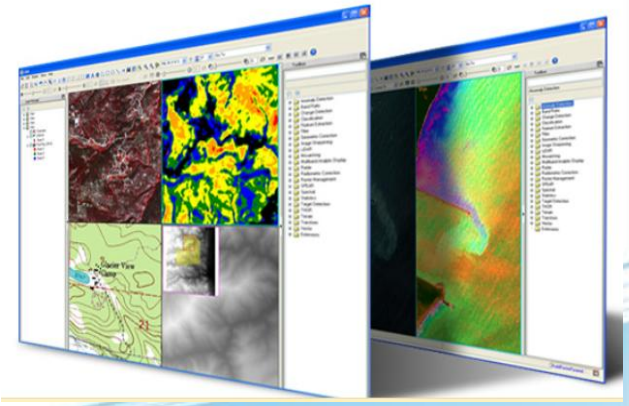
Advantages of JSC «NC«KAZAKHSTAN GHARYSH SAPARY»

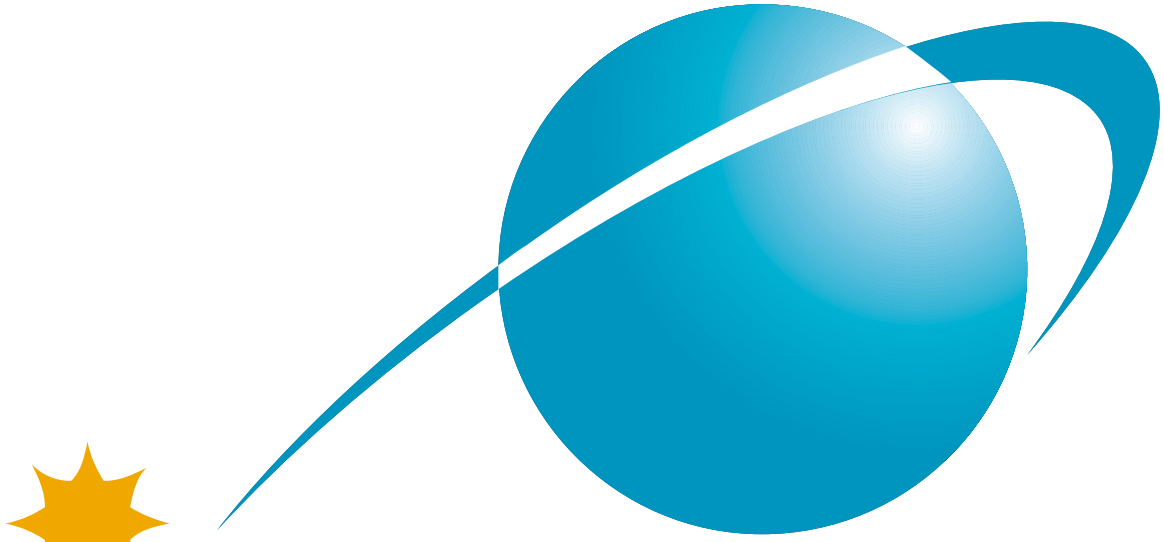
1. National operator of space systems in the Rebublic of Kazakhstan (Space systems of remote sensing RK and the High-Precision Satellite Navigation System of the Republic of Kazakhstan);
2. Availability of highly qualified specialists in receiving and processing remote sensing data;
3. Using the latest technologies, methods and specialized software;
4. Space images reception from Kazakhstan satellites and full cycle of processing.











ҚАЗАҚСТАН

ҒАРЫШ САПАРЫ

THANK YOU FOR ATTENTION!

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