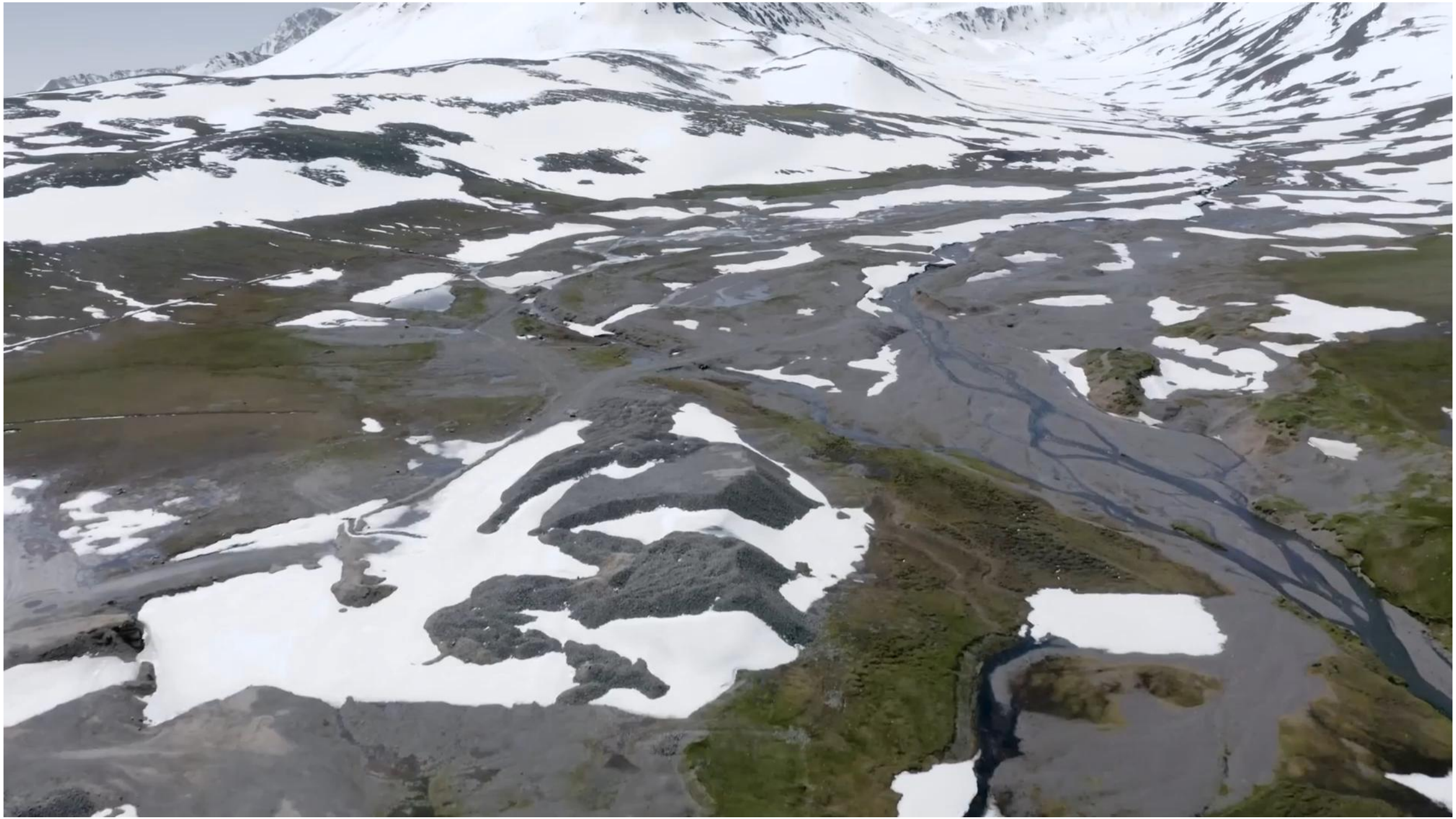
COUNTRY REPORT: MONITORING AND FORECASTING OF DANGEROUS NATURAL PROCESSES IN THE KYRGYZ REPUBLIC

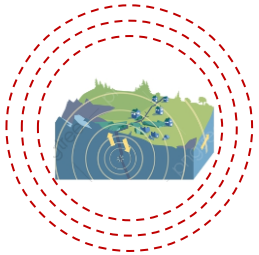
TWENTY-NINTH SESSION OF THE INTERGOVERNMENTAL CONSULTATIVE COMMITTEE ON THE REGIONAL SPACE APPLICATIONS PROGRAMME FOR SUSTAINABLE DEVELOPMENT (ICC-29)

2 to 4 September 2025
Seoul, Republic of Korea



UNIFIED SYSTEM FOR INTEGRATED MONITORING AND FORECASTING OF EMERGENCY SITUATIONS (USIMF ES)

SOURCES OF EMERGENCIES



MONITORING STATIONS



STATUS PARAMETERS:

- seismic activity;
- water level;
- air temperature;
- snow accumulation;
- soil freezing;
- soil moisture;
- precipitation;
- topography;
- snow/glacier boundaries

FUNCTIONAL AND SECTORAL MONITORING BODIES AND SERVICES

1. Institutes of the National Academy of Sciences of the Kyrgyz Republic:

- Institute of Seismology (earthquakes);
- Research Center "Geopribor"
- Institute of Geomechanics and Subsoil Development (landslides);
- Institute of Water Problems and Hydropower Engineering (flooding);
- Institute of Geology (landslide processes).

2. Ministries and agencies

- Ministry of Energy and Industry of the Kyrgyz Republic;
- State Water Resources Agency under the Ministry of Agriculture and Water Resources of the Kyrgyz Republic;
- Hydrometeorological Service;
- OJSC KyrgyzGIIZ (engineering and geological research);
- Central Asian Institute of Applied Earth Research;
- National Statistics Committee of the Kyrgyz Republic;
- Automated information and management system (CMC under the MES KR)
- Structural subdivisions of the MES etc.

MINISTRY OF EMERGENCY SITUATIONS KYRGYZ REPUBLIC

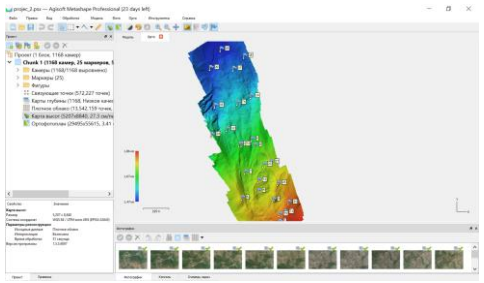
Organization of functioning and coordination

DEPARTMENT FOR MONITORING AND FORECASTING OF EMERGENCY SITUATIONS

Functions and tasks in the USIMF ES:

- Monitoring sources of emergency situations;
- Collection, processing and analysis of data on sources of emergency situations;
- Development of forecast materials;
- Creation and development of a unified data bank on sources of emergency situations;
- Organization of information interaction within the framework of the Unified System of Integrated Monitoring and Forecasting of Emergency Situations.









Presentation of forecast materials

SITUATION CENTER OF THE PRESIDENTIAL ADMINISTRATION OF THE KYRGYZ REPUBLIC



CRISIS MANAGEMENT CENTER UNDER THE MES KR



TO MINISTRIES, DEPARTMENTS AND LOCAL SELF-GOVERNMENT BODIES

CONSEQUENCES OF MUDFLOWS IN KYRGYZSTAN





Consequences of sediment-laden stormflow in the upper part of Temir village, 18 August 2024. Damaged houses during the event







TECHNOLOGY AT THE HEART OF THE MONITORING SYSTEM



REMOTE SENSING

Using data from various satellites and sensors to collect detailed information on natural hazards



GEO-REFERENCED IMAGES OF THE AREA;

Analysis of highly detailed aerial land imagery allows changes to be monitored.



ARTIFICIAL INTELLIGENCE ALGORITHMS

The ability of artificial intelligence to process vast amounts of data and identify patterns is key to predicting hazardous processes



CLIMATE MODELS

Help consider the impact of climate change on the risk of natural hazards

IT-MODULE WITH ALGORITHMS FOR MONITORING AND FORECASTING OF HIGH-ALTITUDE LAKE OUTBURSTS

Innovation:

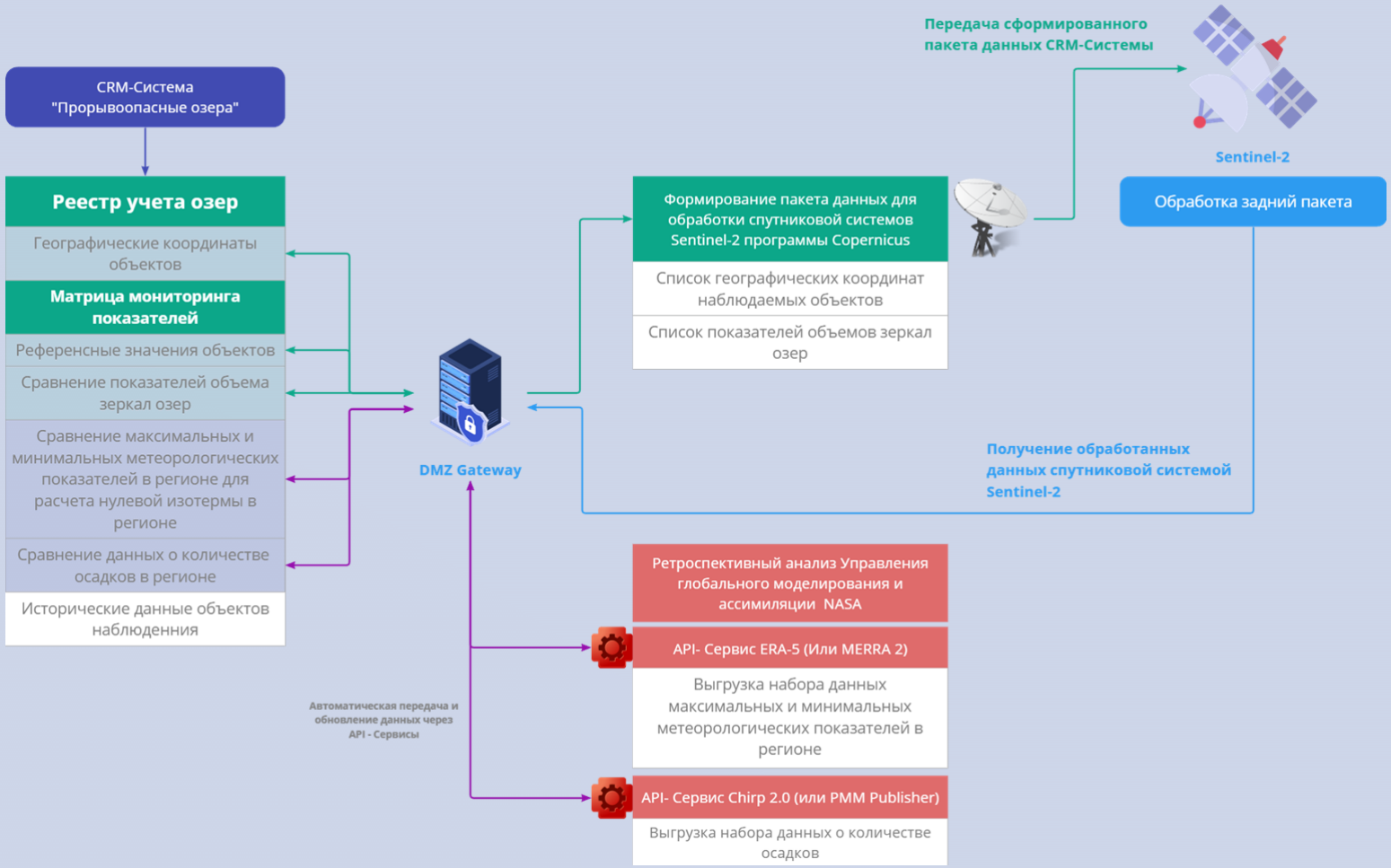
Algorithms: The system uses proprietary algorithms based on machine learning to automatically calculate the lake's mirror area, define its boundaries and identify potential breach threats.

Multi-parameter analysis: The system takes into account a wide range of parameters such as anomalous temperature, maximum temperature, solid precipitation, liquid precipitation, humidity and temperature gradient for a comprehensive risk assessment.

Prediction: The system can predict the probability of a lake outburst by setting reference values for each lake separately.

Alerting: The system automatically alerts specialists when multiple reference values are exceeded.

SYSTEM CONCEPTUAL FRAMEWORK



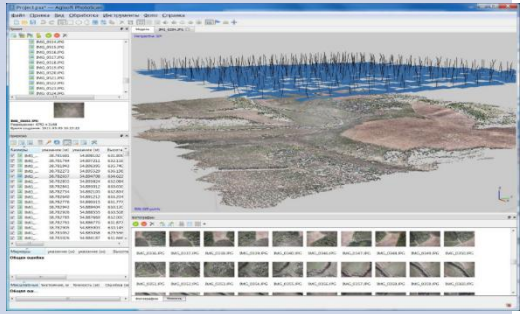
Takyr-Tor lake in June 2025

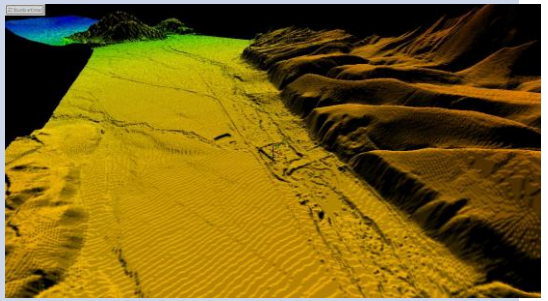


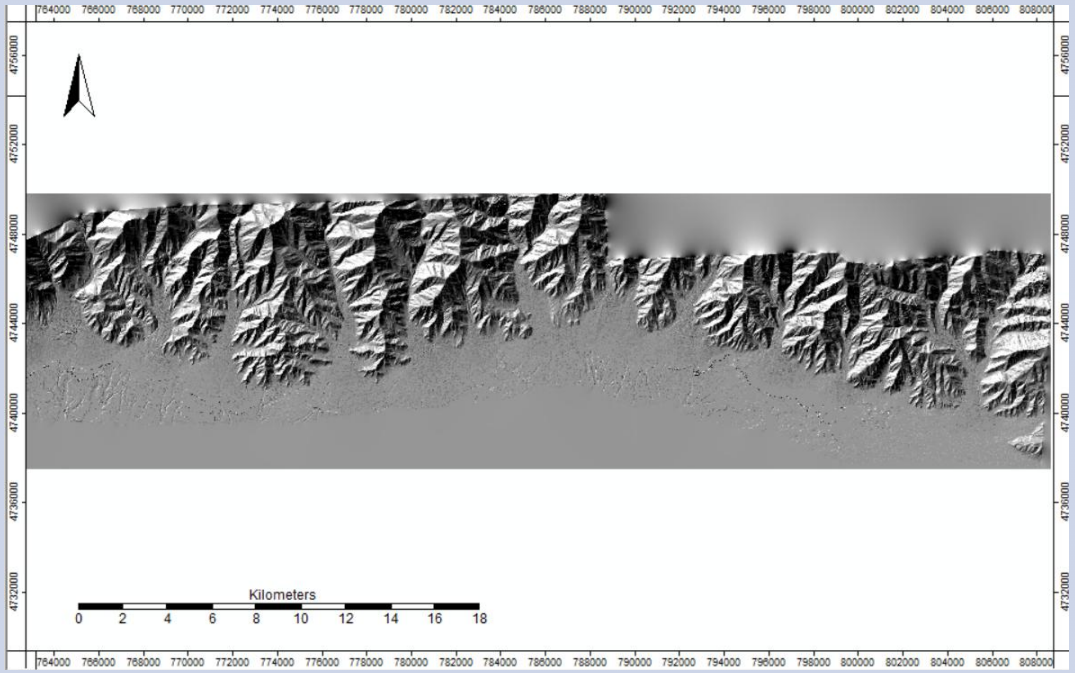
USE OF TOOLS AND EQUIPMENT TO INVESTIGATE HAZARDOUS AREAS

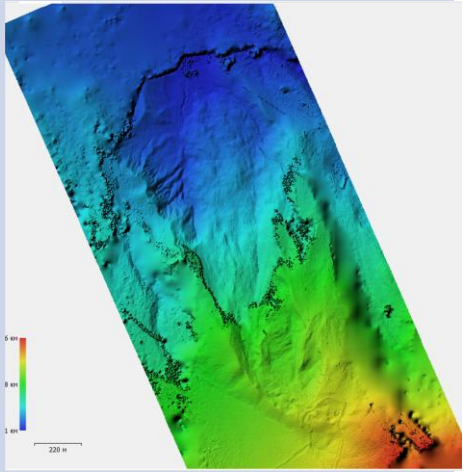




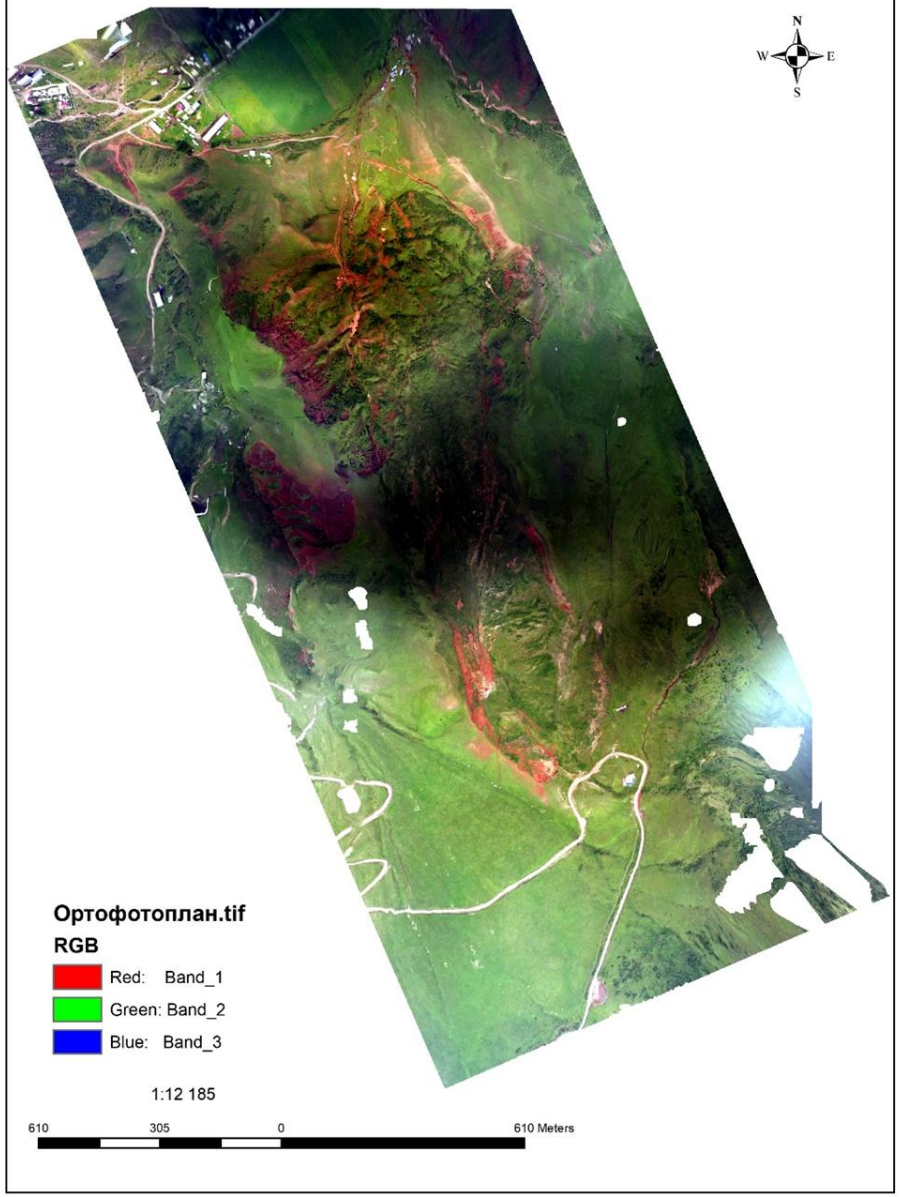








Orthophotomap of the Tatyr site, Chunkurchak landslide 2019



Operational and instrumental observation methods:

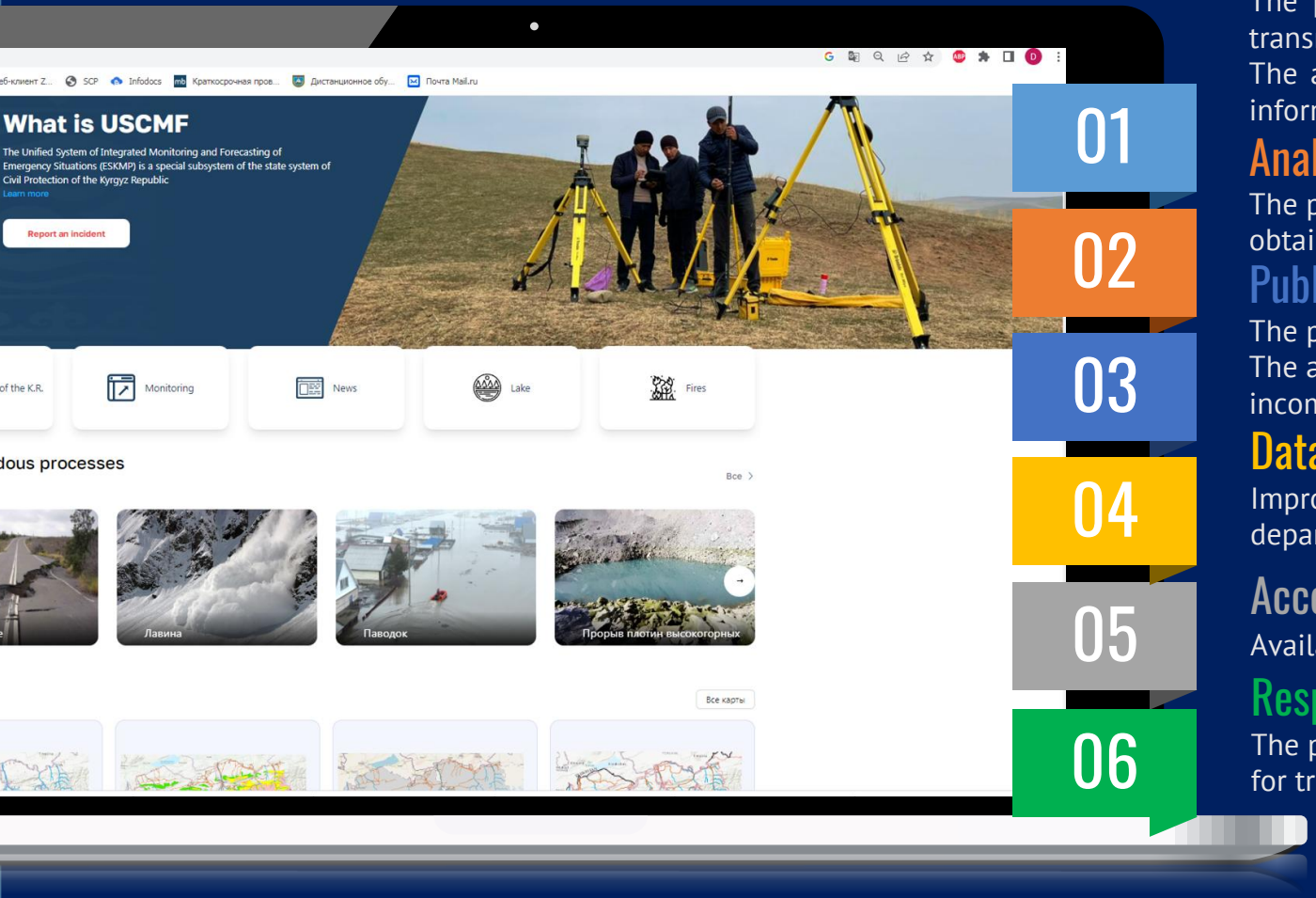


Modeling of the flood hazard for the Ala-Archa River



USIMF ES Web Portal

To provide information on hazards



01

Map service

The possibility of improvement and rapid response due to information maps for transmitting information to the Critical situation management center;
The ability to create information maps, as well as dashboards based on incoming information and their publication in the form of graphs

02

Analysing climate data

The possibility of taking into account climatic parameters due to the possibility of obtaining information from weather stations and hydro posts built into the system

03

Publication of reports

The possibility of publishing forecast materials;
The ability to create information maps, as well as dashboards based on incoming information and their publication in the form of graphs;

04

Data exchange

Improved system of information interaction with other organizations and departments with the exception of duplication of monitoring work

05

Accessibility

Availability of spatial information from other departments

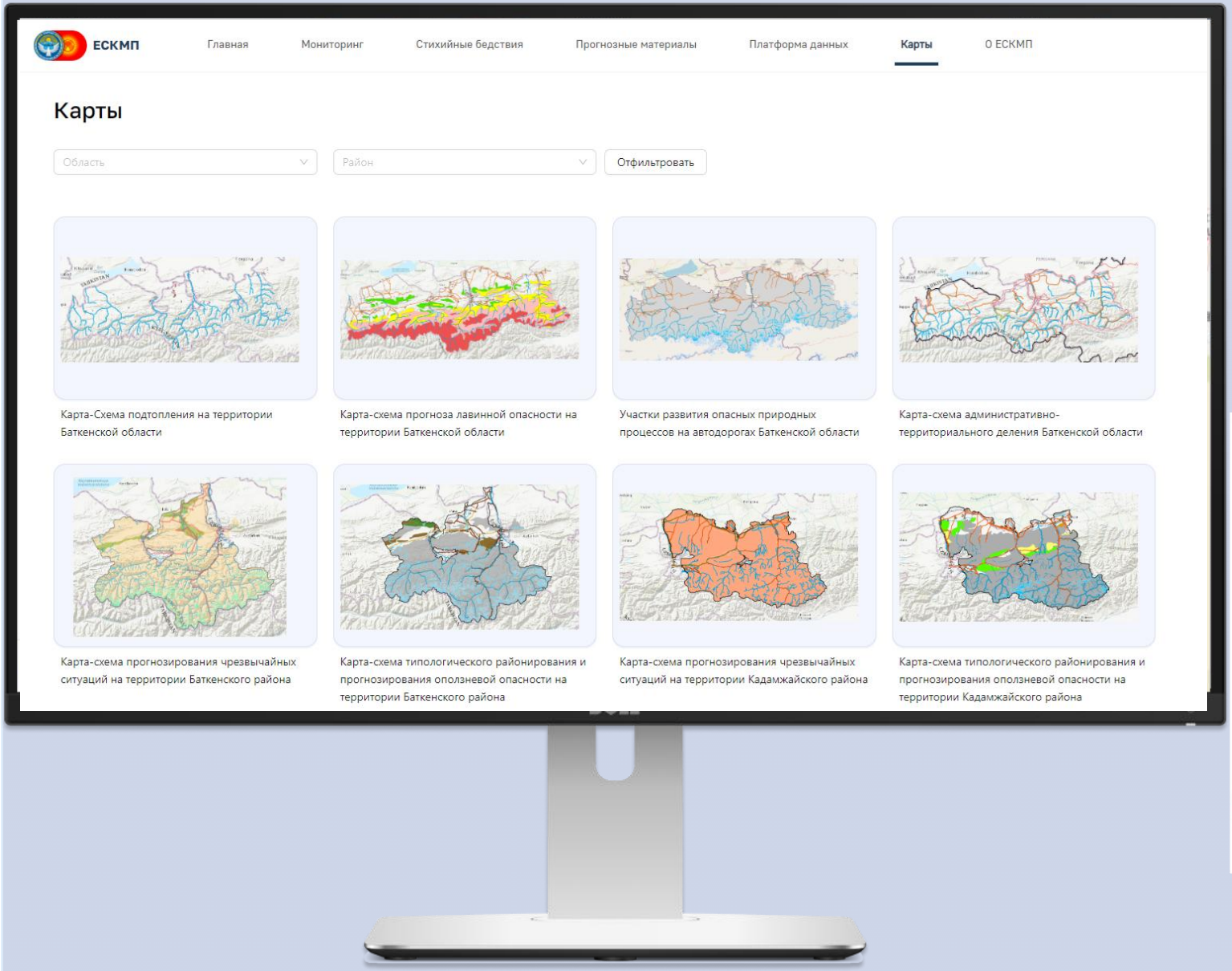
06

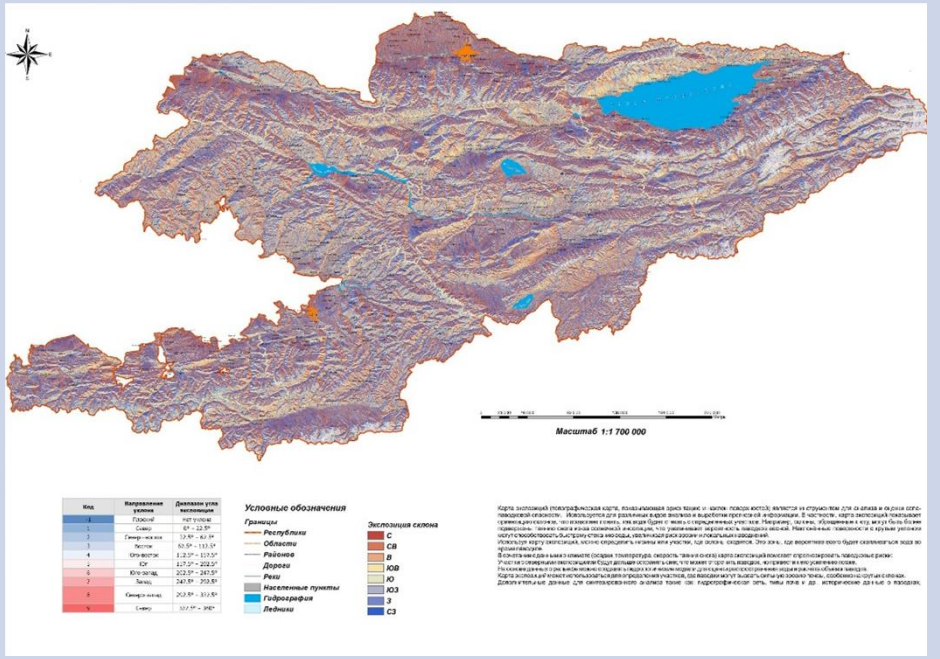
Response

The possibility of improvement and rapid response due to information maps for transmitting information to the Critical situation management center

https://cmbbs.okm.kg/

MAPS OF NATURAL HAZARDS







cmbbs.okm.kg/maps

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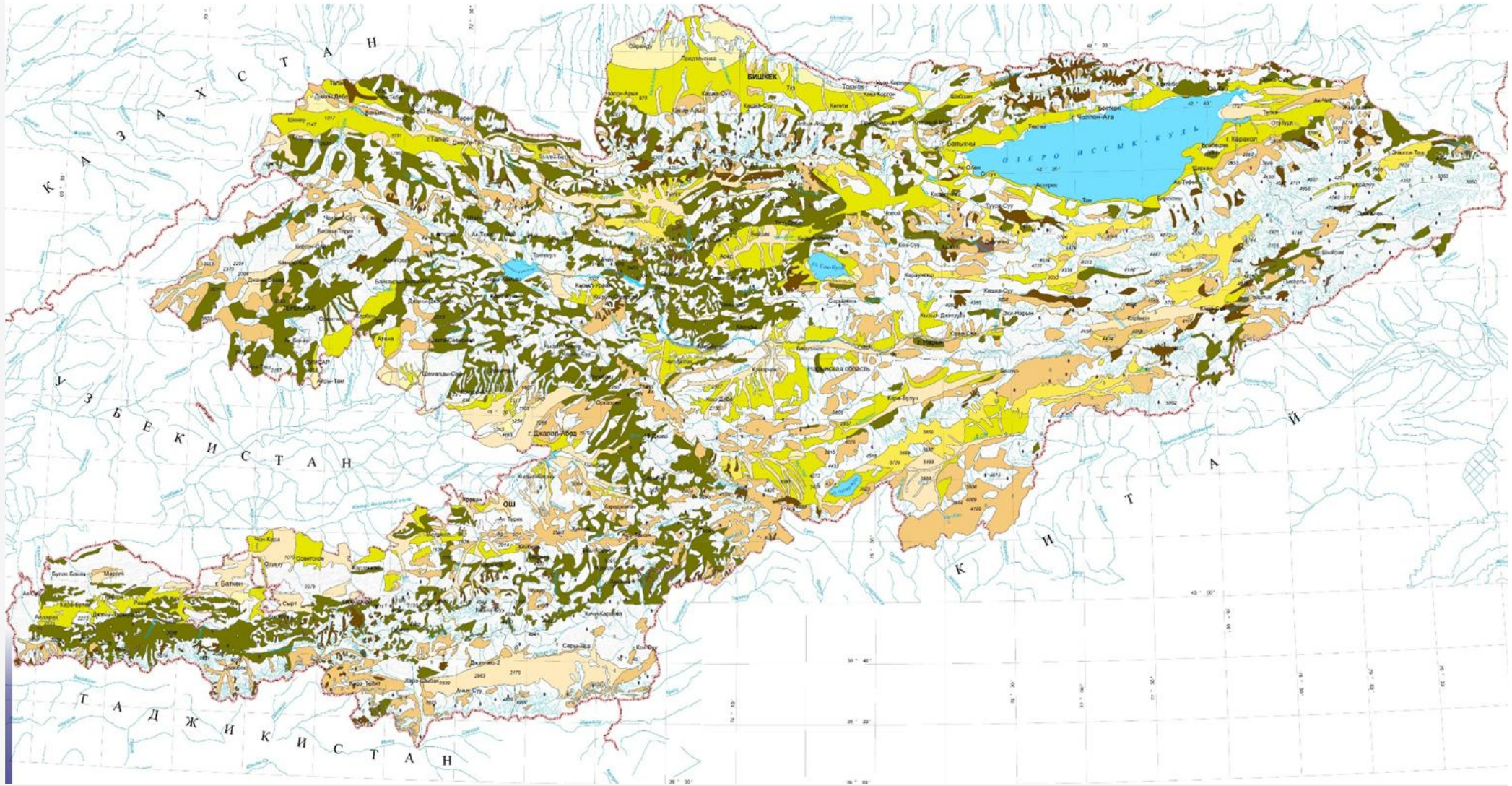
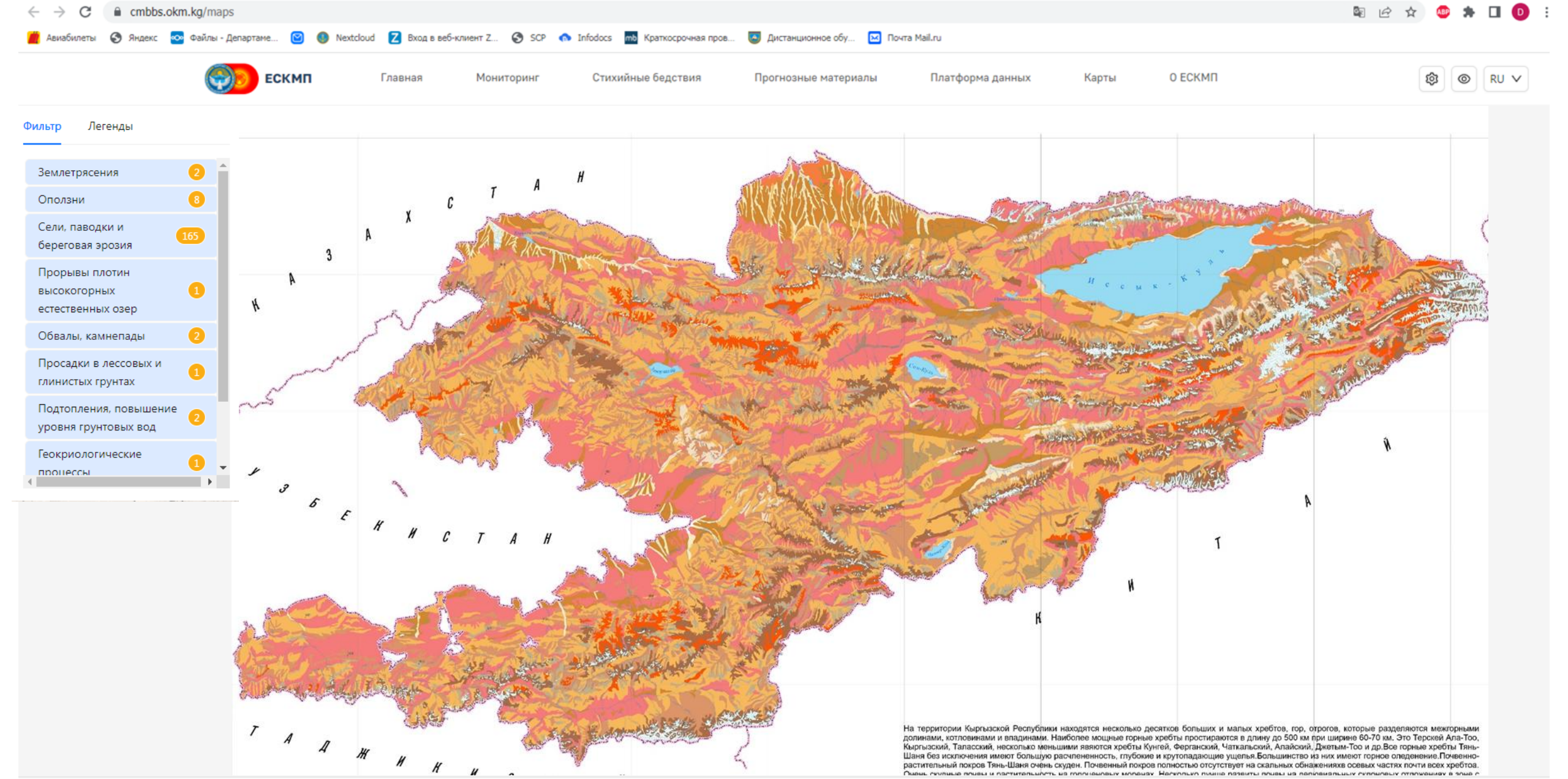
Фильтр | Легенды

- Землетрясения
- Оползни
- Сели, паводки и береговая эрозия
- Прорывы плотин высокогорных естественных озер
- Обвалы, камнепады
- Просадки в лессовых и глинистых грунтах

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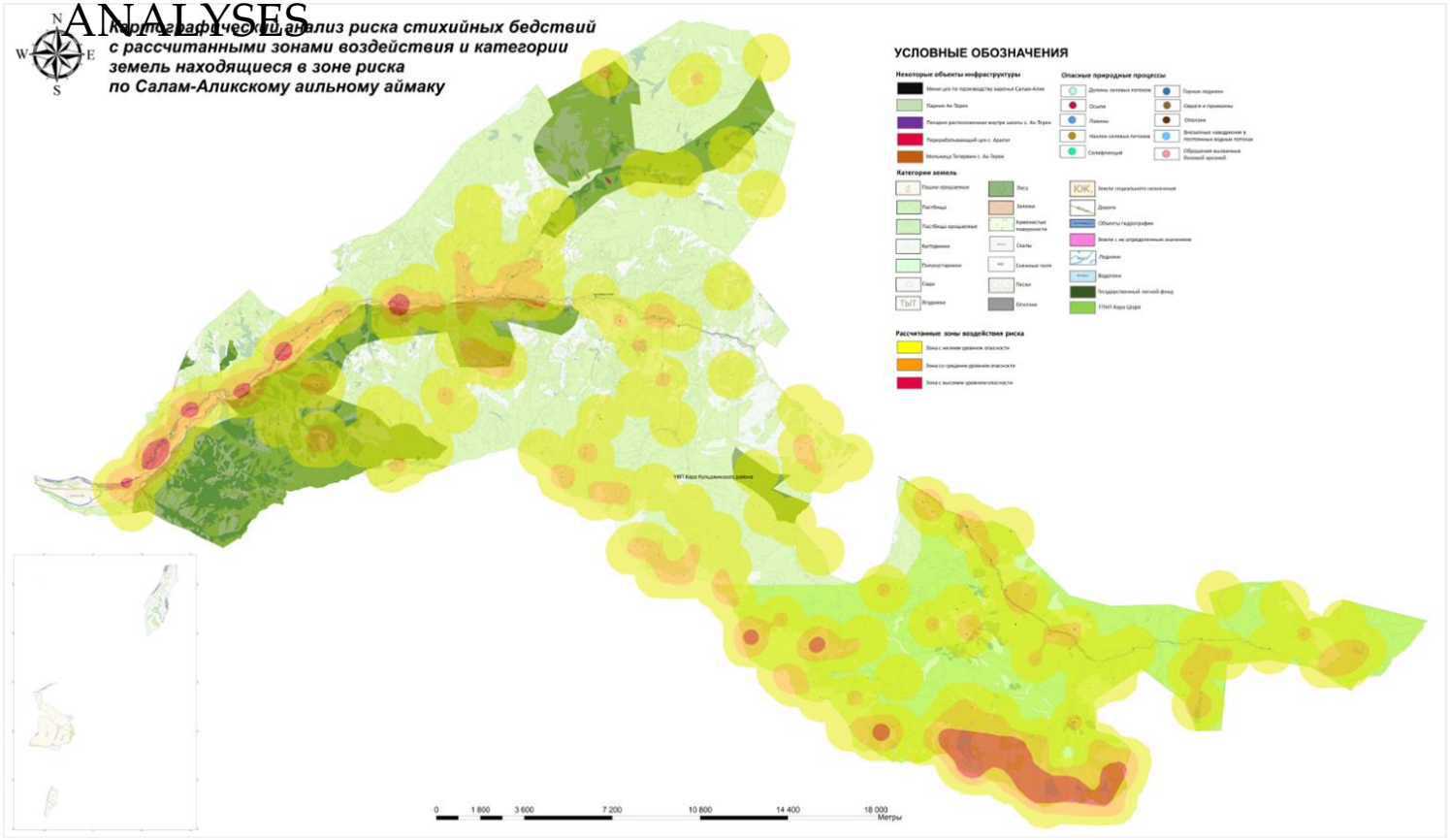
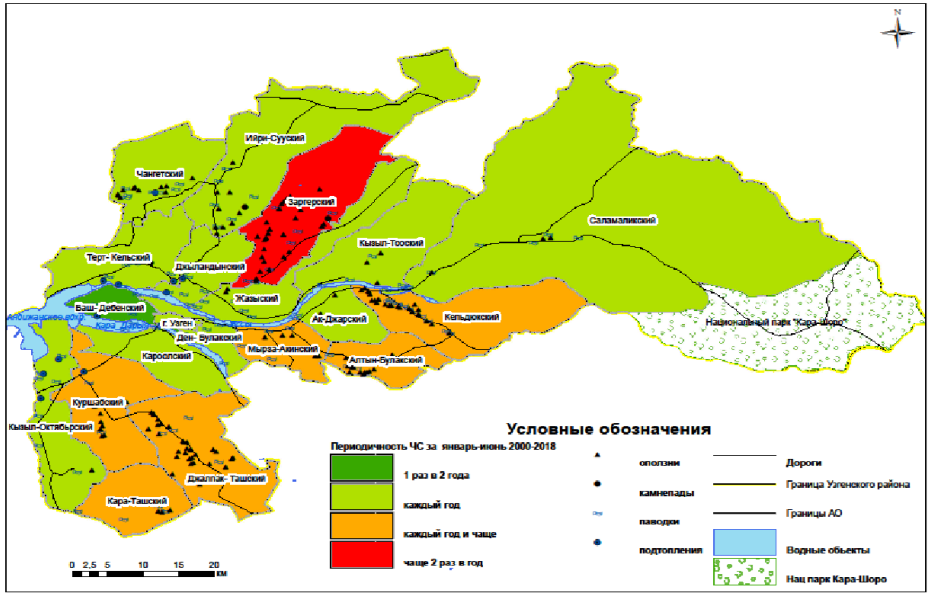
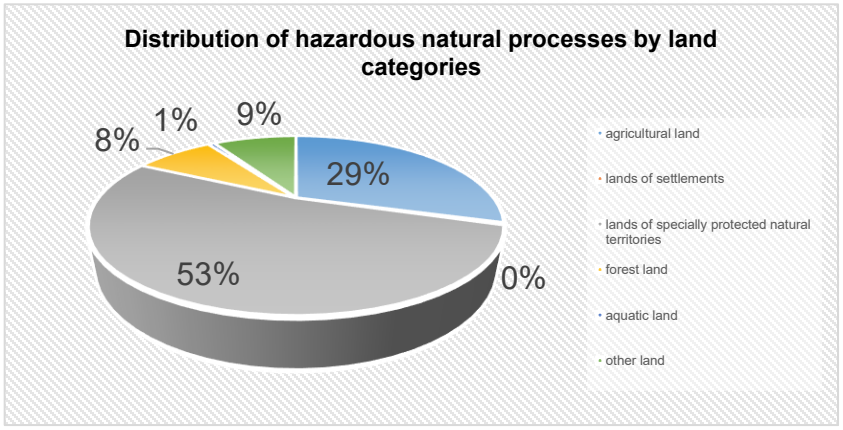
RU
Фильтр
Легенды
Землетрясения 2
Оползни 8
Сели, паводки и береговая эрозия 165
Прорывы плотин высокогорных естественных озер 1
Обвалы, камнепады 2
Просадки в лессовых и глинистых грунтах 1
Подтопления, повышение уровня грунтовых вод 2
Геокриологические процессы 1
КАЗАХСТАН
УЗБЕКИСТАН
ТАДЖИКИС
КИТАЙ
Иссык-Куль
На территории Кыргызской Республики находятся несколько десятков больших и малых хребтов, гор, отрогов, которые разделяются межгорными долинами, котловинами и впадинами. Наиболее мощные горные хребты простираются в длину до 500 км при ширине 60-70 км. Это Терскей Ала-Тоо, Кыргызский, Таласский, несколько меньшими явяются хребты Кунгей, Ферганский, Чаткальский, Алайский, Джетым-Тоо и др.Все горные хребты Тянь-Шаня без исключения имеют большую расчлененность, глубокие и крутопадающие ущелья.Большинство из них имеют горное оледенение.Почвенно-растительный покров Тянь-Шаня очень скуден. Почвенный покров полностью отсутствует на скальных обнажениях в осевых частях почти всех хребтоа.

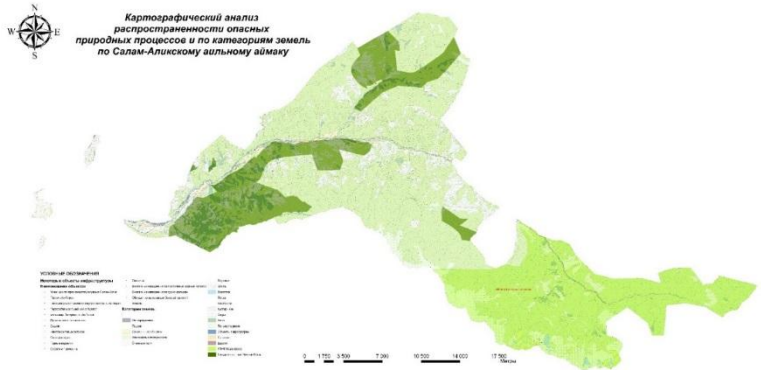
GEOSPATIAL DATA FOR COMMUNITY-BASED DISASTER RISK ANALYSES

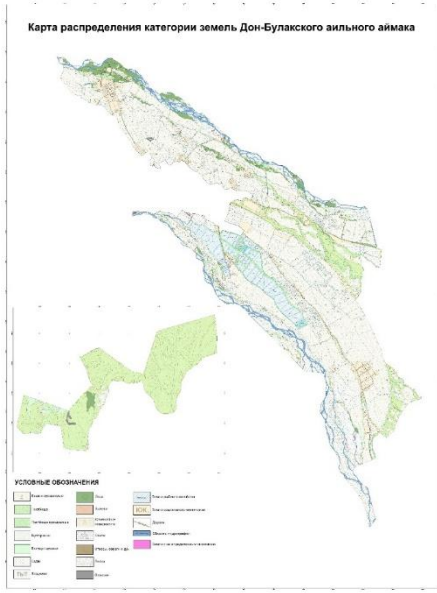


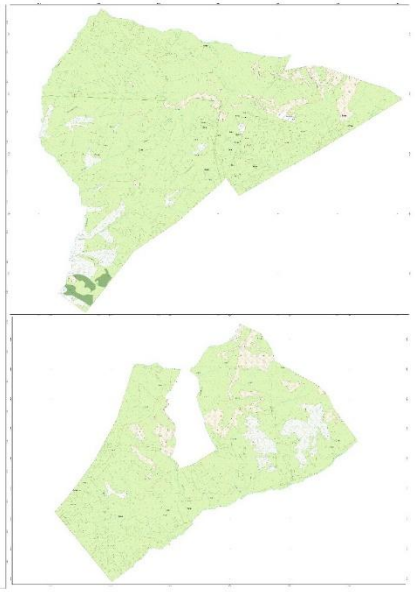
Disaster repeatability map for administrative units of Uzgen district



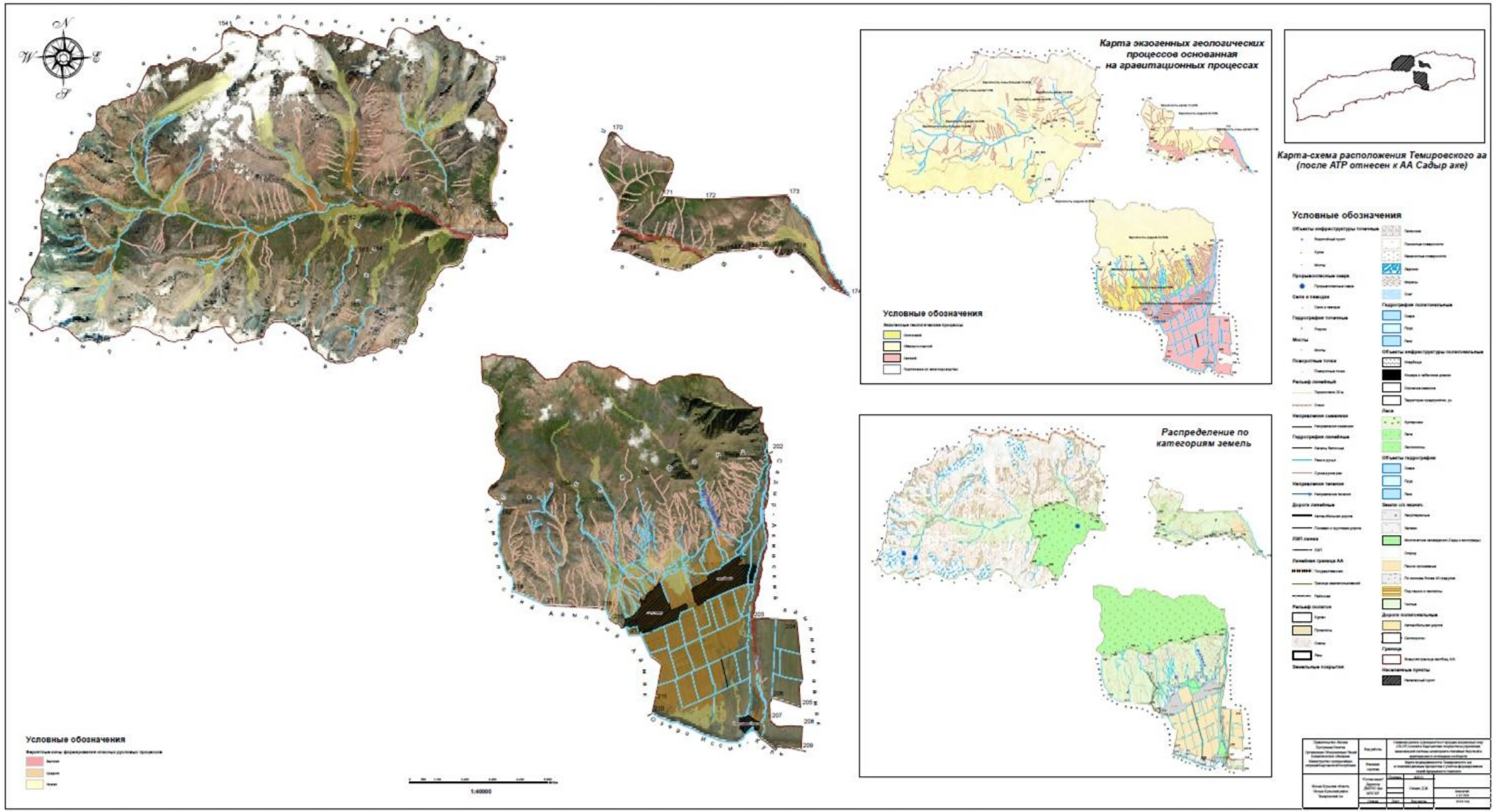








MAP OF EXPOSURE OF TEMIROV AIYL AIMAG TO THE IMPACT OF RURAL FLOWS



The Kyrgyz Republic acknowledges the transformative role of space applications in addressing national challenges related to climate change, disaster risk reduction, sustainable agriculture, and water management, aligned with the Asia-Pacific Plan of Action (2018–2030)

Major Achievements – Capacity Development

- 40+ specialists trained (2023–2025)
- Skills: satellite imagery use, drought monitoring, land degradation assessment
- Small but competent expert team established for remote sensing applications

Major Achievements – Capacity Development

- Analytical study completed on drought information system
- Outcomes: drought-prone mapping, data gap assessment, roadmap for CADIS
- Foundation for digital platform integrating satellite and ground data

Challenges

- Technical and financial constraints
- Limited data interoperability between institutions
- Need for institutional sustainability and expertise retention

Future Directions and Plans

1. Operationalize National Drought Information System
2. Expand trainings
3. Integrate space data into policies for agriculture and DRR
4. Strengthen regional cooperation and joint projects

The next stage focuses on moving from research to implementation, ensuring space applications directly support sustainable development and resilience.








Thank you for your attention!