



# KONFERENCA JUBILARE "90 VJET GJEOLGJI SHQIPTARE"



## GEOPHYSICAL CONTRIBUTIONS DURING 90 YEARS OF ALBANIAN GEOLOGY, AND FACING OF THE TRANSITION CHALLENGES

Alfred FRASHËRI , Salvatore BUSHATI

Faculty of Geology and Mining  
Academy of Sciences of Albania

*Tirana, October 2012*

- In 90 anniversary of the Geology of Albania we bow respectfully to Albanian geophysicists: to students, to our colleagues and friends during the years, with which we share the joys, achievements and difficulties of research works, with which we sleep in the stiffing and the rainy days in the mountains, in tents that they often leak. Them to dedicate this writing; sacrifices of their families, with much love and care they supported to perform the duties of their passions in life, with dedication throughout Albania.
- For conducting research have worked 289 engineers geophysics geophysics, as well as dozens of physicists, electrical and electronics engineers, etc. Among whom many scientific have scientific degrees and titles. In the field of applied Geophysics contributed valuable Alfred Frashëri, Ali Mema, Aleko Stamata, Sunrise Luari, Anastas Dodona, Betim Muco, Çaush Xhufi, Daver Canon Eduard Sulstarova, Enrico Veizi, Hasan Topçiu, Hidai Haxhiu Fatmir Fezga, Ferdinat Dafa, Jani Skrame Jorgji fluid, Kliti alder, Llambi Langora, Ligor Lubonja, Llambro Duni, Naun Priftaj, Neim Cavani, Novruz Kodheli, Nikolin Leka Nikola Zendeli, Pertef Nishani, progress Alikaj, Radium Avxhiu, Rushan Lico, Salo Arapi, Safet Dogjani, Salvator Bushati, Siasi Koçiu Spiro Cosmas, Stavro Dimas, Shyqyri Aliaj, Teki Biçoku, Thanas Anthony, Rainbow Dhrami, Veronika Peci, Wilson Bare, Wilson SILO, Vladimir Veizaj, etc., etc..

# Albania is rich with natural resources: oil, gas and solid minerals.

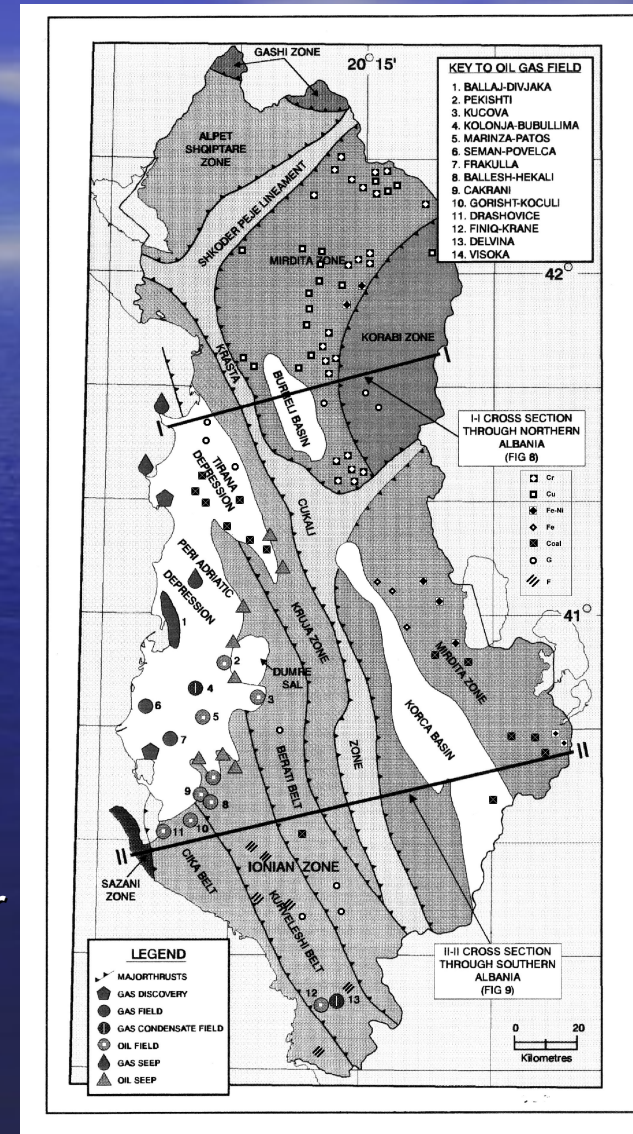
Integrated geological-geophysical-geochemical prospecting has discovered and developed tens of solid mineral deposits, and oil & gas reservoirs in Albania.

The economic capacity of the Albanian Mining and Petroleum Industries, it is possible to present by maximal extractions during 1984:

- 1,007,000 tons/year of copper minerals,
- 960,000 tons/year chromites.

About 20 million tons of copper minerals and 21 millions tons of chromites have been extracted.

- Oil production reached a peak of 2.250.000 tons /year in 1973.
- Up until 1990s, there were extracted 49,5 million tons of oil, about 12 million cubic meters of natural, and
- 47 million tons of coil.



- The Bitumen from the Selenica mines in southern Albania has been extracted since the ancient times. Illyrian tribe of pirusts was well known for copper processing. An activist of the Albanian Renaissance, the philosopher
- Sami Frashëri, in his book **"Albania, What It Was, What It Is, and What Will It Be"** (1899), wrote "...it is necessary to explore all metals all over Albania ... In the capital of Albania, in addition to secondary schools must be a university, and an academy..... to develop in Albania the literature, history,..... and geology, etc."
- Nearly half a century later, a politician Mehdi Frashëri in his book **"The Albanian Problem"** (1944) wrote: "... At near future, Albanian oil in Kuçovo as well as in Patos will form a source of national wealth and a key target for state revenues " and "... in Albania there have been explored some ores, which can also reasonably be used for developing the economy and industry of the country....". *Procuring fuel, as in time of peace as well as in time of war has taken a great importance that plays a leading role in foreign policy of states. For these reasons fuel in majority of states have been the monopoly items. On the one hand to give sufficient revenues case of the state, on the other side to have under control; for all of its cases if the monopolization of the fuels in foreign hands is a suicide, that in case of need the state lacks main factor of each movement* (p110).

- First gravity & magnetic surveys, Vertical Electrical Soundings, and well logging have been performed by Italian geophysicists during 1931-1942 period.
- Geophysical research in fifty's years: by Soviet and German geoph.
- From 1952 here returned studies two first Albanian engineers. At that time were formed also the first geophysicist's technicians.
- **After 1961, all geophysical surveys have been performed by Albanian geophysicists.**
- For two years in the seventy's years, the Albanian geophysicists have worked together with the Chinese geophysicists.
- **With two Albanian geophysicists engineers started the Albanian geophysics in 1952. Today, after 60 years, there are 304 geophysicists, as well as tens of physicists, electrical engineers, etc. that are working on exploration and geophysical surveys. Among them are 48 doctors of sciences, 7 professors, 1 assistant professor, 9 and 12 leading researchers and masters of the research, respectively.**

- **Albanian Geophysicists** have established since 1989 **Geophysical Society of Albania (GSA)**, which is part of the **Albanian Association of Geoscientists and Engineers (AAGE)**. GSA is a **Associated Member of the European Association of Geoscientists and Engineers (EAGE)** and is part of the **Balkan Geophysical Society (BGS)**.
- Geophysical explorations in Albania, year by year have been developed as:
  - a complex of methods,
  - as technological level of the surveys and interpretation, and
  - is raised up coordination with other geological and geochemical methods.

# GEOPHYSICAL METHODS APPLIED BY THE MEMBERS OF AGS IN DIFFERENT INSTITUTIONS AND COMPANIES

↑ <b>GEOPHYSICS</b> ↓	↑ <b>Methods</b> ↓	Application-fields			
		<i>Oil-&amp;gas</i>	<i>Mining</i>	<i>Engineering- Environmental</i>	<i>Regional</i>
↑ <b>Applied</b> ↓	<b>Seismic-reflection</b>	++		++	+
	<b>Electrical</b>	+	++	++	+
	<b>Gravity</b>	+	+	+	++
	<b>Magnetic</b>		+	+	++
	<b>Well-logging</b>	++	+	+	+
	<b>Radiometric</b>		+	+	+
↓ <b>Seismology</b> ↓	<b>Earthquakes</b>	1.→ Seismological-Surveys-Network 2.→ Seismological-zoning-of-Albania			
	<b>Engineering</b>	1. Seismic-Micro-Zoning-and-seismic-risk-evaluation 2. Seismic-monitoring-of-the-hydropower-plant-dams			
↓ <b>Geothermal</b> ↓	1.→ Geothermal-studies 2.→ Geothermal-energy-platform-and-use-scenarios				

Geophysical Exploration and studies have been performed in the framework of the three Geophysical Enterprises:

- **1. Oil and Gas Seismic and Gravity Enterprise in Fieri City:**

4 seismic teams, 1 gravimetric, 1 geoelectrical team,

Marine expedition with seismic, geological and geoelectrical teams.

70 geophysicists engineers.

2500 km/year of seismic profiling by multiple coverage.

- **2. Oil and Gas Well Logging Enterprise in Patosi City.**

30 geophysicists engineers.

Well logging: electric, radioactive and sonic groups,

gas logging groups, perforator groups,

laboratory determination of physical properties of the rocks, and

interpretation group.

Well logging groups carry integrated geophysical study of exploration deep wells (up to 6700 m) for oil and gas, with an annual volume of 80,000 linear meters of exploration wells and tens of thousands linear meters of production wells.



- **3. Geophysical Enterprise of Tirana for mining geophysics.**

106 geophysicists engineers.

**Geoelectrical teams** (35-40 km<sup>2</sup>/year mapping at the scale of 1:10 000, 1:5.000 and 1:2.000).

Averagely the same area have covered also by the **gravity** and **magnetic** survey.

In 2008, the restructuring of the Albanian Geological Service, the company was reformed and closed: several specialists went to the Institute of Earth Sciences was established, some remained in the geophysical unit of Albanian Geological Service.

- **In Geological & Geodesical Enterprise** of the Ministry of Construction and in the Hidrogeological Enterprise of Tirana have two specialized geophysical expeditions for engineering geophysics (1983) and water exploration (1980).

- **Seismological studies** pertain to three areas:
  - Seismotectonic,
  - Seismology, and
  - Earthquake engineering.
- **Teaching of applied Geophysics** has started in **1955** in the Polytechnic Institute of Tirana.
- The formation of geophysical engineers and their post graduate training since **1961** in the Geophysical Branch, Chair of Geophysics, Faculty of Geology and Mining, Polytechnic University of Tirana.

The period of study was five years for engineers, and taken three years for doctoral studies.

Geophysicists of all generations have developed the Albanian geophysics, and have given outstanding contribution to the discovery of eleven oil and gas reservoirs, ten copper deposits, and many other solid minerals.

They have performed also the geophysical regional studies of the Albanides, which are known beyond the borders of the country.

There are **637 of papers** published in national scientific journals, **33 of papers published in international scientific journals**, and **hundred papers that have been presented in international scientific forums** by Albanian geophysicists, ranking among the best Albanian ambassadors in the international community.

Unfortunately, during a very difficult post communist transition between 1990 to 2012, geological research and other scientific activities, including the geophysics went downhill.

Geophysical companies are closed, the volume of work has fallen to the minimum possible, leading to zero discovery of oil and gas, as well as solid minerals.

The geophysics branch in the Polytechnic University of Tirana was recently closed. There are only option for the second cycle, master diploma on geophysics.

Many of the best geophysicists migrated and work in their specialty in France, U.S.A., Canada etc.

- Despite all these processes for geophysics and geological researches, *the Albanian geophysicists currently in Albania are trying to save the geophysics in the conditions of the Albanian market economy.*
- We have started to widen the field of the application of geophysics in other areas and disciplines.
- **Geophysical surveys with modern equipment and software are as important to geological exploration and studies as the X-ray equipment and echo-sounds are to the doctors. Therefore, a geology without geophysics risks a return to the nineteenth-century level.**

In order to assess the new scientific research, inter alia, it is necessary to ask and analyze:

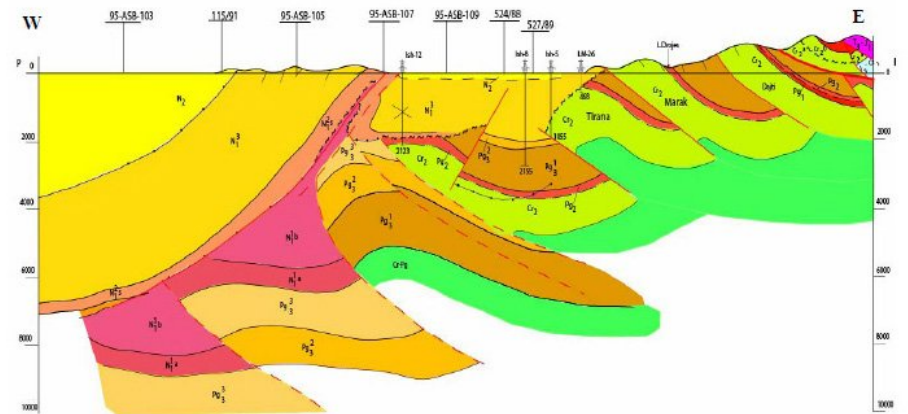
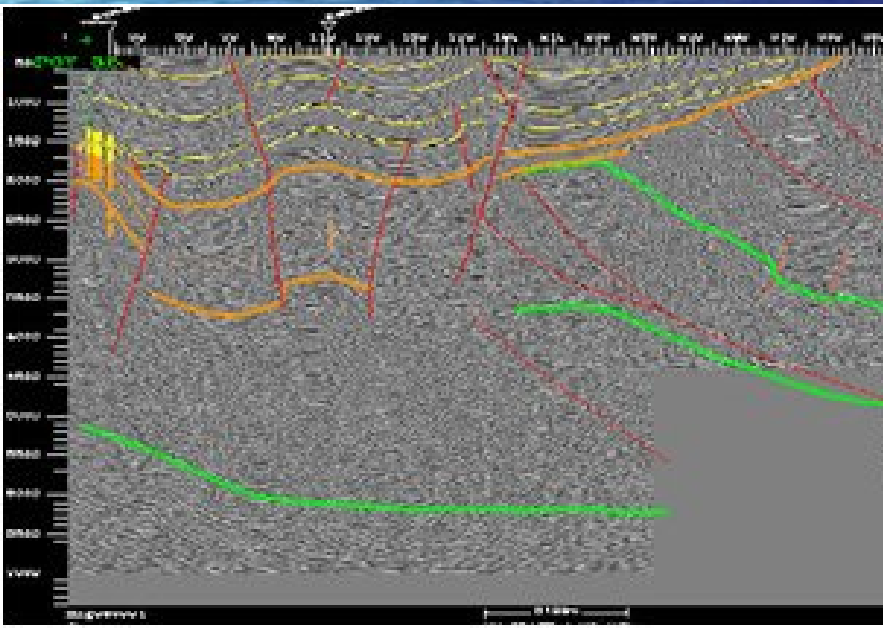
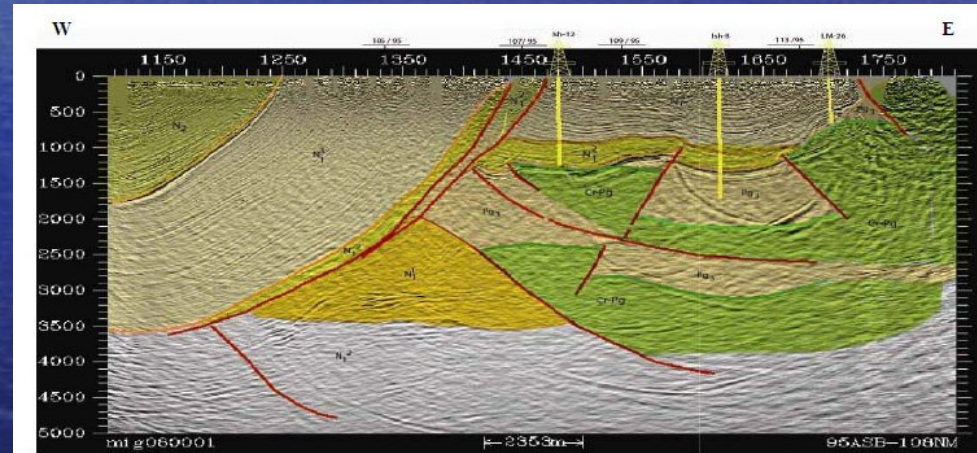
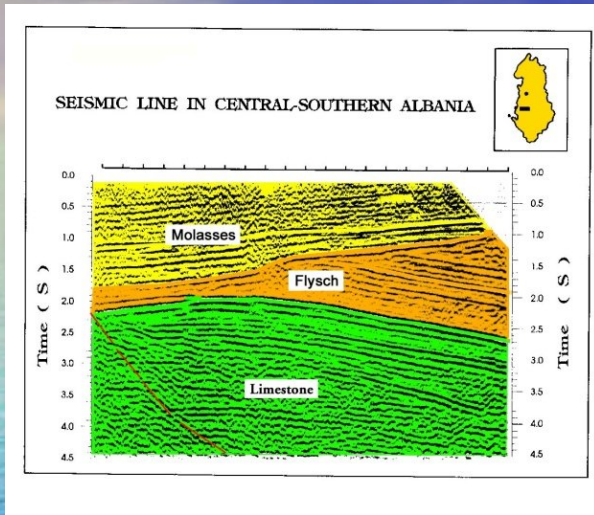
- what was done,
- how it was done, and to determine future tasks and objectives.

In order to present a modest contribution in this direction, we have made a review of the Albanian Geophysics in the years **1950 to 2012**.

# The role of geophysical methods in the framework of integrated oil & gas exploration

- Integrated geophysical exploration for oil and gas had the **reflection seismic survey** as the main method, in onshore and offshore.
- Perspective regions for oil and gas have been mapped by **gravity surveys**.
- Have been used also some vertical electric soundings.
- Successful experiments, but in small volume, were also made for direct search of oil and gas reservoirs by complex of methods: **natural electric field, radiometric and magnetic surveys**.
- All deep oil and gas wells have been studied by integrated **well logging** methods.

# Contributions: in discovery of 5 Oil & 6 gas reservoirs





History of the development of seismic work can present in the three main stages:

- **First Stage 1952-1970:** oscilographic recording, and manual processing and interpretation.
- **Second stage from 1970 to 1978:** Analog magnetic record. multiple coverage profiling, digital processing of the seismic data rugged terrain
- **The third stage from 1980 to 1990:** Digital recording improvement the seismic data processing and interpretation.

**After 1990** there were gradually declining to zero geophysical exploration works for oil and gas by Albanian geophysicists. Actually, performing of the seismic exploration there are realized by foreign companies.

# Albanian Well Logging Service has celebrated 80th anniversary:

Well logging service has started with electric logging, well deflection, diameter measurements, the temperatures records.

- **Sixty years:** quantitative and qualitative interpretation of logging data, determination of the physical properties of the terrigene productive horizons.
- **Later period:** greater development and geophysical integrated logging of the wells in several directions:
  - a) integrated studies : electric, gamma-gamma, neutron logging, neutron activation, sonic and electric lateral loggings, the use of radioactive tracers.
  - b) Quantitative interpretation of geophysical data through computers.
  - c) Study the physical characteristics of the oil and gas bearing collector rocks: carbonate and terrigene.

**Currently**, unfortunately even this direction of the Geophysics is abolished, because there are stopped the drilling of the exploration and development deep wells by Albanian Oil and Gas Industry.

# The role of geophysical methods in the framework of integrated exploration of solid minerals

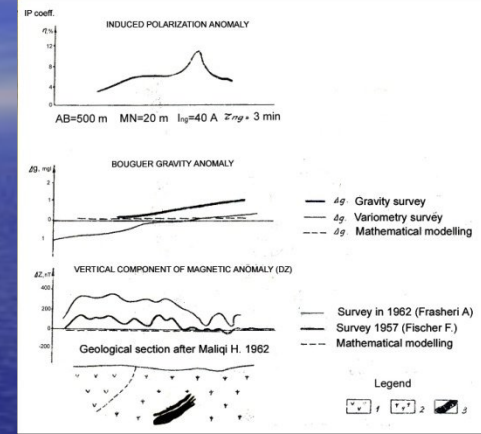
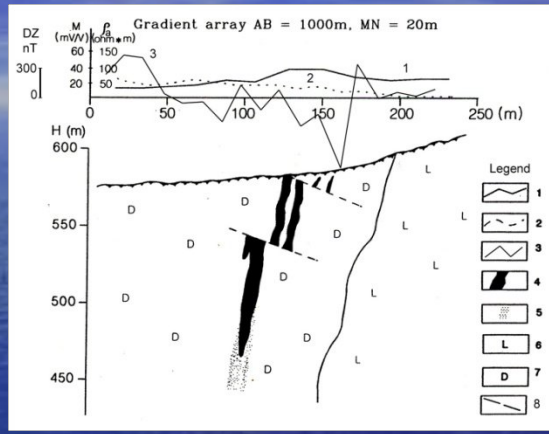
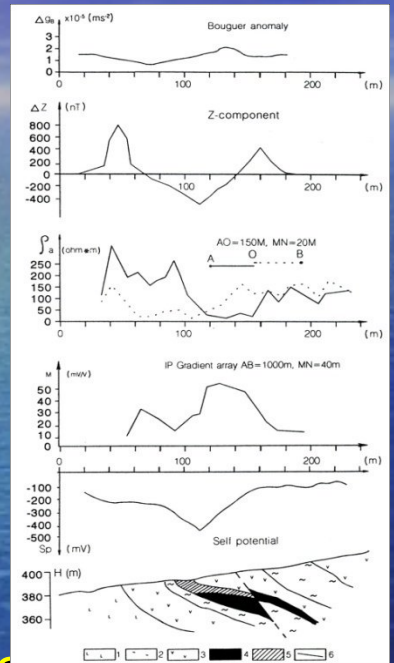
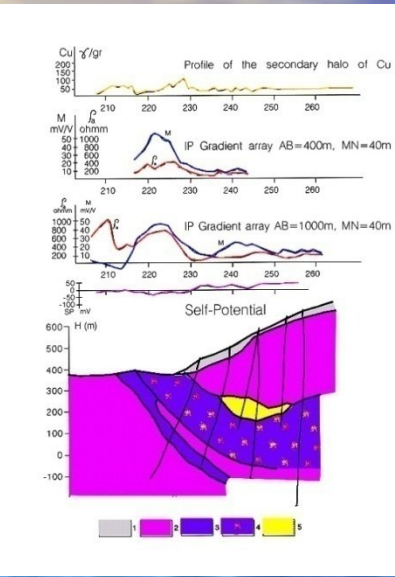
- Geophysical methods were important part of integrated geological exploration for solid minerals, first of all for:
  - copper**, and
  - chromite** mineral resources and deposits.

The role of geophysical methods in the complex has been depended on many factors:

- The kind of mineral to be prospected,
- The stage of the search, and
- The tasks to be solved.

Application of mining geophysics has been concentrated in two major directions:

**1. Direct search: The kind and the genetic type of the mineral have been determinant for the applied methods**



**GEOPHYSICAL ANOMALIES OVER THE CHROMITE ORE BODIES**  
 VLAHNA DEPOSIT IP and Magnetic anomalies  
 KAM TROPOJA DEPOSIT Gravity & Magnetic Anomalies

**Copper deposits**  
 Gjegjani 1959-1961  
 Qafa Barit 1961-1973

**The contribution of the geophysics in the exploration: 13 copper deposits, 145 positive boreholes from, 356 drilled wells for the chrome**

The methodology of the geophysical exploration for copper resources (from the 1930's up to date) and chrome resources (from 1958 up to date) in Albania is developed in conformity with the geological tasks to be solved and with the scientific-technical levels of the geophysical methods.

- **Geophysical copper deposits** exploration and development has high efficiency.

The geophysical method application have been depended by **ore body** depth of location, and kind of the mineralization type.

Geoelectrical surveys have been main prospecting methods, through following evolution:

- **1953-1960** discovery have been based on geophysical self-potential method and resistivity profiling) and geological integrated surveys, for massive and shallow ore bodies, where redox phenomenon is developed.

- **1973-1989-** geophysical exploration was based on results of the application induced polarization- main exploration method in the depth, and self- potential method and resistivity profiling for detalization and selection massive ore bodies from mineralization zenes, in the complex with geological-geochemical integrated surveys.

- During the phase of detailed exploration and developing have been applied:

- the induced polarization method
- EM profiling,
- the radio wave floodlighting method
- mise a la mase method,
- the borehole vectorial magnetic surveys,
- The electrical and gamma-gamma logging.

- In the exploration activity we were learning that:

The minerals and surrounding rocks are characterized by unique value of the physical properties, which depend on their physical-chemical conditions. The inverse is not true, i.e. the same magnitude of a physical property or feature may be the same for several minerals and rocks. For example, good electrical conductors are not only massive sulphides but kaolin and clays as well. Therefore, a single geophysical method and one physical feature of the medium are not sufficient to solve the problem. To find a solution is necessary to know another physical property, for example the induced polarization (IP) parameter, or chargeability. **Exploration have been integrated, with complex of the geophysical methods.**

- In 1978, usefully was started developing of the **IP/Resistivity “Real Section”**.
- Perturbations caused by the topographic effect, variation of thickness and composition of the overburden beds should be considered carefully to avoid false signals and spurious anomalies. To solve this problem, started from 1973 the application of mathematical methods and computer processing of the field data and their interpretation.
- Heights years period was characterized by exploration of copper sulphide massive and disseminated ore deposits, which are located at the depth up to 700-800 m. The main exploration method has been induced polarization method, and underground surveys. The increase of the depth of investigation has been supported by mathematical modeling.
- These achievements were based on further methodological and organizational improvements organization of the geological-geophysical surveying in Albania. Complex geological-geophysical-geochemical teams for the search of copper deposits were created to carry out mappings at scale 1:5000 and detailed studies of anomalies at scale 1:2000. **This was the key of success.**

In the mid eighty's years period there have been solved also two other problems:

- The discrimination of massive ore bodies in great depth, between mineralized zones.
- The discrimination of anomalies composed by the superimposed of the effect from the sulphide ore bodies and from the nearby serpentinite individualization.

These complicated problems stand in front of search for all geophysicists of these days. To solve them we needed another improvement of the methodology of geophysical search, which started at the second half of the years eighty up to date. Besides surface geophysical mapping, have been started to develop the underground geophysical surveys. Underground geophysical methods such as the "mise-à-la masse" were implemented since 1959-1960. The radio wave floodlighting method was experimented in 1964. Other methods were added to this complex such as the vector magnetic method and IP surveys in bore hole, and the borehole's electromagnetic methods of low frequencies, TURAM-TURAM.



The underground geophysical surveys have applied in two directions:

- 1. For the search in the space around and under borehole or galleries, and
- 2. For geophysical documentation of the borehole by electrical and radiometric loggings.

Its objectives were:

- To search of ore bodies in depths 600-700 m.
- To decrease the density of mine works and boreholes
- To decrease the sampling during the drilling process up to the use of drilling without sampling.

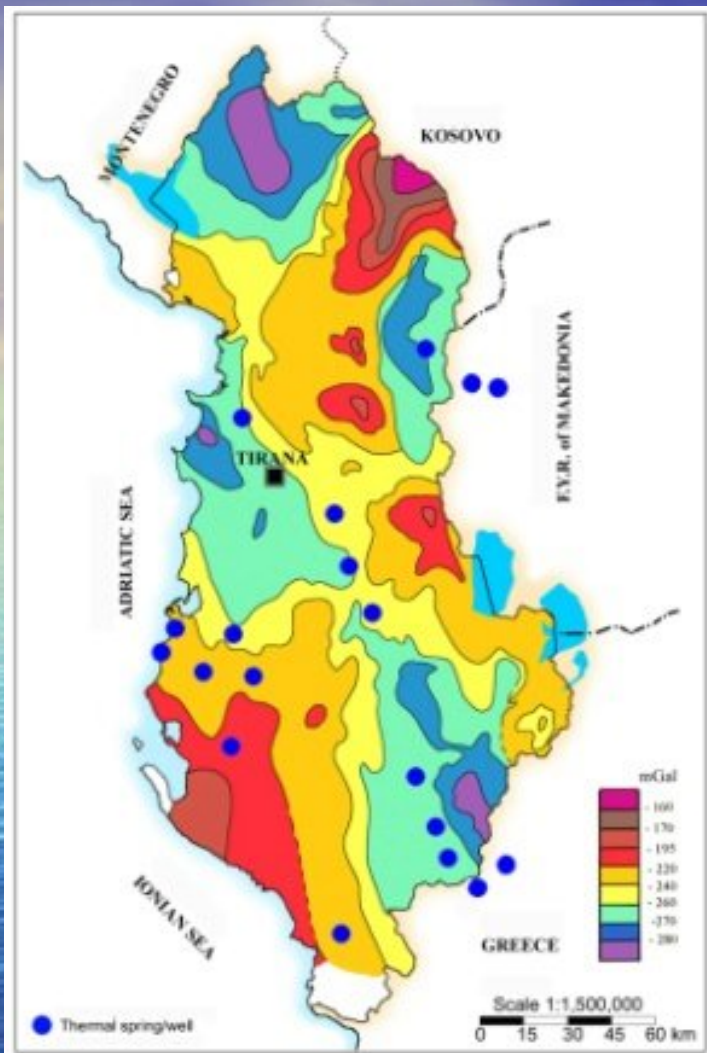
The implementation of geophysical methods in search for mineral resources, in general, and for mineral ore bodies, in particular, has been based also on methodological criteria: **moving from known areas toward unknown, which made possible to discover the biggest copper fields in Albania**, which consisted of 11 copper deposits, located at different topographic levels from surface down to depth of several hundred meters.

**After 1990 year up to present, geophysical exploration of the copper and chrome deposits with the minimal field volumes there are realized by foreign companies, which work in Albania.**

***2. Geophysical structural mapping in the complex with geological mapping in order to recognize the geological settings of perspective zones, and ore control factors.***

The contribution of geophysical studies in the recognition of the tectonic zones and their relationship, is well known in Albania.

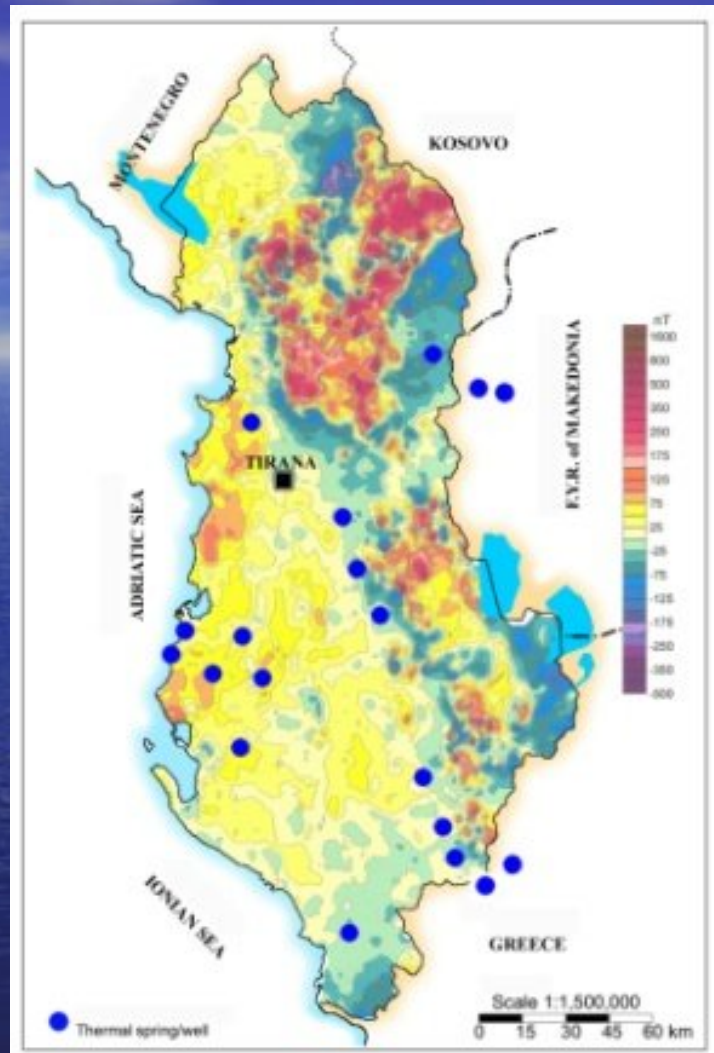
- The gravity and magnetic mapping at scales between 1:25.000-1:200.000.
- In some zones of interest seismic lines and electric soundings have been conducted as well, as example in the Neogene mollasic interfosess.
- The geological setting of ore fields has been studied by using gravity, magnetic and electrical methods at scale 1:10,000 and sometimes 1:5,000. IP/Resistivity profiling and soundings have been increasingly employed in detailed exploration.
- A particular attention has been paid to petrophysical studies as well.



BOUGUER GRAVITY ANOMALIES MAP OF ALBANIA

(After Bushati S, 1998)

Fig. 1.6



TOTAL MAGNETIC FIELD MAP OF ALBANIA

(After Bushati S, 1998)

Fig. 1.8

Bouguer Gravity Anomalies Map,  
at scale 1:200.000

Total Magnetic Field Map  
at scale 1:200.000

# Development of gravity and magnetic surveys

The development of magnetic and gravity surveys was performed in several directions:

- Expanding the field of use of gravity and magnetic methods, as well as technology of surface mapping and underground surveys. Magnetic surveys have been applied for solid ores deposits exploration, including copper, chromium, iron - nickel, bauxite, asbestos, heavy mineral placers.
- Study of magnetic properties and density of minerals and rocks.
- Building of the magnetic and gravitacional country networks of Albania and their connection to international ones.
- The compilation of algorithms and standard software for processing and interpretation of magnetic and gravity data.
- The major results present the Bouguer Anomalies of the Gravity Field and Magnetic Field of Albania Maps, at the scale 1:200.000.
- Performing of the paleomagnetic studies in all Albanian territory, according to the bilateral projects Albania Austria, France, and Greece

# Radiometric studies and explorations

The first measurements of natural radioactivity in Albania, carried out in 1958-1959. Until 1990, radiometric studies and research have been secret.

During the ninety years were opened the radiometric research that have been oriented to solve many problems, which doesn't not have the relations with the Uranium explorations:

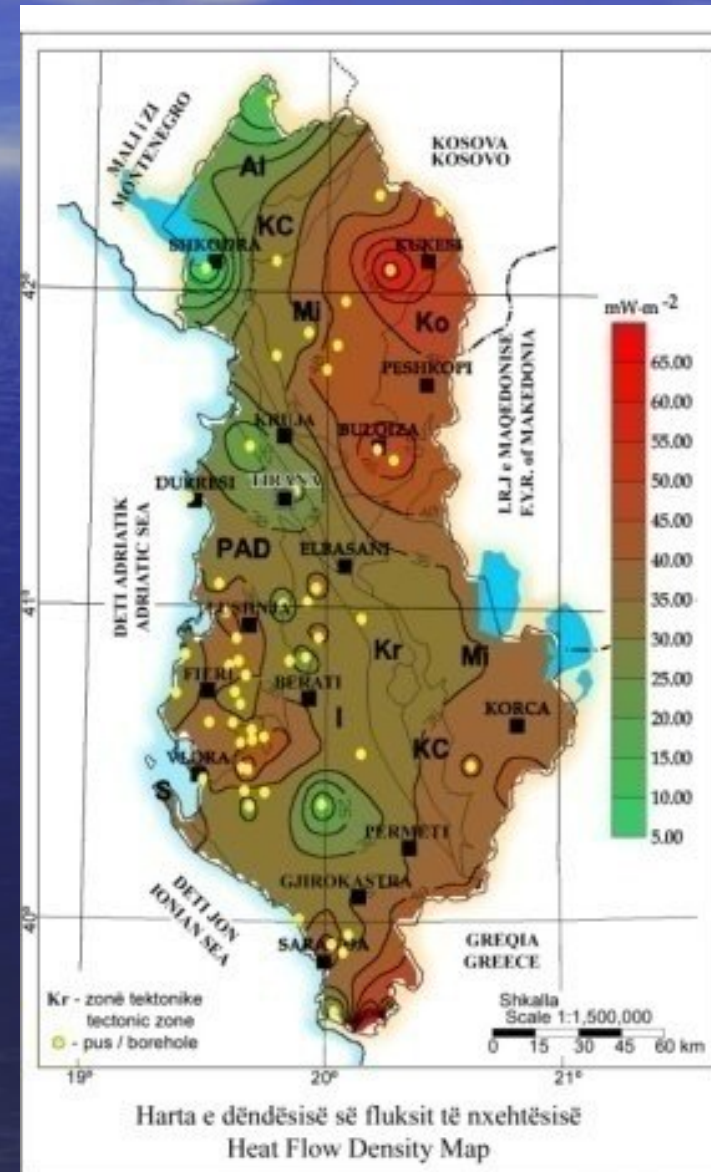
- Gamma spectrometric determinations by radioactive elements U, Th, K in geological samples, in the context of an international project, and for Geochemical Atlas of Albania.
- Regional radiometric studies according to the total gamma radiation parameter. Has been realized the study "Natural Radioactivity of Albania."

Currently, radiometric studies are oriented to solving environmental problems

# Geothermal studies

Results of the geothermal studies have been presented in the monographs:

- “Geothermy of Albanides” (1990),
- “ Geothermal Atlas of Albania” (1995),
- “Atlas of Geothermal Resources in Albania” (1996, Published 2004),
- “Geothermal Atlas of Europe” (1992) published by Geographisch-Kartographische Anstalt Gotha, Germany,
- “Atlas of Geothermal Resources in Europe”, European Commission (2002).
- “Geothermal energy resources in Albania and platform for their use”, Monograph published by Faculty of Geology and Mining, Polytechnic University of Tirana, (2010).

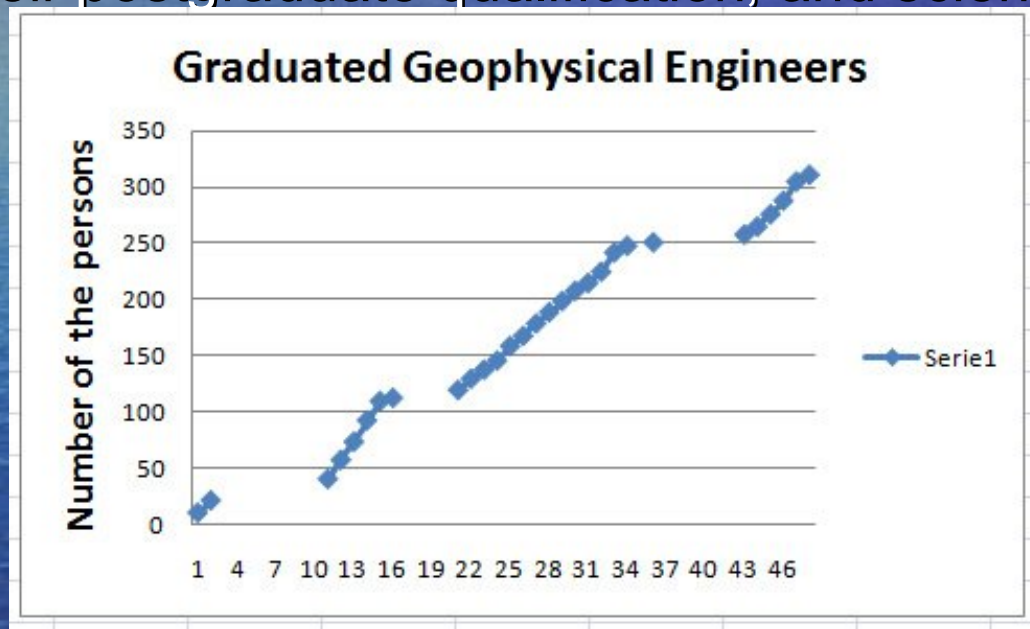


# Seismological studies

- **Albanian seismological network** (from 1979) has fourteen stations in major cities of the country, is part of the European and global network, International Central Bureau of Seismology in Strasbourg, France.
- Major seismological study: **“Seismic Zoning Map of Albania”** (1972), **“Catalog of Earthquakes in Albania”** (1975), and **“Seismological Zoning of Albania”** (1979).
- Eighties years were period when spread massively seismological studies for solving engineering problems, realizing complex seismological- engineering and geotechnical engineering micro zoning of leading cities of the country. Continued high levels of international cooperation on the problem of seismic risk the corner of the Balkans, in the event of the Assembly of European Council of Seismology, as well as in projects of UNESCO.
- Are conducted seven joint international projects and has collaborated on eight projects under the National Program for Research and Development for the publication of major seismological maps, seismo-engineering, neotectonic and the geological risks maps.

# 7. Forming of the geophysicist engineers and their post graduate qualification

Great contribution in development of the geophysics in Albanian is presented by Section of Geophysics in the Faculty of Geology and Mining, Polytechnic University of Tirana in both directions: engineers forming , their postgraduate qualification, and scientific research.



In the Geophysical Branch have been formed **304 of engineer geophysics**, were specialized in geophysics many physicists.

Since 1962, Geophysical Branch has also conducted postgraduate qualification of 48 doctors of sciences.



- The period of study has been five years for engineers, taken 1-2 years (postgraduate school) and three years for doctoral studies.
- During the period 1961-2008 are compiled and continuously improve the curriculum, they respond better to the requirements of time and level of scientific and technological research and geophysical studies and exploration.
- In the Framework of implementing the Bologna Protocol, is closed Branch of Geophysics. Under the new curricula, after the first three years of common cycle (Diploma Bachelor for Georesources or Geoinformatics), a geophysical option is in the second year of the second two years cycle (Scientific Master's degree). **With this curricula, results level landing of the scientific and professional formation of geophysical engineer.**

# Scientific research activity of the Geophysical Section professors, in the collaboration with geophysicists of the Mining and Oil & Gas industries during 1961-2012

**1. Mining geophysics:** For copper, chromite, bauxites, etc. exploration:

Application of the new methods and technologies in Albania:

- Induced polarization method (1962 up to present)
- Micro magnetit surveys (1967)
- IP & RD Real section (1978 up to present)
- Increasing of depth of geophysical investigation (1984 up to present)

**2. Mathematical and physical modeling** for geoelectric, gravity and magnetic methods, and inversion in geophysics. Compilation of the algorithms and software's for data processing and interpretation.

**3. Extension of the application fields** of geophysical methods for exploration of: chromite, asbestos, bauxites, heavy, rare and precious mineral placers, geotechnical and environment investigations, hydrogeological research, application of the natural electrical field for direct search of oil reservoirs.

4. ***Participation in integrated geological-geophysical studies*** for design of exploration oil and gas deep wells ( 1973-1992).
5. ***Marine geophysics*** (1974-1990): Design and construction of the marine geoelectric station for marine vertical electrical soundings and profiling, and participation in performing of the offshore integrated geological-geophysical studies of the Albanian Adriatic Shelf and design of deep wells for gas exploration in Durresi Bay.
6. ***Regional geophysical studies***: Geothermal (1989 up to present), Palomagnetic (1989-1997).
7. ***Geophysical well logging and over normal pressure studies***
8. ***Engineering and environmental geophysics*** (1982 up to present),
9. **Publication of the books**: The Section of Geophysics has completed all courses with textbooks, published in the period 1963-up to present: **19** books for Branch of Geophysics, **4** books for Geological Branch and **5** monographs.

# What shall we do further - as conclusions

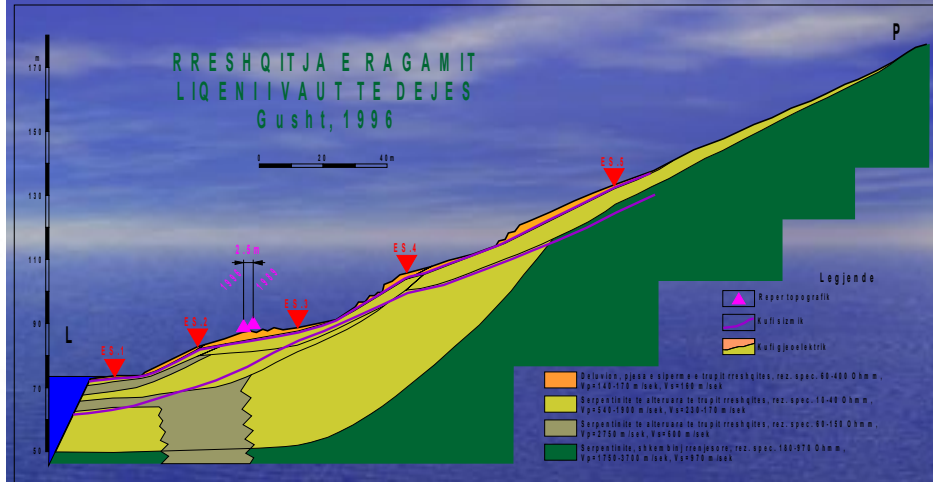
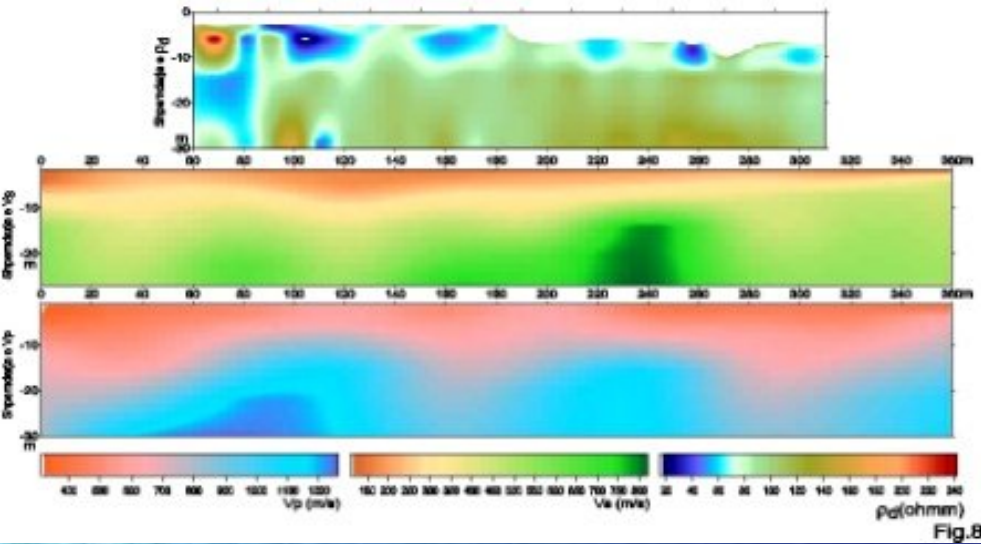
In response to the demands of time and development directions of the geophysics in the last two decades, there were worked successfully for the creation of **Engineering and Environmental Geophysics in Albania**.

For this have been worked in many fields:

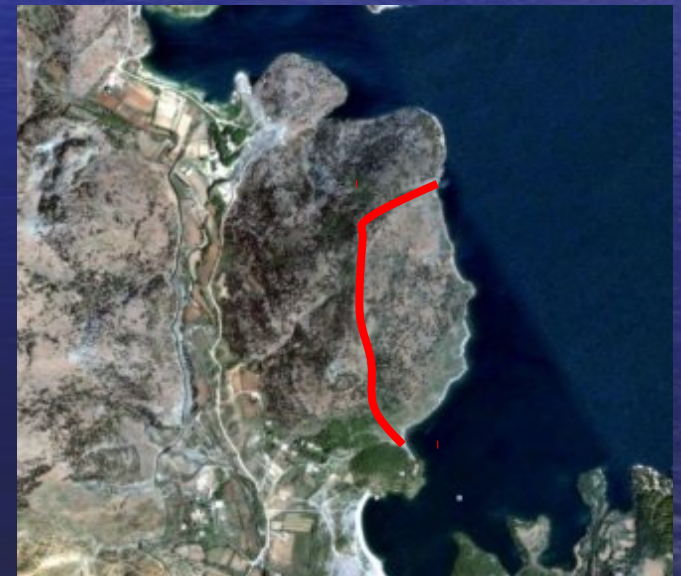
- In-situ seismic and geoelectric tomographies for dams investigation,
- the slope stability evaluation and landslides study,
- soil and bedrocks study in construction and dam sites, of highways, tunnels, etc.,
- karst areas exploration,
- quality assessment of the concrete during construction works, and in the airport runway,
- water exploration,
- study of the urban and industrial landfills,
- assessment of the environmental impacts.

Actually are taken the first positive results, first experience, as well as problems of the beginning.

**ELEKTRICAL RESISTIVITY REAL SECTION AND SEISMIC SECTIONS OF HEAD REFRACTION WAVE VELOCITIES  $V_p$  dhe  $V_s$  VAU DEJES HYDROPOWER PLANT RAW MATERIAL DAM**



Dams investigation



Landslides investigations

- Currently, the geophysical prospecting of oil and gas reservoirs, copper and chromium and other solid minerals deposits are suspended entirely by Albanian geophysical teams.
- Cessation of work and geophysical studies extremely serious consequences for future geological researches: **The geological explorations remain without the modern research methods, and turn to the thirty years of the last century level.**
- With the termination of geophysical explorations, the teams will be destroyed and lost an half century of their experience, well known also from prestigious institutions of advanced countries.

Today, in Albania is important that, in addition to traditional explorations and geological-geophysical studies, based on scientific platform to take the proper development and implementation of Applied Geophysics directions in accordance with the requirements of market economy, for oil & gas and solid minerals explorations, as well as for solving engineering and environment tasks, using modern methods and surveys technology.

For the development of engineering and environmental studies are used the same methods, technologies, and equipments that are used for search of minerals. So, at the present, with exceptions when were working in the framework of European project. Albanian geophysical teams is necessary to obtain modern equipment to solve these new geological tasks, presented by today the market economy in Albania. In particular, this situation is very serious for the study of construction areas, of roads, the investigation of the hydrotechnic constructions like dams, the evaluation of the slope stability and landslides, the assessment of geological hazards, etc..

For the forming of the young geophysicist engineers, currently the problem is re-opened of the Geophysical Branch, and the preparation and implementation of curricula and programs in accordance with the requirements of the Bologna Protocol and today technological level of the geophysical methods. Future geophysicists should be able to realized the oil & gas, and solid minerals exploration, in parallel is necessary to be able to solve also the engineering and environmental problems, applied surveys with modern technology and digital processing of data.

I want to finish our speech with a actual directions of geophysical methods application that opens new horizons for the geophysics in Albania.

Problem to be solved	Multidisciplinary approach
Air/gas emission quality monitoring	Contamination chemistry, fluid dynamics, gas radiometry/emanometry
Noise/vibrations monitoring, induced quakes control	Seismic monitoring, seismic signal processing
Geological mapping in urban areas	Sophisticated geophysical methods, remote sensing, geological mapping
Forensic/criminologic investigations	Sophisticated geophysical methods, medical/engineering ultrasonic investigations, toxicology
Lithological and geological structure, depth to bedrock or groundwater level	Geotechnics, Sophisticated geophysical methods
Cavities, caverns, mining shafts, soil sinking	Sophisticated geophysical methods, civil engineering, archaeology, history
Soil/rocks physical characteristics	Geology, geophysics, hydrogeology, hydrogeochemistry
Roads/bridges, railways, tunnels, channels, pipelines and cables detection and quality	Geophysics, geotechnics, hydrogeochemistry, microbiology, toxicology
Groundwater distribution, quality and management	Hydrogeology, hydrogeochemistry, toxicology, microbiology, fluid transport modeling, regulations in domain of ecology
Groundwater contamination	Sophisticated geophysical methods, chemistry, fluid flow modeling, regulations in domain of ecology
Leakage from landfills	Toxicology, medical statistics, geochemistry, geophysics
LNAPL transport detection and monitoring	Geophysics, civil engineering, toxicology
Public health: geochemical, factors, medical factors	Volcanology, seismology, matematical modeling, Sophisticated geophysical methods, civil engineering, geography – GIS, fluid dynamics
Safe disposal of toxic waste	Stratigraphy, paleobiology, volcanology, matematical modeling, fluid dynamics, geophysics, geography – GIS, atmosphere physics
Landslides, volcanic eruptions, earthquake forecasting, amelioration	
Sea level variations, global heating, catastrophic floods	





Thank you very much for your  
attention!