GENERAL DIRECTORATE OF MINERAL RESEARCH AND EXPLORATION

- MTA
  - was established in 1935
  - 84 year old long standing history

To make research, exploration, analysis and infrastructure works, produce information, contribute to welfare of the country

To lead in earth sciences by adapting itself continuously on a global scale
# MTA WITH NUMBERS

Personnel Structure (05.03.2019)

<table>
<thead>
<tr>
<th>CLASS OF SERVICE</th>
<th>CENTRAL UNITS (Campus)</th>
<th>REGIONAL</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Officials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Staff</td>
<td>1.088</td>
<td>440</td>
<td>1.528</td>
</tr>
<tr>
<td>Administrative Staff</td>
<td>286</td>
<td>248</td>
<td>534</td>
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<tr>
<td>Advocacy Service</td>
<td>8</td>
<td>0</td>
<td>8</td>
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<tr>
<td>Health Services</td>
<td>11</td>
<td>0</td>
<td>11</td>
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<tr>
<td>Assisted Services</td>
<td>18</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>Worker</td>
<td>549</td>
<td>274</td>
<td>823</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1.960</td>
<td>963</td>
<td>2.923</td>
</tr>
</tbody>
</table>

- **Technical Staff**: 1,088 at Central, 440 at Regional, total 1,528
- **Administrative Staff**: 286 at Central, 248 at Regional, total 534
- **Advocacy Service**: 8 at Central, 0 at Regional, total 8
- **Health Services**: 11 at Central, 0 at Regional, total 11
- **Assisted Services**: 18 at Central, 1 at Regional, total 19
- **Worker**: 549 at Central, 274 at Regional, total 823
MTA has the potential of making research and exploration on airborne geophysics by planes, on coastal, marine and seismic researches by Oruc Reis Vessel and on geochemical studies simultaneously at every square meter of Turkey and other countries.
The aim of the geological researches is to produce base data for all earth science branches.

Main topics are
- Geological Mapiing
- Landslide Research
- Active Fault Research
- Remote Sensing Research
- Geographical Information System
- Paleoseismology Research
- Geological Heritage Research
- Volcanology Research
- Climate Change Research
- Paleontology Research
Turkey, an important segment of the Alpine-Himalayan tectonic belt, hosts notably diverse mineral deposits. The complex geologic and tectonic structure of Turkey makes it more difficult for exploration and mining, although it contributes to mineral diversity of the region. Turkey is one of the few countries which can provide most of their raw materials in spite of the geological and technological drawbacks.
Some metallogenic provinces in Turkey are:

1. Ophiolite related provinces; These provinces include chromite, magnesite, asbestos, copper mineralizations.

2. Volcano-sedimentary mineral provinces, related to felsic volcanisms; They include copper, copper - lead - zinc, manganese mineralizations.

3. Mineral provinces related to magmatisms; They include skarn, porphyry, ephithermal systems, with, iron copper, lead-zinc, antimony-gold, wolfram, molybdenum, etc.

4. Sedimentary hosted mineral provinces; They include manganese, iron, redbed type iron-copper, phosphate, stratabound barite-lead, zinc-lead mineralizations.

5. Evaporite related mineral provinces; They include boron, trona, salt, gypsum, celestite mineralizations.

6. Laterite and placer related deposits and mineralizations. They include bauxitic iron, bauxite, nickel, gold mineralizations.
While MTA made approximately 6 million meter drilling studies from 1935 to 2015, 1,542,349 meter drilling is realised just in 2018.
SOME RESOURCES FOUND IN THE LAST TWO YEARS

- 3.3 billion tons coal having 2,000-3,500 calories
- 1.5 billion tons thenardite
- 190 million tons bentonite
- 265 tons gold
- 500,000 tons copper
- 4 million tons lead-zinc
- 35,000 tons rare earth element
- 2,000 tons uranium
LABORATORY FACILITIES

- Our laboratories make **ACCREDITED** analysis.
- The labs have updated with modern technology.
- We can analyze up to 90 parameters.

**TS EN ISO/IEC 17025 Standard**

- **2017**
  - 265,923 Samples
- **2018**
  - 525,137 Samples
ORUC REİS is a fully-equipped multipurpose Research Vessel, having 2D/3D seismic equipment and also remote operating vehicle (ROV), multi-beam echosounder, gravity, magnetic, high resolution systems, gravity-piston corer and oceanographic equipments.

MTA opens for international proposals of collaboration on marine research with R/V ORUÇ REİS. Besides, MTA has already been conducting joint studies with the some important worldwide marine research institutes and organizations based on signed MoUs.
AIRBORNE GEOPHYSICAL SURVEYS

Geophysical studies (i.e. Magnetic, gravity, electrical, electromagnetic, seismic, well-logging and radiometric techniques) are applied for mineral exploration, geothermal research and other scientific research projects in different scales from smaller-scale to regional-scale.

Beside, We are conducting Airborne Geophysical surveys (Magnetic and radiometric) since 2018 by two planes.
With the establishment of Core Information Bank, any kind of drilling core, samples, and geological samples and all information and analyses results will be gathered and will be scanned with high technology devices and their analyses will be made, and they will be kept in modern archives.

With this project, considerable contribution will be made to the country’s economy by avoiding any duplicated investments.
In Sudan, mining geology and geochemistry pre-studies conducted in 6 fields.

According to the field studies and the analyses results obtained, 2 fields were reserved in Red Sea Region on behalf of MTA.

In 28th May 2018, MTA Company Limited was established to carry on mineral research and exploration activities on behalf of MTA.

In 22nd November 2018, a concession agreement was signed between Sudan Geological Survey (GRAS) and MTA regarding to 2 fields. By this agreement, Turkey has been the license holder and the company holder abroad for the first time in its history.

After the three-year exploration phase, in the event that the suitable operating reserve will be found, operating phase will be started and a new company will be established so as to carry on operating activities.

In the forthcoming period, together with airborne geophysical surveys, detailed mining geology studies will be conducted in the license areas.
At the official visit between December 27, 2017 and January 7, 2018, 6 license areas were reserved for MTA.

MTA realized feasibility studies at the 6 license areas in Uzbekistan and Protocol Agreements with regards to reserving 3 of these license areas was signed.

A company to carry out research and exploration activities in Uzbekistan on behalf of MTA was established with the name of "MTA Tashkent Mining" on July 19, 2018. Concession Agreement of these license areas between MTA and the State Committee of the Republic of Uzbekistan on Geology and Mineral Resources (GOSCOMGEOLOGY) is signed in 13.02.2019.
Within the framework of the Turkey General Geochemistry Atlas Project, 133,320 samples have been taken, the analyses for 57 parameters have been completed, and the publishing of an 18-sheet map having the scale of 1/500,000 covering the whole area of Turkey has been completed.

According to the data obtained as a result of the studies, for 182 license areas where there is a potential the licenses have been taken.
**MTA - JICA Cooperation**

- The training program on “Exploration and Evaluation of the Underground Resources” was conducted between the years 1997-2005 and totally 15 countries were participated in it. The participating countries were Azerbaijan, Bosnia-Herzegovina, Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan, Turkmenistan, Georgia, Moldova, Syria, Ukraine, Afghanistan, Iraq, Palestine and Pakistan.

- The Third Country Training Program for only one country was first realised in 2006 for Palestine and lasted three years. The program was implemented with the technical support of General Directorate of Forestry and General Directorate of Land Registry and Cadastre.

- Within the same context, the program on “Capacity Building in Remote Sensing and Geographical Information Systems” for Iraq was realised between 2010-2013 with the technical support of General Directorate of State Hydraulic Works and Istanbul Water and Sewerage Administration.

- In the Third Country Training programs that were conducted between the years 1997-2013 totally 359 experts were participated and the programs were financed by JICA.

- Within the scope of Third Country Training Program (TCTP) between Japan International Cooperation Agency (JICA) and our General Directorate, training program on Exploration and Evaluation of Mineral Resources for Balkan was realized with 7 participants from Albania and Kosovo between November 9 and 20, 2015. The last program was held in the General Directorate of MTA between November 14 and 25, 2016 with the cooperation of MTA and JICA and 12 participants participated in the program, 5 from Bosnia and Herzegovina, 6 from Albania and 1 from Kosovo.
Exploration projects performed by MTA and Japan sides «Turkish-Japanese Joint Projects»

- Identification of VMS-type Copper-Lead-Zinc deposits in Eastern Black Sea Region with similar geological characteristics as Japanese deposits (1968-1971)
- Cu-Pb-Zn Explorations on Trabzon (1974-1976)
- VMS Type mineral exploration on Giresun-Espiye, and Regional evolation studies of VMS Genesis (1995-1997)
- Geological and geochemical modelling Project on Hydrothermal deposits of Western Anatolia (2001-2004)
- Determination of potential mineralised area and mineral exploration Project on Hopa (Artvin) region (2002-2005)
BASE METALS IN TURKEY
The copper-lead-zinc deposits of Turkey can be classified as the following subgroups in terms of type of formation; they are:

- Mineralizations associated with ophiolites
- Mineralizations associated with andesitic-dacitic volcanism
- Skarn- and vein-type mineralizations
- Porphyry-type mineralizations
- Stratiform-type mineralizations
COPPER-LEAD AND ZINC DEPOSITS IN TURKEY
REE mineralisations in Turkey

- Eskişehir-Sivrihisar
- Sivas-Karaçayır
- Sivas-Yıldızeli (REE-Th)
- Kayseri-Felahiye
- Malatya-Kuluncak (REE-U-Nb)
- Burdur-Çanaklı

Legend:
- Occurrence
- Resource / Reserve (Feasibility Study Ongoing)
- Reserve
Malatya-Kuluncak region is seen as an important resource.

In the field there are alkaline magmatic rocks intruded to limestones. Minerallization is related with these alkaline rocks and metasomatism.

Between 2015-2018 MTA carried out Geophysical, Geological and Drilling Studies.
- 100 km$^2$ 1/25000 scale detailed geological map
- Totally at 10000 location (distance between profile lines are 50 meters and every 50. Meters on the line), Magnetic and Spectrometer Data (U, Th, K) observed. And according to these data, Th, U and K concentration maps produced.
• Resources for the REE oxides with grade ≥2000 ppm has been estimated as 20,000,000 tonnes.
• U₃O₈ with grade 200 ppm has been calculated as 4,000,000 tonnes (800 tonne metal content)
• Nb₂O₅ with grade 1000 ppm has been calculated as 20,000,000 tonnes.
• Niobium-Tantallium- Uranium is one of the most important ore formation where the REE Oxides can be recovered.
In the area, there is fluorite mineralisation related the contact metasomatism. REE’s, thorium and uranium accompany to the florites. Syenite intruded to the limestone. We carried out detail gravity, magnetic and radiometric geophysical studies.
Carbonatite dyke and peralkaline syenitic rocks including REE mineralization are situated in north of Sivas city.

Contact between Alkali-feldspar-syenite and sovite on trench.
Surface samples content up to 3500 ppm total REE. Drillhole samples carbonatites content up to 10.100 ppm total REE.
There is a syenite intrusion. The detail geology and drilling study realized in this region. In the borehole sample obtain 10,000 ppm total REE in flourite bearing zone.

Closer view of nepheline-syenite

Flouritased carbonate rock
A private mining company worked in Çanaklı deposit (Southwestern Turkey). The host rocks are unconsolidated pyroclastic deposits associated with alkaline volcanism Çanaklı-1 and 2 sites, which are adjacent to each other, have 0.08% and 0.07% REE concentration, respectively. 80 and 414 million tons of possible reserves have been reported.
Conclucion

- Extensive alkaline magmatism occurred as a result of extensional tectonics in Turkey.
- When the geological maps, geochemistry atlases and airborne radiometric surveys carried out on recent years are assessed together, it is possible to discover new potential areas.
- We are ready to cooperate with you on mineral processing from REE mineralization in addition to mineral exploration surveys and new possible discoveries as well.