

Minex – Central Asia Forum

Astana – Kazakhstan, March 17-19 2015

“Integration of Remote Sensing,
Satellite Data, Lidar and Geophysics
into a Kazakhstan GIS”

Gary Tipper – Int. Business Development

SkyTEM Surveys

Dr. Boris Geldyev – CEO

TERRA Remote Sensing and GIS



Minex Central Asia Forum 2015

- Introduction of SkyTEM and TERRA
- previous data availability in Kazakhstan
- advantages of data integration
- examples of remote sensing data types
- examples of airborne geophysical data
- discussion of new Geoportal GIS

SkyTEM Surveys

- Established in 2004 – spin-off Aarhus University
- 40 people – Denmark, Canada, Australia, S.Africa
- Large R&D group
- Member of IAGSA – safety a priority



SkyTEM HQ - Aarhus, Denmark



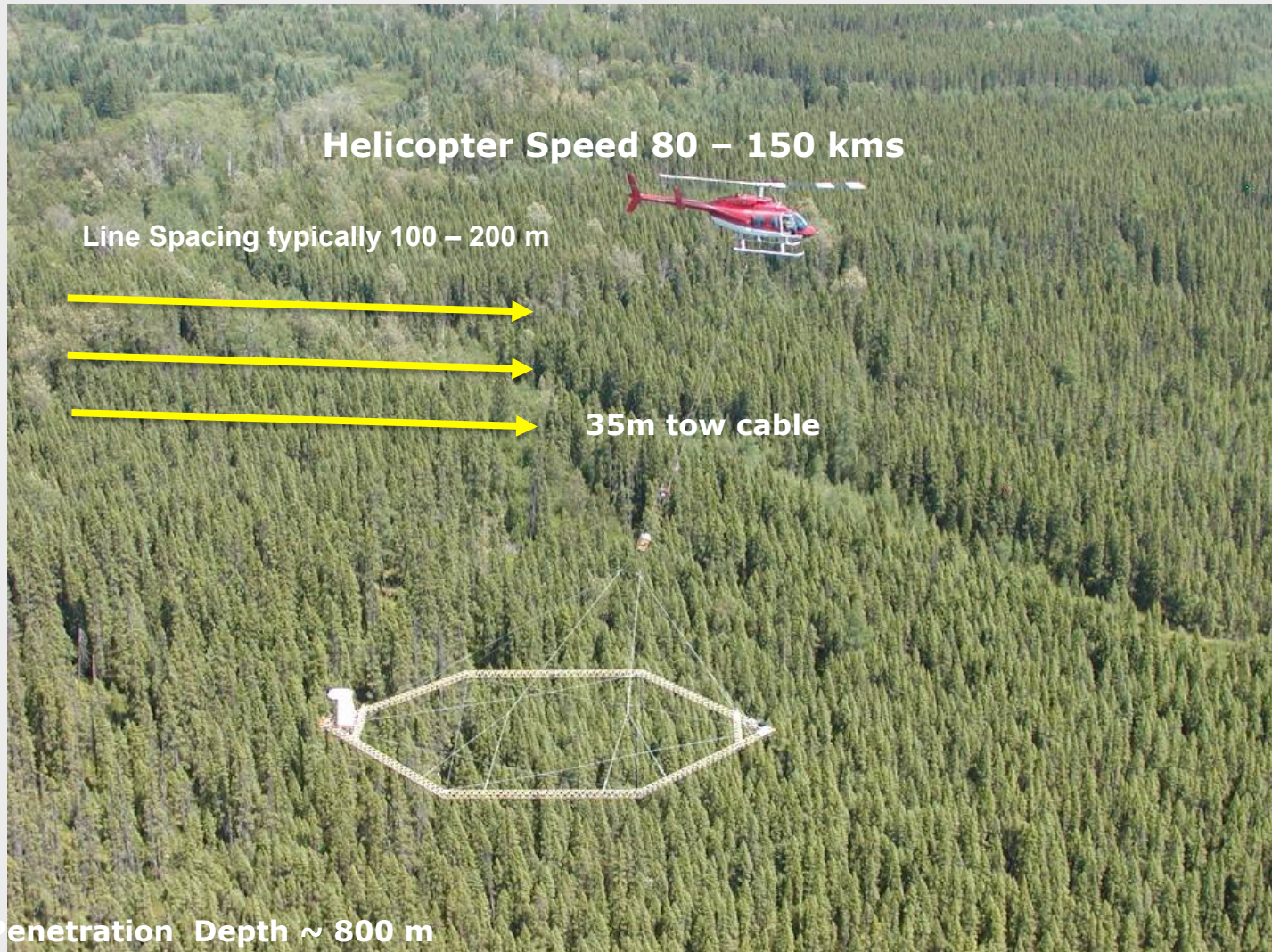
Terra Remote Sensing and GIS

- based in Almaty - Kazakhstan
- specializing in Remote Sensing, Satellite Imagery, Lidar, GIS
- field operations for conventional surveys, as built, DTM's
- expert staff in geology, geophysics and GIS
- Geomatics
- Aerial Photography
- Environmental Studies and Consulting
- Project Development
- well respected with existing Government and Private sector clients within Kazakhstan

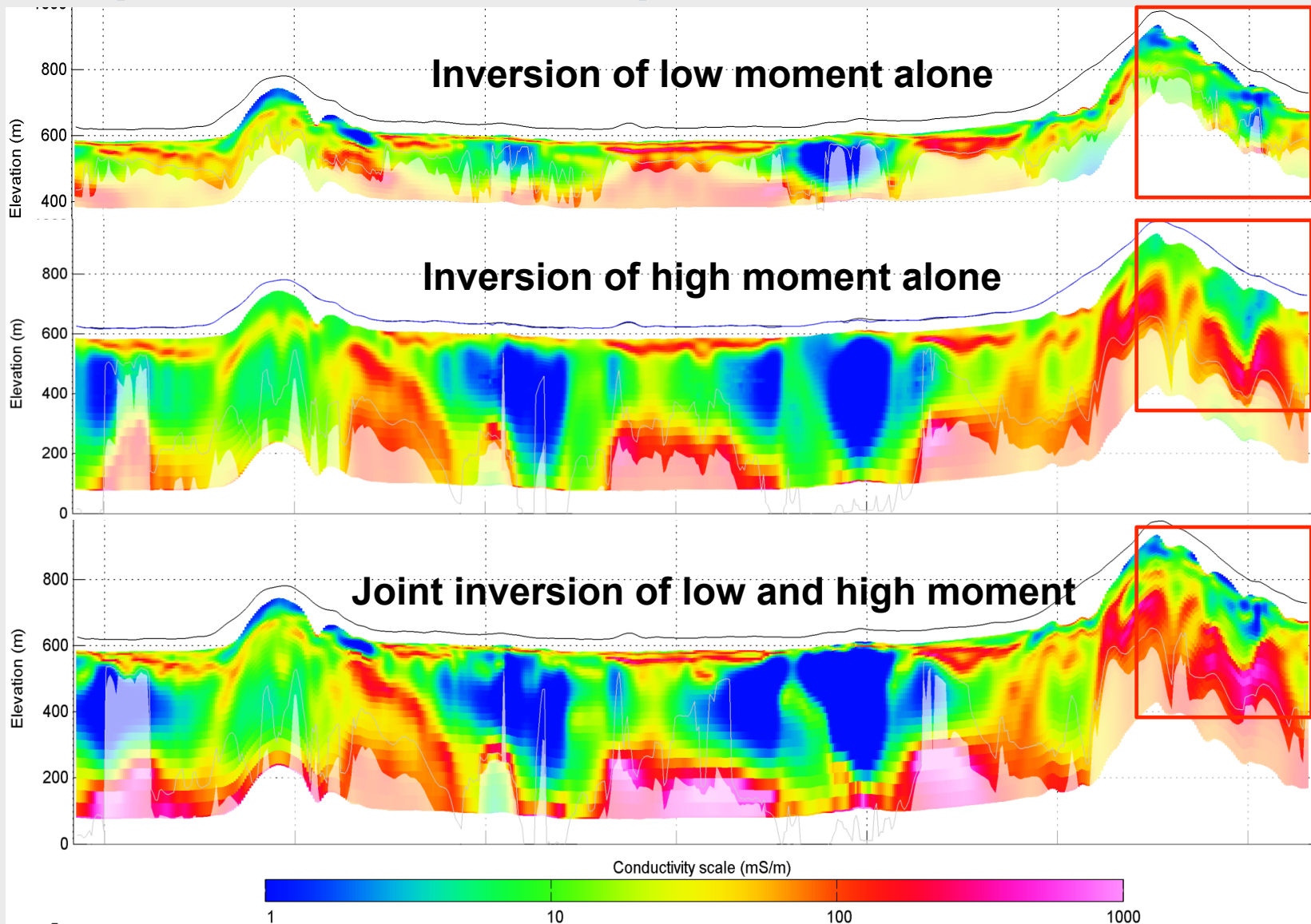
Geophysics, Remote Sensing and Lidar Definitions

- **“Remote sensing** - is the science of acquiring information about the Earth’s surface without actually being in contact with it.” [National Resources Canada](#)
- **“Lidar** – (Light detection and ranging) is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth”. [NOAA](#)
- **“Geophysics** – the physics of the Earth and it’s environment, including the physics of fields such as meteorology, oceanography, and seismology.” [Wikipedia](#)

SkyTEM – Time Domain EM/magnetics



Patented - MultiMoment SkyTEM508 Layered earth



Data integration benefits

Discover Resources

- **Extend Existing Mines**
- **Advanced Exploration**
- **Regional Exploration**
- **Industry Exploration**

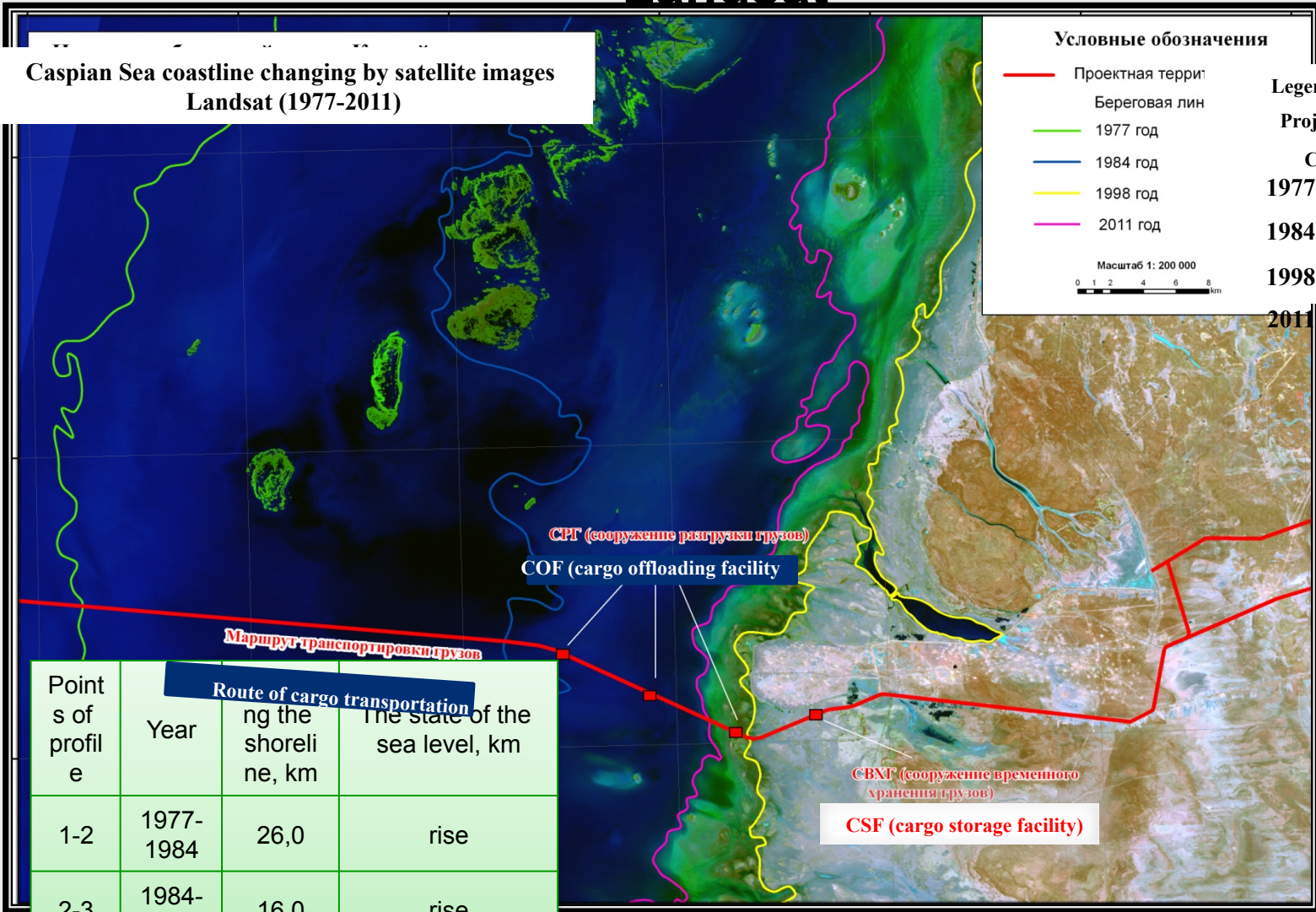


обнаружения ресурсов

- **Расширение существующих шахт**
- **Расширенные исследования**
- **региональная разведка**
- **отраслевая геологоразведка**

Ecosystem classification using satellite data

Landsat

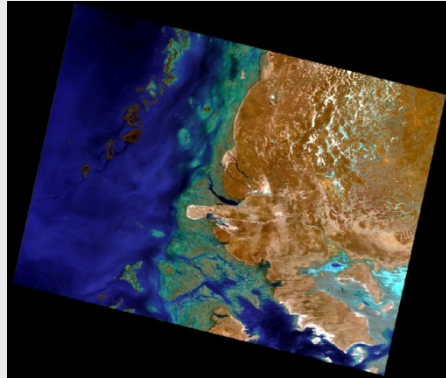


Caspian Sea coastline changing by satellite images Landsat (1977-2011)

Points of profile	Year	Route of cargo transportation along the shoreline, km	The state of the sea level, km
1-2	1977-1984	26,0	rise
2-3	1984-1989	16,0	rise
3-4	1989-2011	2,7	fall

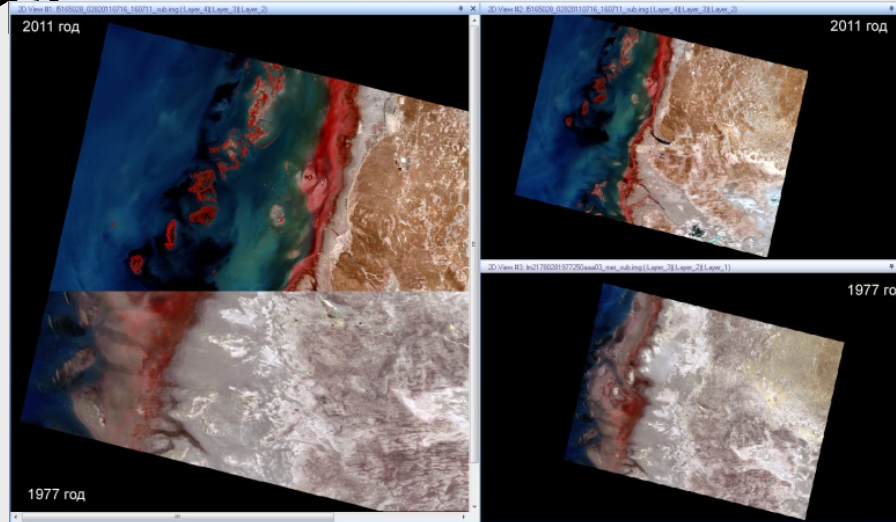


Comparative analysis of Landsat satellite data for the period 1977-2013

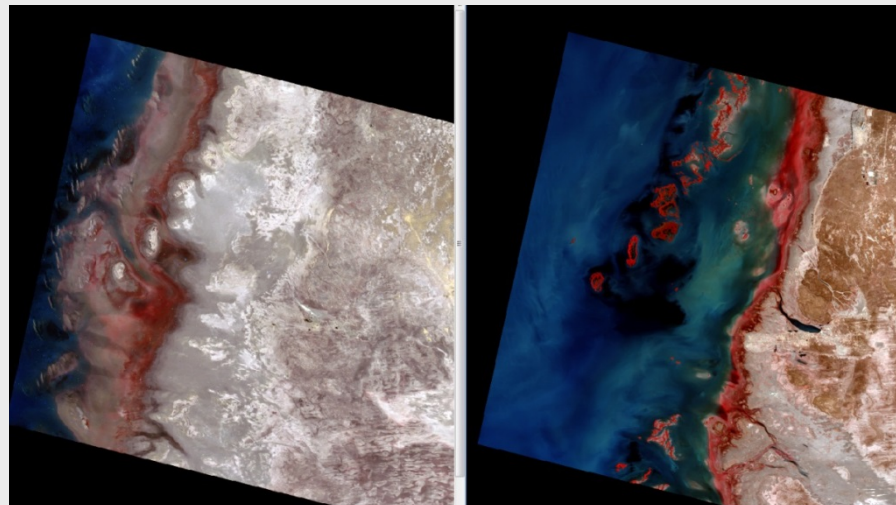


Satellite image
LANDSAT8.
(multi-channel
radiometer OLI
(Operational Land
Imager))

Date: May 2, 2013



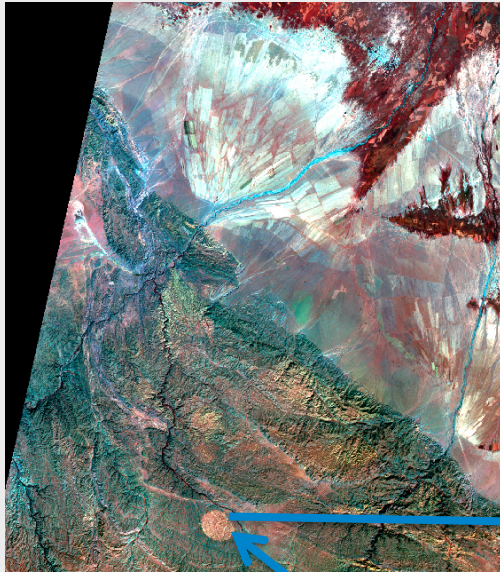
For the retrospective analysis of shoreline change were used Landsat data for the period from 1977 to 2011, characterized by significant fluctuations of the Caspian Sea.



Satellite image Landsat-2 ERTS.
Date: September 7, 1977

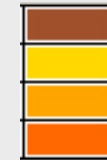
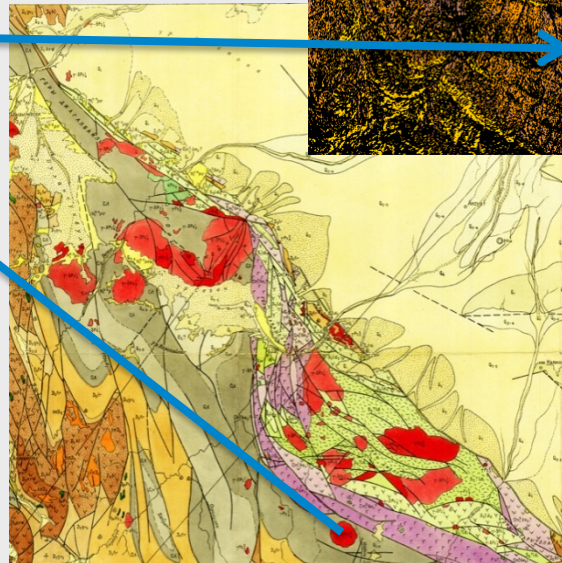
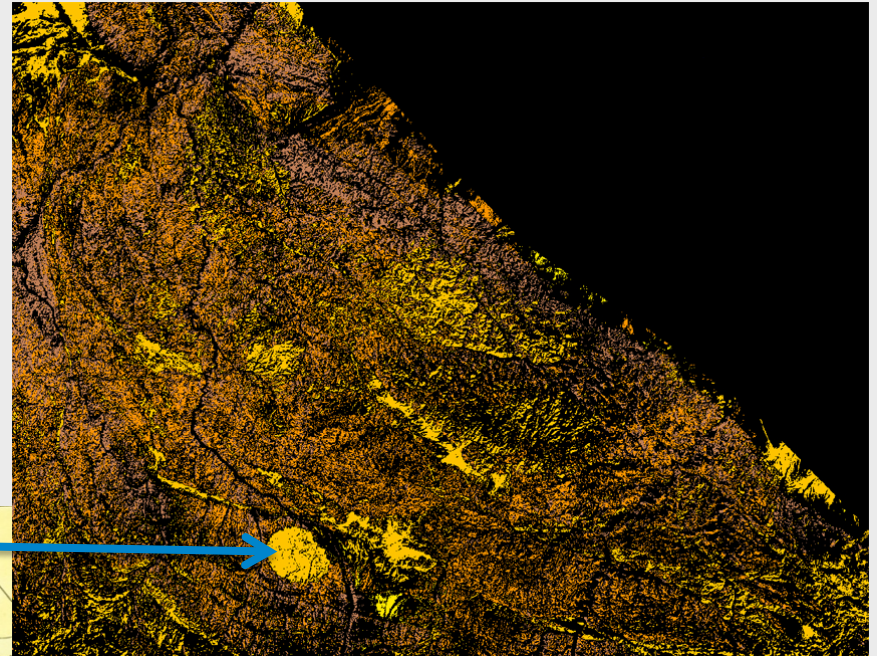
Satellite image Landsat-5 TM.
Date: July 16, 2011

Lithological interpretation of Remote Sensing Data



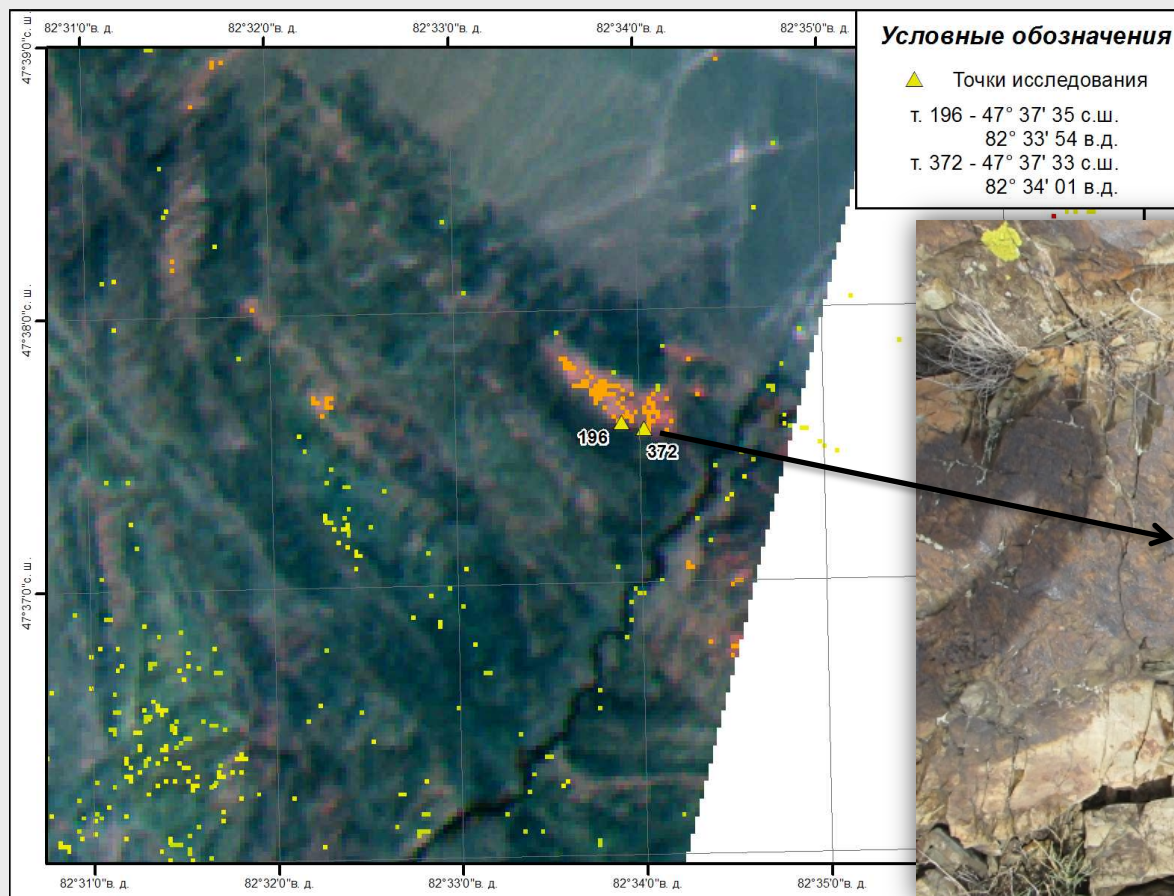
Landsat -8 (2013-09-02)

Comparative analysis of geological materials and satellite data



Effusives with different composition
The Quaternary deposits
Intrusions with acid composition
Terrigenous deposits

Verification of remote sensing data



**Desert varnish in the form of crust
from hydroxides of iron**

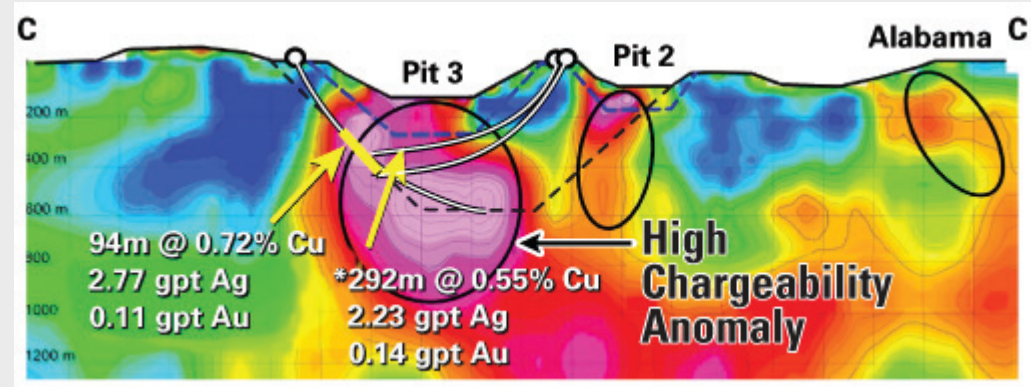


**Map-mask the index of possible
manifestations of iron**

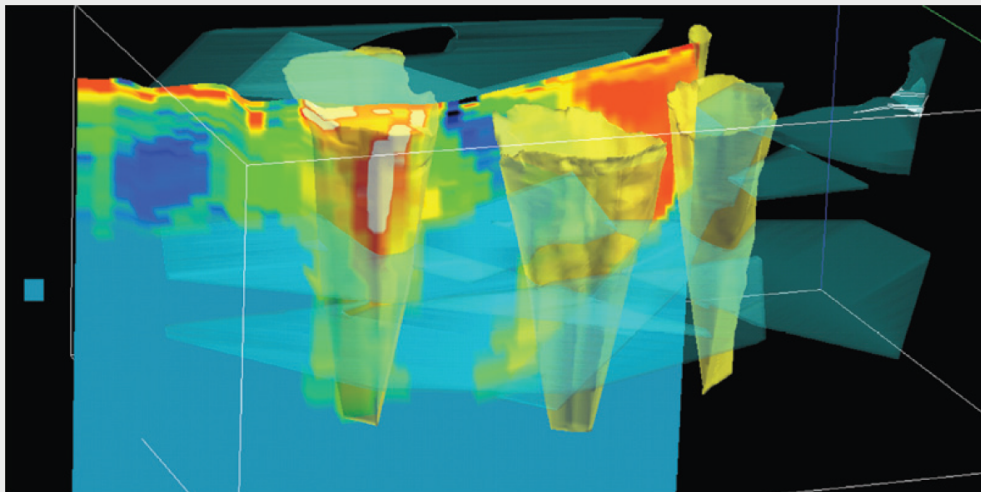
Extend Existing Mines Расширение существующих шахт

Employment/Services

Social and economic impact



Copper Mountain, Canada



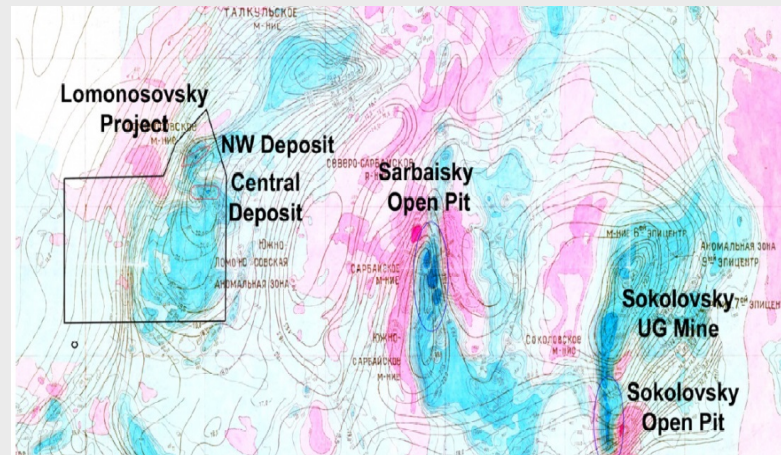
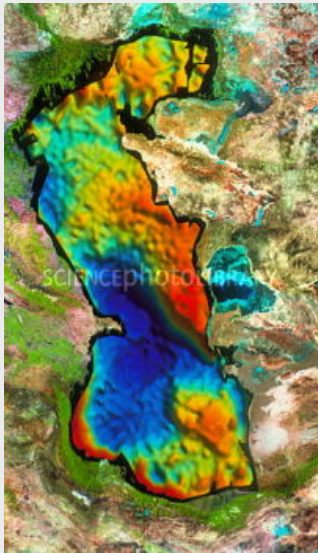
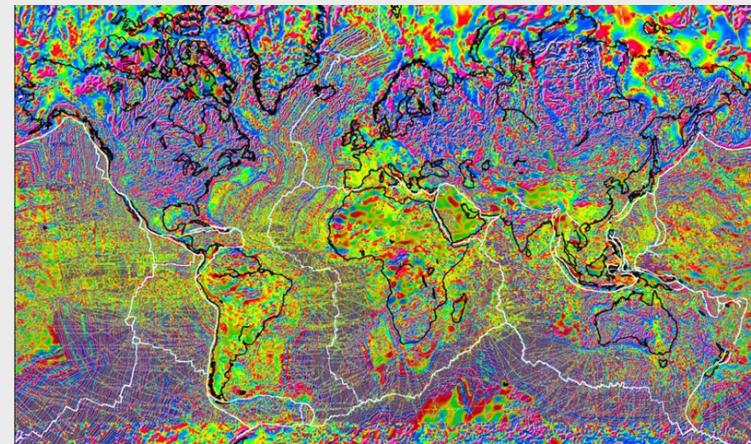
Tax base/Revenue source

Jwaneng Diamond Mine, Botswana

Large Scale Mapping

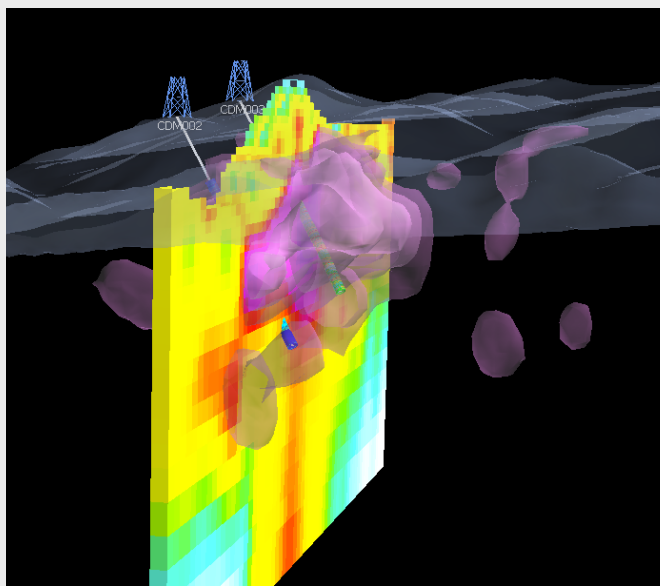
Региональная Разведка

Regional Exploration

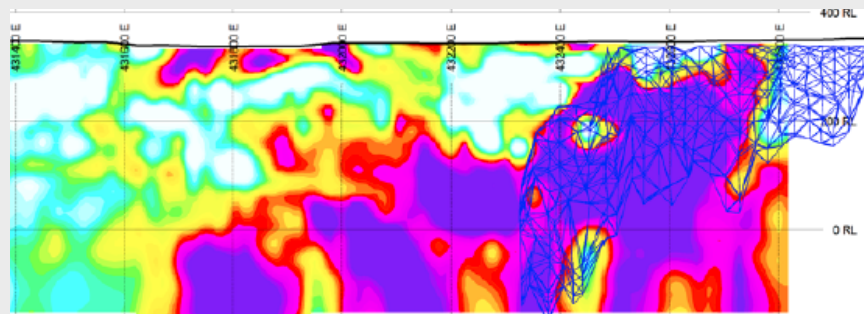


Advanced Exploration

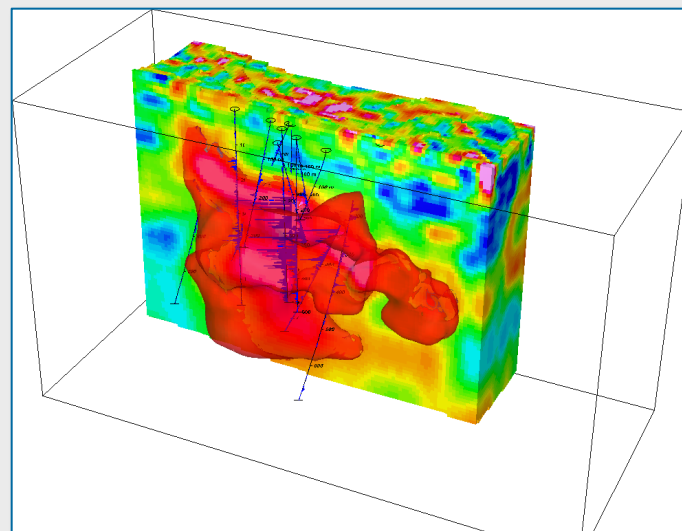
Расширенные исследования



Santa Cecilia, Porphyry Chile

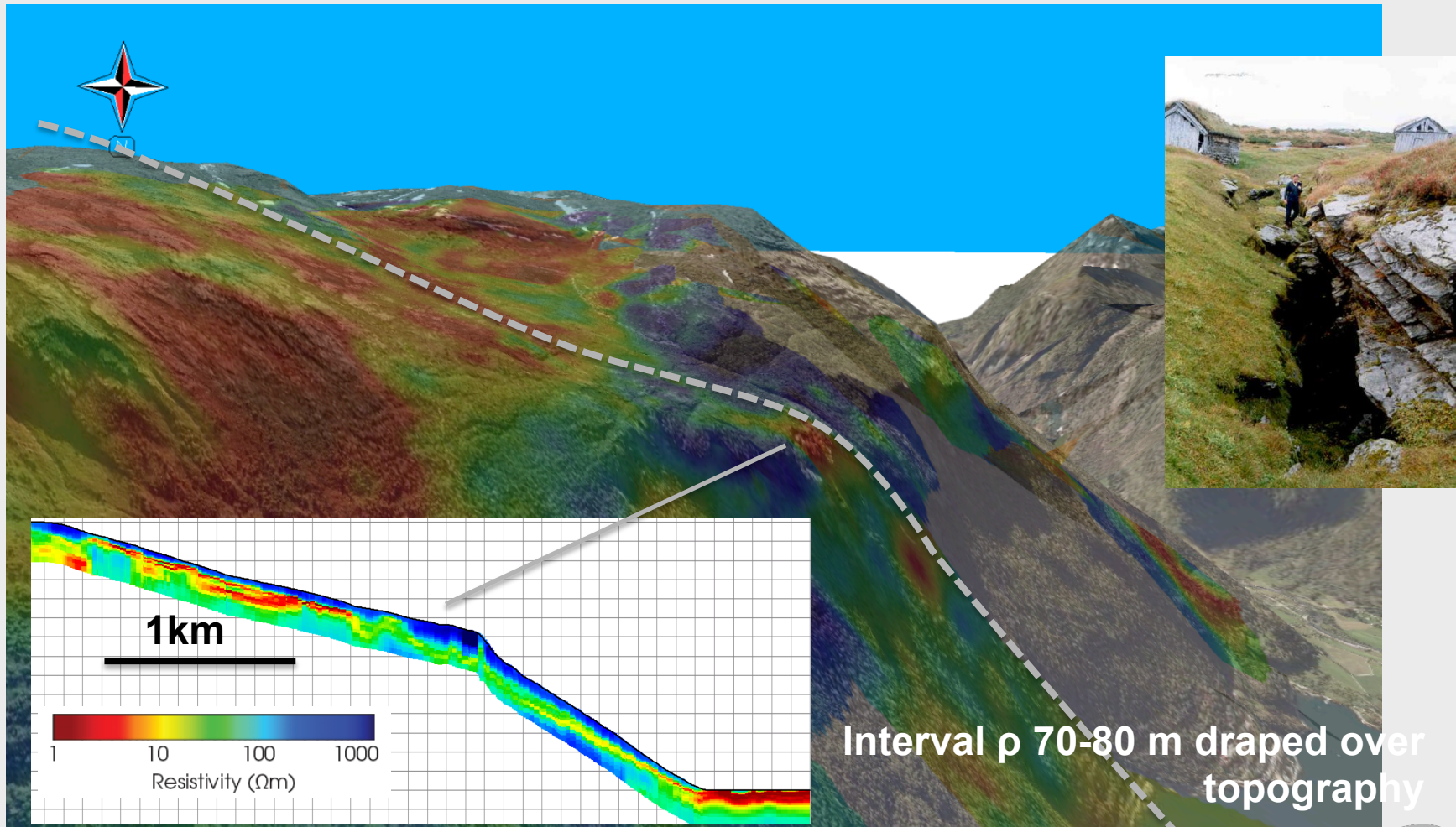


Junior Lake, Nickel, Canada

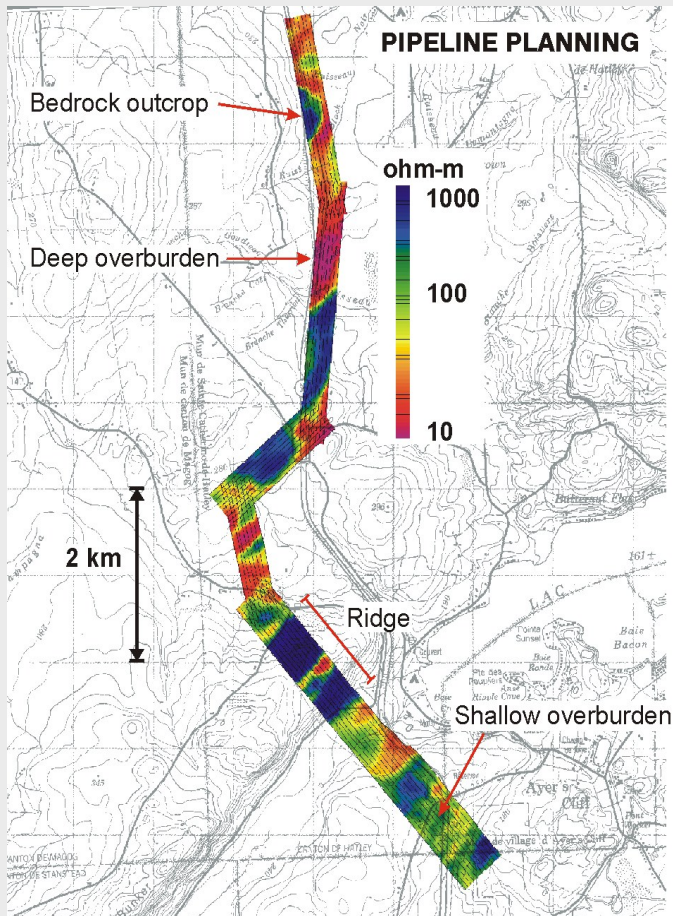


Mumbwa Copper IOCG, Zambia

Engineering - Complex anomalies connected to rock slides

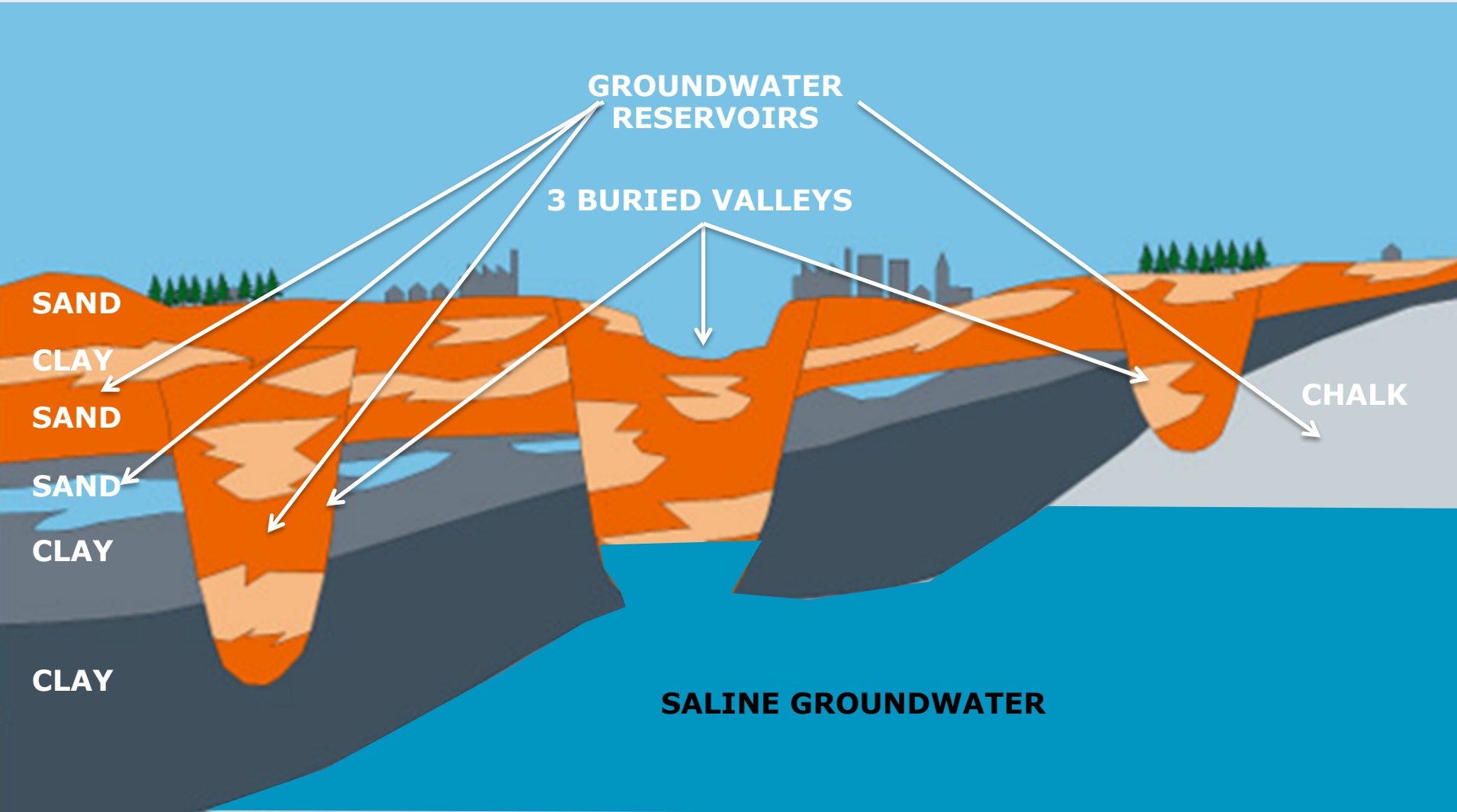


Pipeline and route Planning & Detection

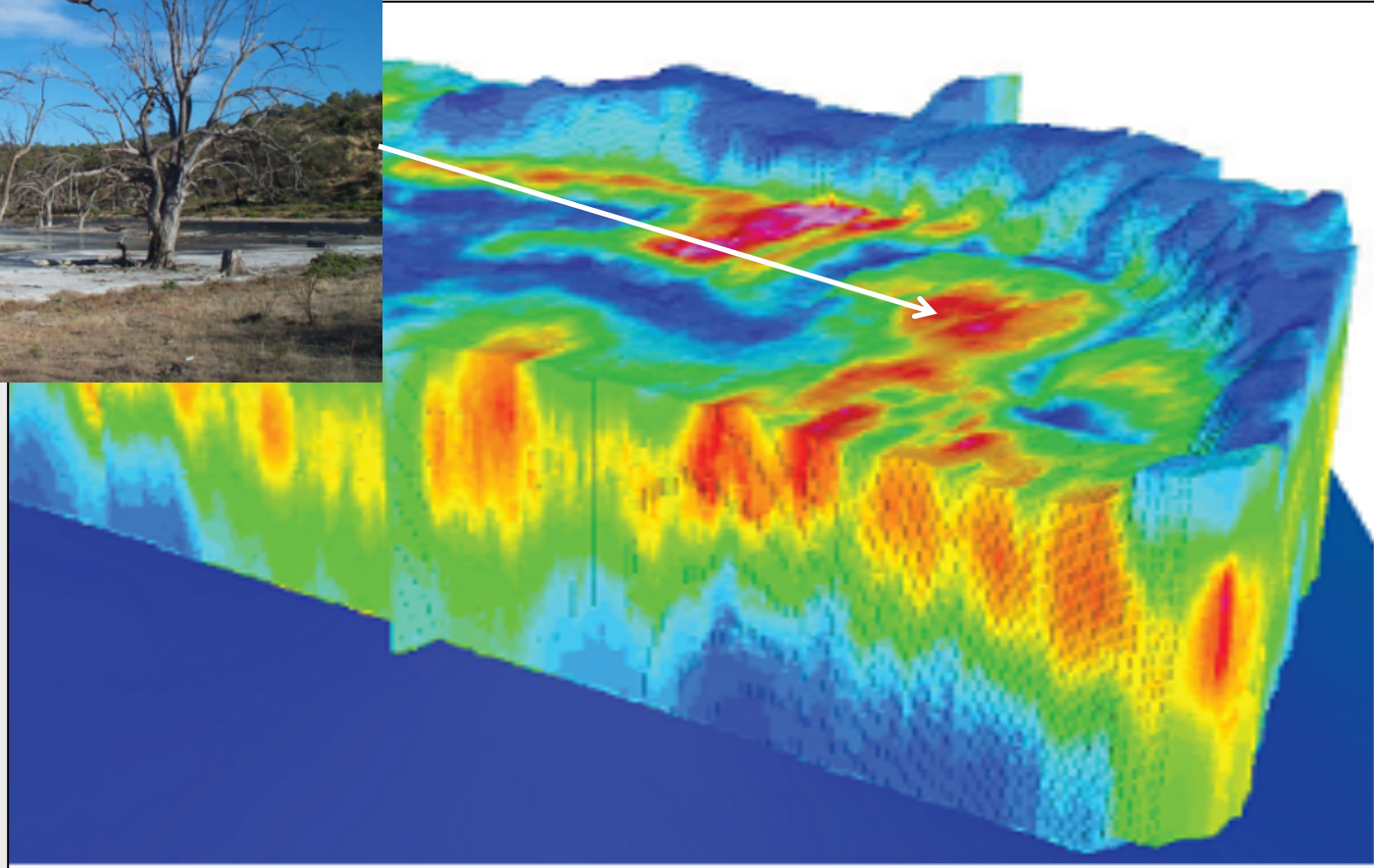


- Pipeline detection: horizontal gradient mag, low and slow acquisition.
- Pipeline corridor mapping
 - Identifying bedrock to minimize blasting cost
 - Map conductive geology for installation of cathodic protection

Groundwater resources

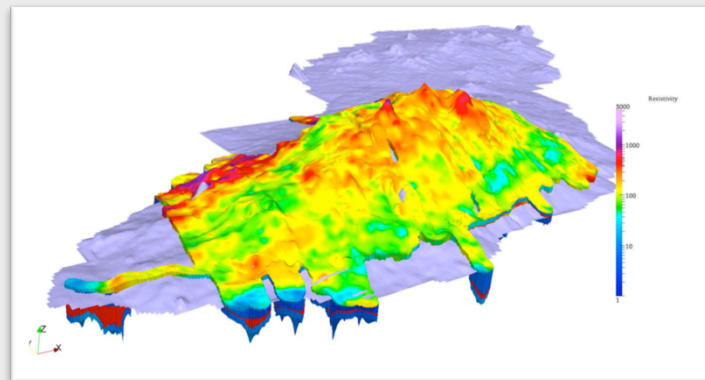
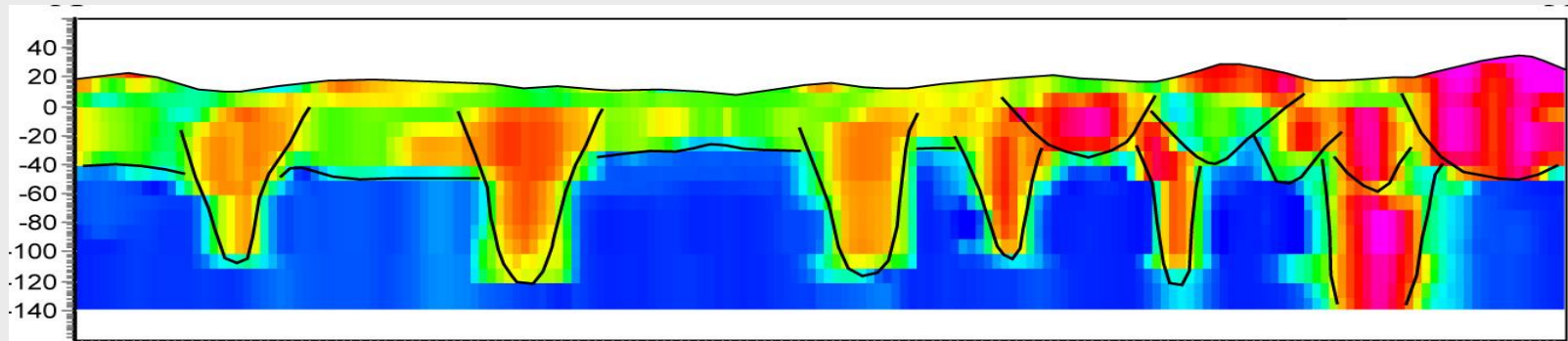
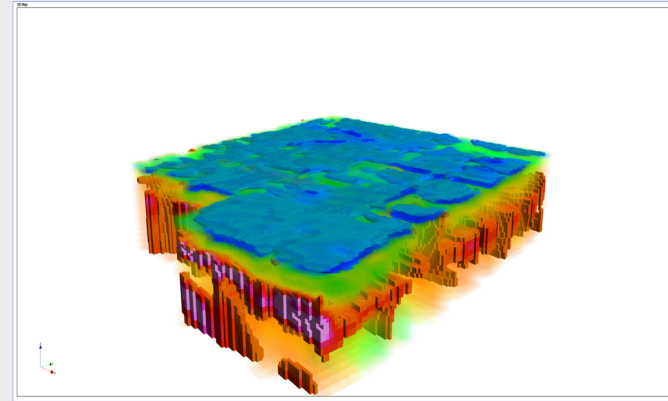


Salinity Mapping Murray River, Australia



Deliverables

- **Wide variety of products available**
- **1D, 2D and 3D imaging**
- **Quick delivery of preliminary data**

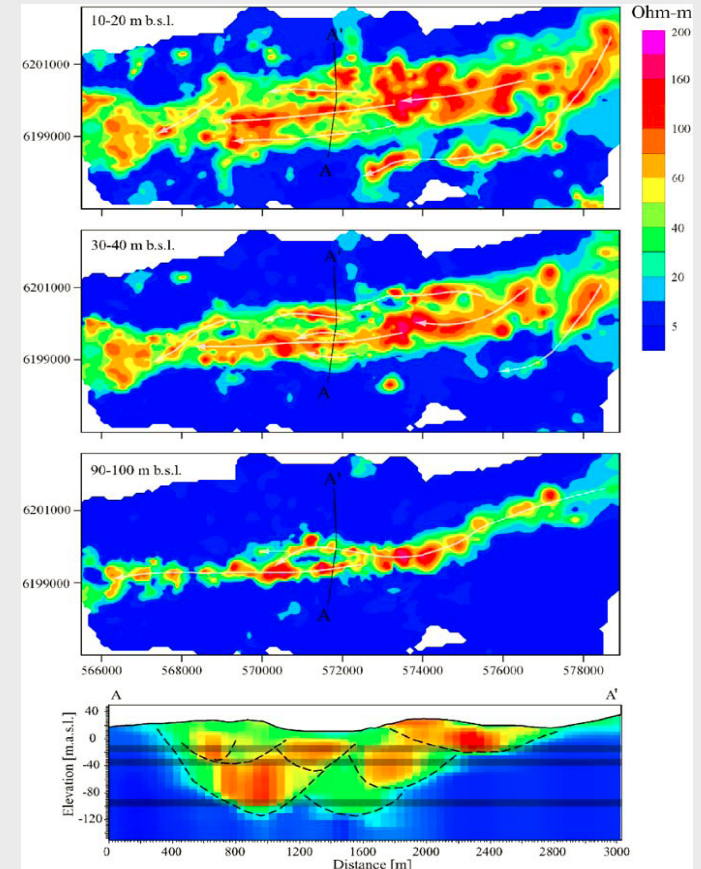
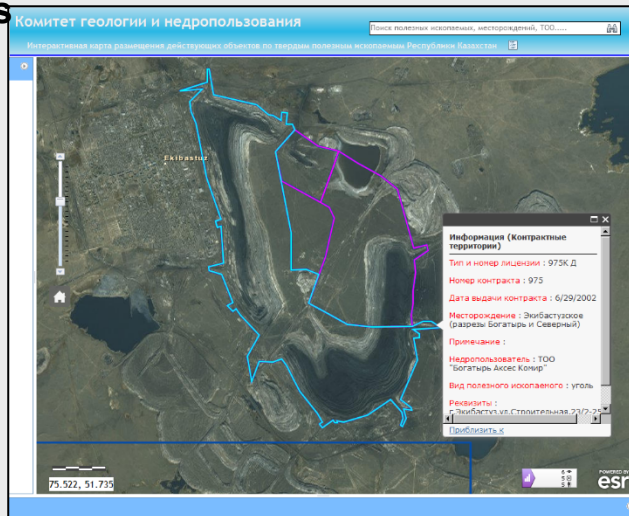


Opportunities of geoportal

The project was developed on behalf of the Committee of Geology and Subsoil Use of RoK in 2013-2014 and continues today.

<http://geoportal-kaz.org>

- 1) Search of subsoil objects according to different criteria
- 2) Browse available information about the object
- 3) Formation of application for the development of a new object of subsoil
- 4) Drawing of the new subsoil object in the object drawing mode or by entering of the existing coordinates



Opportunities of geoportal

Комитет геологии и недропользования

Интерактивная карта размещения действующих объектов по твердым полезным ископаемым Республики Казахстан

Найдено результатов: 409

Слои

- Слои
- ТПИ
 - Срок действия контракта
 - Контрактные территории (все)
- На стадии оформления
- Заявка на свободу территории
- Реестр договоров ГИН
- Полигоны и зоны падения ракет
- ООПТ
- Границы

Информация об объектах

Подложки

Инструменты

Заявка

Справка

ID	Недропользователь	Месторождение	№ контракта	Отвод	S отвода (км2)	Глубина отработки (м)	Полезные ископаемые	Дополнительная информация	Контакты
18 1	ТОО "Корпорация Казахмыс"	Тастау	243	Горный	1,53	260	медь	Тастау, Саяк III	г.Караганда ул.Алиханова,13/95-21-85,95-20-88/Огай Э.В.
18 2	ТОО "Корпорация Казахмыс"	Тастау	243	Горный	2,84	150	медь	Саяк II	г.Караганда ул.Алиханова,13/95-21-85,95-20-88/Огай Э.В.
18 7	ТОО "Алтын-Айтас"	Плато Покровское	148	Геологический	15,7	Null	золото	долина реки Жанама	Алматы,Тимирязева,17/250-17-72/Нурумов М.Е.
18 8	ТОО "Ангренсор"	11 поле Экибастузского м-ния	1262	Горный	3,8	до горизонта +200 м	уголь		Павлодарская область, г.Экибастуз, ул. Кунаева,156/8(7187)75-51-52/Темирханов Е.

Knowledge Transfer

Technology – Operations – Interpretation

Передача знаний

Технология – операции- интерпретация

Develop relationships with local Universities
Mentor geophysical interns and graduate students



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- Thank you