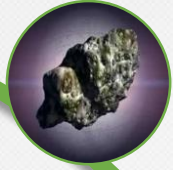




# Rare Earth Elements Research Institute (NATEN)

Dr. Hasan Hüseyin ERDOĞAN  
NATEN  
Acting Director  
Tokyo-13 March 2019

# Outline



**What are Rare Earth Elements (REE)?**

**Global Supply of REE**

**REE Potential of Turkey**

**Rare Earth Elements Research Institute (NATEN)**

**Possible Cooperation with Japanese Institutions**

# Outline



**What are Rare Earth Elements (REE)?**

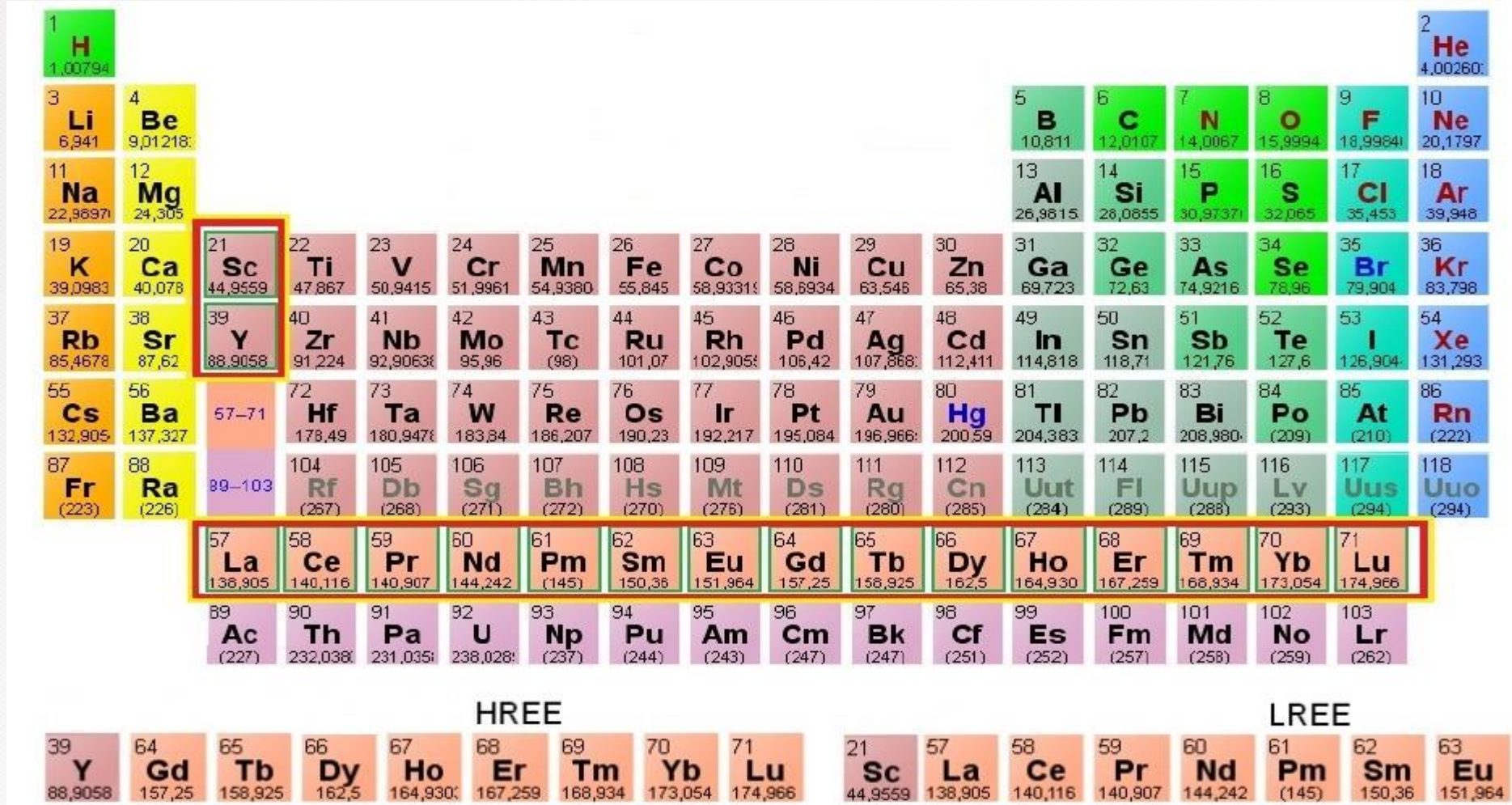
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# What are Rare Earth Elements?



“Rare Earths” are 17 metallic elements including lanthanides, scandium and yttrium. Scandium and yttrium are considered rare earth elements since they tend to occur in the same ore deposits as the lanthanides and show similar chemical properties.

# Properties of REE

(Sc) Scandium  
(La) Lanthanum  
(Ce) Cerium  
(Pr) Praseodymium  
(Nd) Neodymium  
(Pm) Promethium  
(Sm) Samarium  
(Eu) Europium

Light REE

(Gd) Gadolinium  
(Tb) Terbium  
(Dy) Dysprosium  
(Ho) Holmium  
(Er) Erbium  
(Tm) Thulium  
(Yb) Ytterbium  
(Lu) Lutetium  
(Y) Yttrium

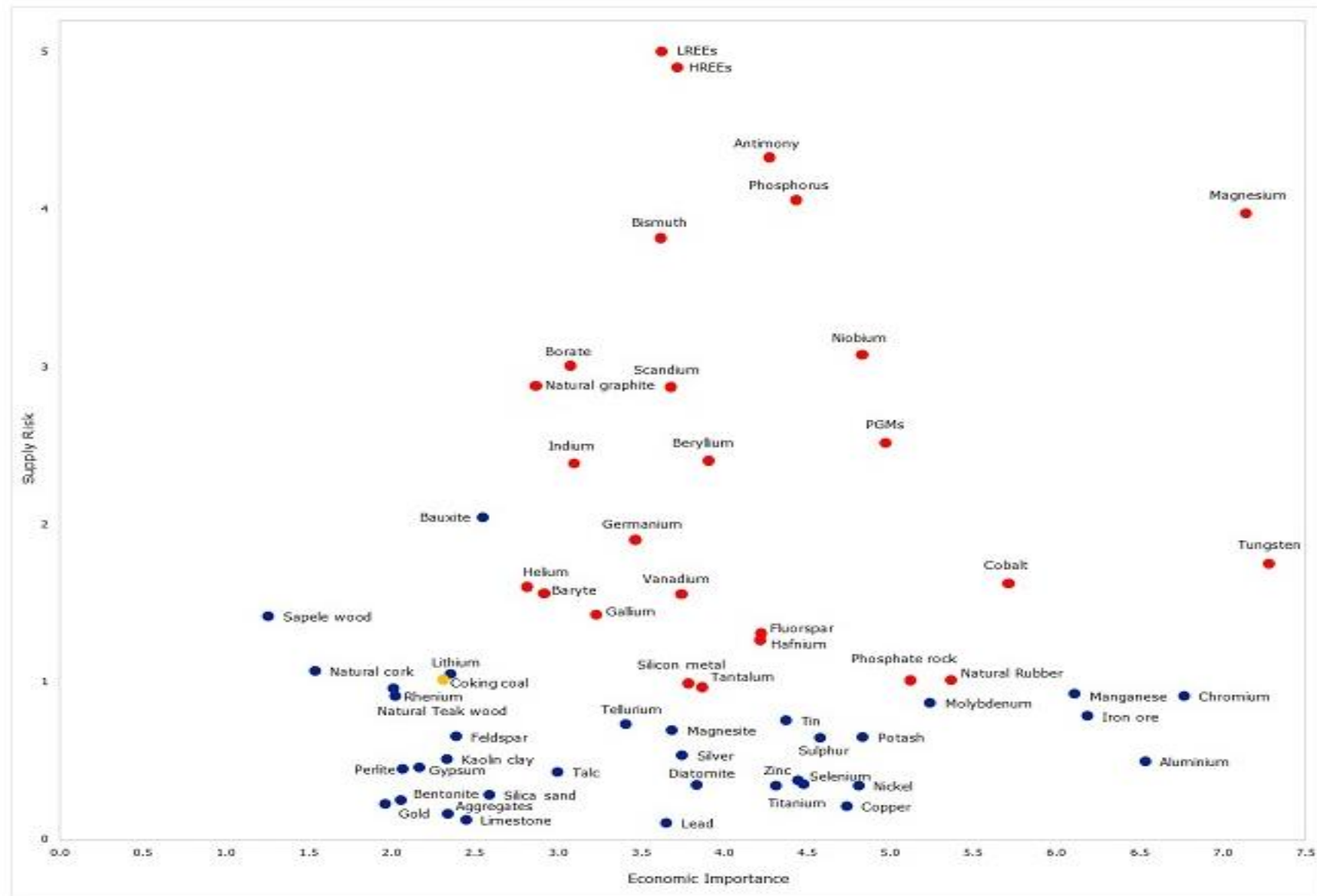
Heavy REE



## Properties of REE

- Iron gray/silvery in color
- Typically soft, malleable and ductile
- Usually reactive
- Reactivity especially strong at elevated temperature
- High electrical conductivity
- High melting and boiling points
- Reacts with H<sub>2</sub>O and releases H<sub>2</sub>

# Why REE are Important?



Source: 2017 EU  
Critical Raw Materials  
Report

# Why REE are Important?



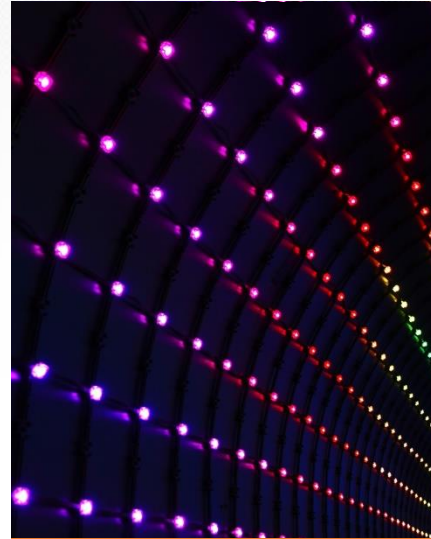
## Renewable Energy

- ✓ Praseodymium
- ✓ Neodymium
- ✓ Dysprosium



## Digital Technology

- ✓ Yttrium
- ✓ Europium
- ✓ Terbium



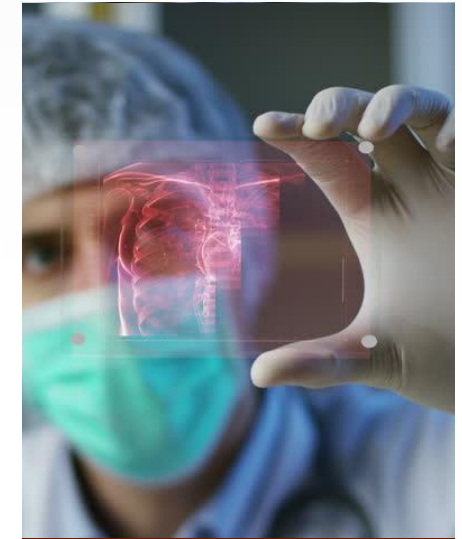
## Lighting

- ✓ Yttrium
- ✓ Europium
- ✓ Terbium



## Military and Industry

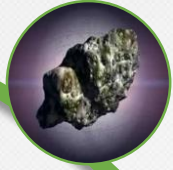
- ✓ Lanthanum
- ✓ Cerium
- ✓ Dysprosium



## Medical Applications

- ✓ Neodymium
- ✓ Gadolinium
- ✓ Dysprosium

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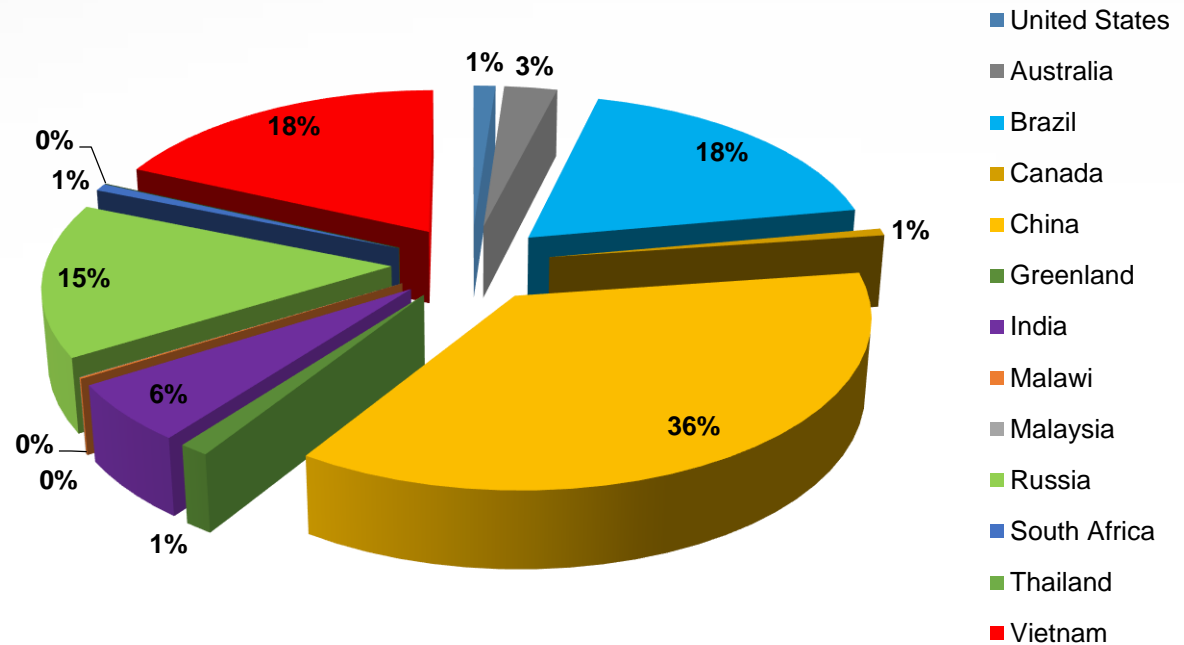
**Possible Cooperation with Japanese Institutions**



# Global Rare Earth Reserves

COUNTRY	REE RESERVES (t)
United States	1.400.000
Australia	3.400.000
Brazil	22.000.000
Canada	830.000
China	44.000.000
Greenland	1.500.000
India	6.900.000
Malawi	140.000
Malaysia	30.000
Russia	18.000.000
South Africa	860.000
Thailand	NA
Vietnam	22.000.000
<b>World total (rounded)</b>	<b>121.000.000</b>

### Country REE Reserves



Source:USGS Mineral Commodity Summaries 2018.



2017 Global Rare Earth Reserves were determined as 121 Million Tones

# Global Rare Earth Reserves



China ranks first with 36% in REE reserves. It follows Brazil and Vietnam by 18% and then fourth place is Russia with 15%.

# Events in the WORLD



✓ In China, the rare -earth mining production quota for 2017 was set at 105,000 tons, unchanged from that in 2016.



✓ In Nebraska, one company commissioned an operation that produced separated rare-earth oxides from an initial production feedstock material from recycled fluorescent light bulbs. The company planned to ramp up production to 18 tons per month using a specific technology.



✓ Through September 2017, China had exported 39,800 tons of rare-earth materials, a 10% increase compared with exports for the same period in 2016.

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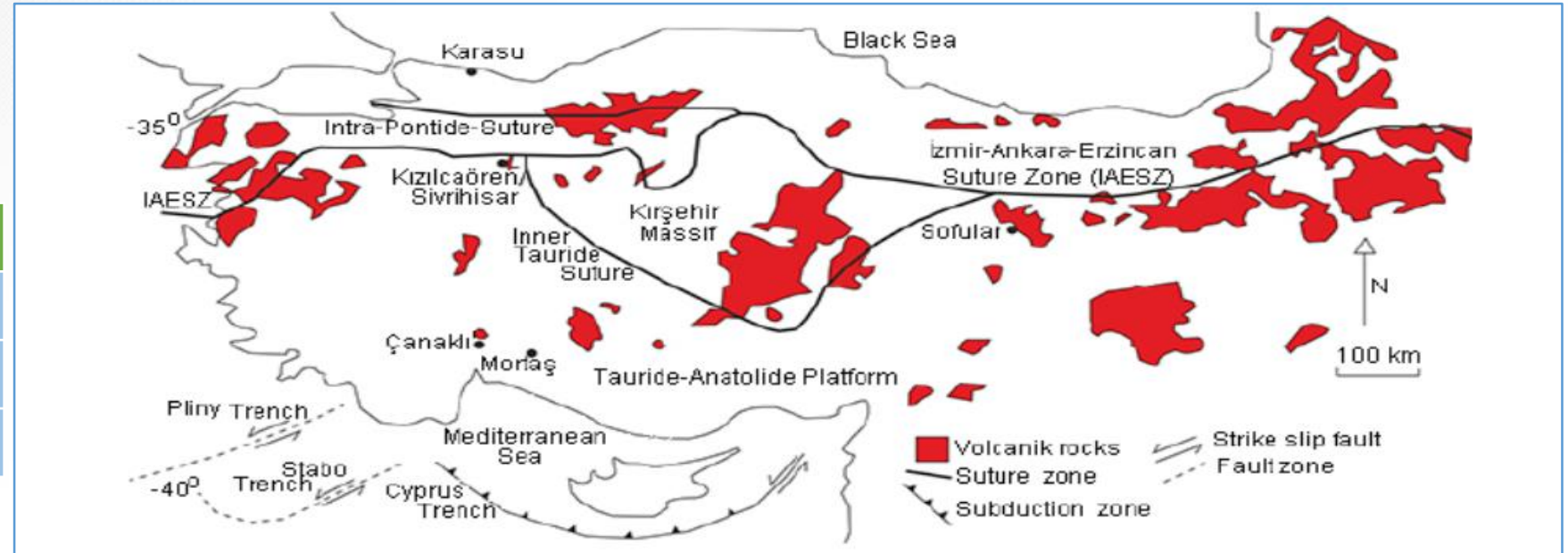
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# REE Potential of Turkey

## Potential REE reserves/resources in Turkey;

Location	Status
Eskişehir	Proven
Sivas	Possible
Malatya	Possible



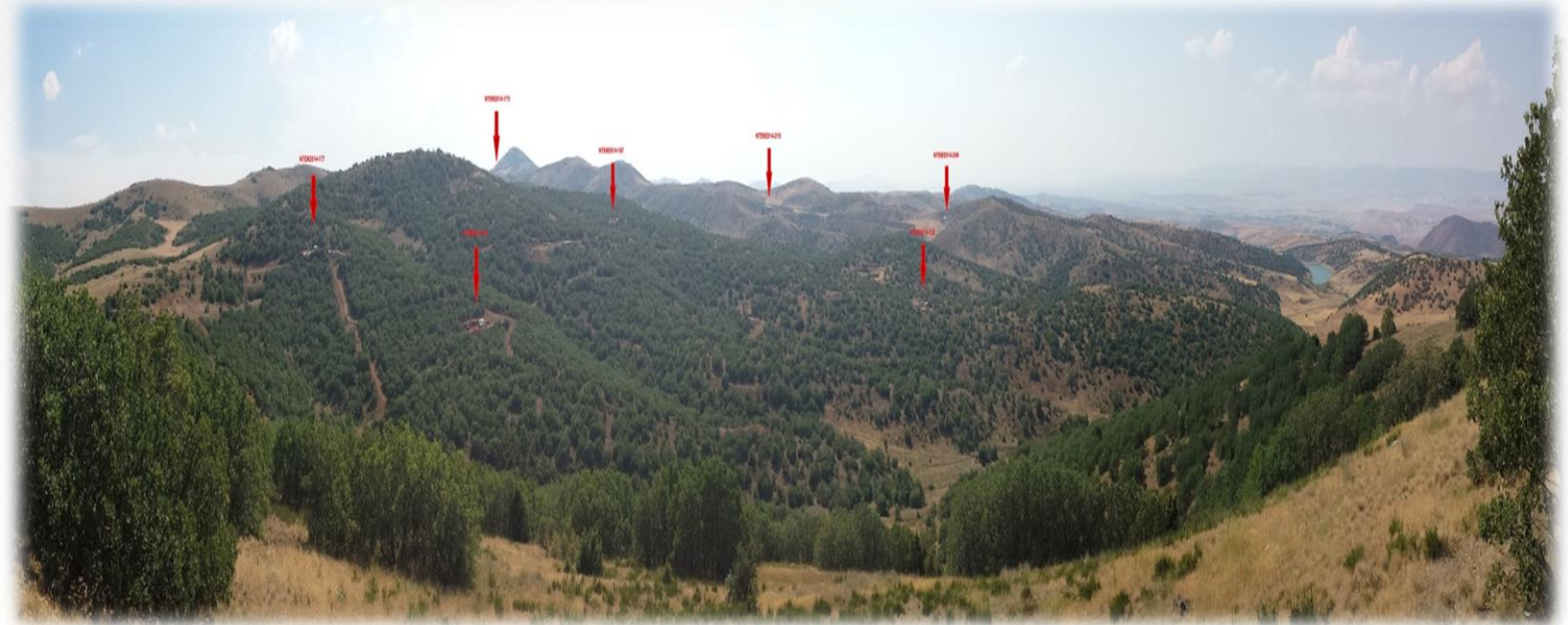
# Eskişehir – Beylikova - Kızılcaören

Biggest Deposit in Turkey

## The ore deposit;

✓ in Eskişehir,

✓ 35 km away from Ankara-Eskişehir highway and 12 km away from railway,



## Reserve (t)

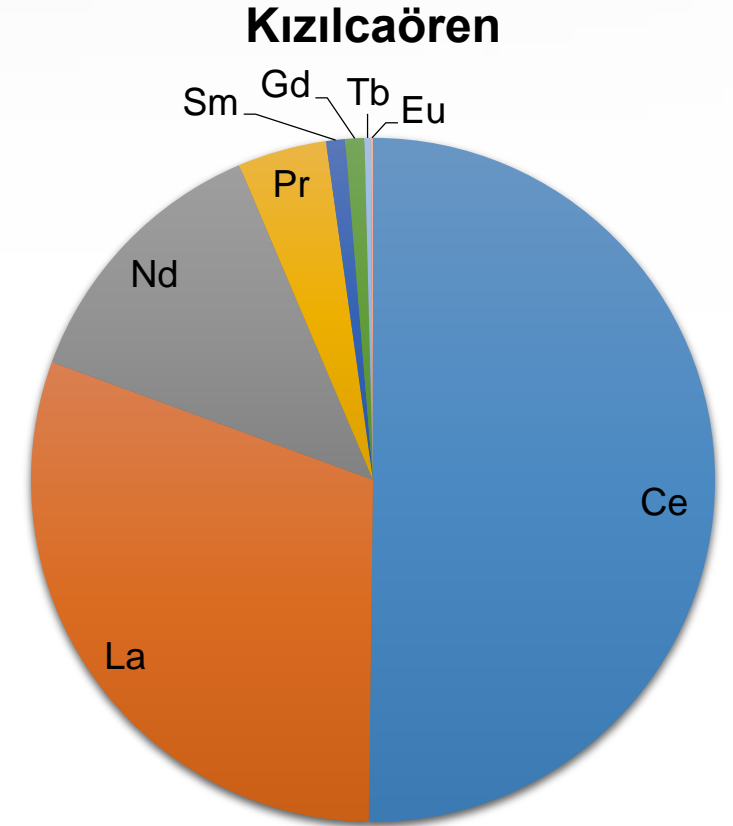
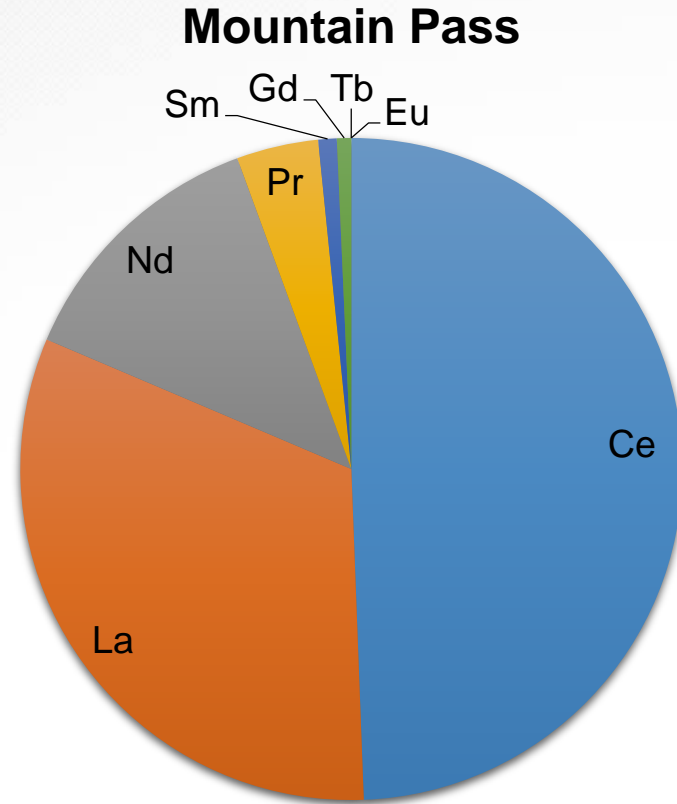
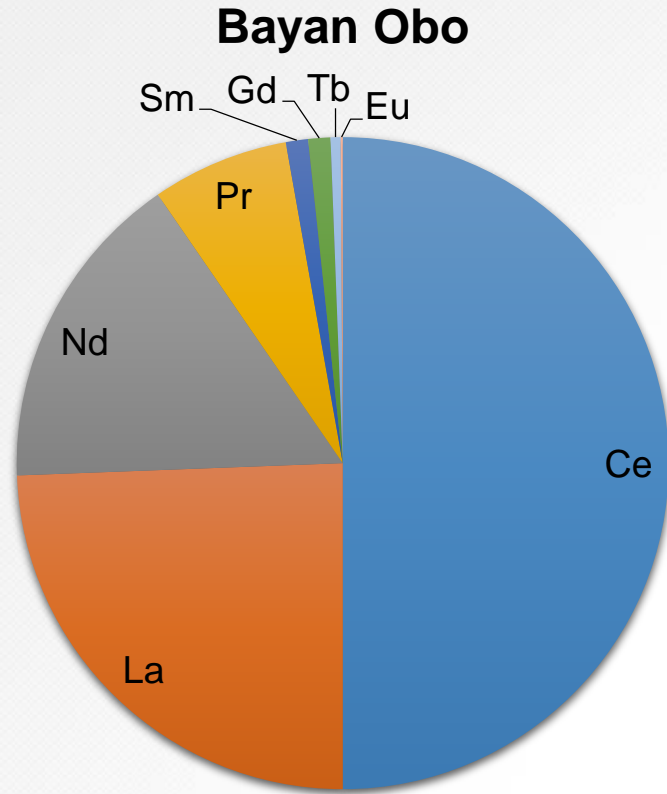
Proven

53 Million

✓ has average 3.14% grade.

# Eskişehir – Beylikova - Kızılcaören

Biggest Deposit in Turkey



# Eskişehir – Beylikova - Kızılcaören

Biggest Deposit in Turkey



- ✓ There are still ongoing studies on the field.
- ✓ After those studies, the proven reserve is expected to be much more than current estimates.



# | Related Corporations



General Directorate of  
Mining and Petroleum  
Affairs  
(MAPEG)



General Directorate of  
Mineral Research  
and Exploration  
(MTA)

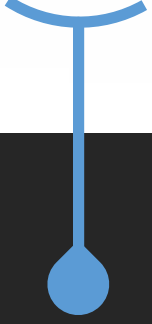


General Directorate of  
Eti Mining Operations  
(ETİ Maden)



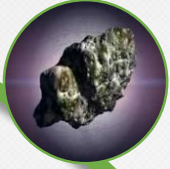
National Boron  
Research Institute  
(BOREN)

# NATEN



Rare Earth Elements  
Research Institute  
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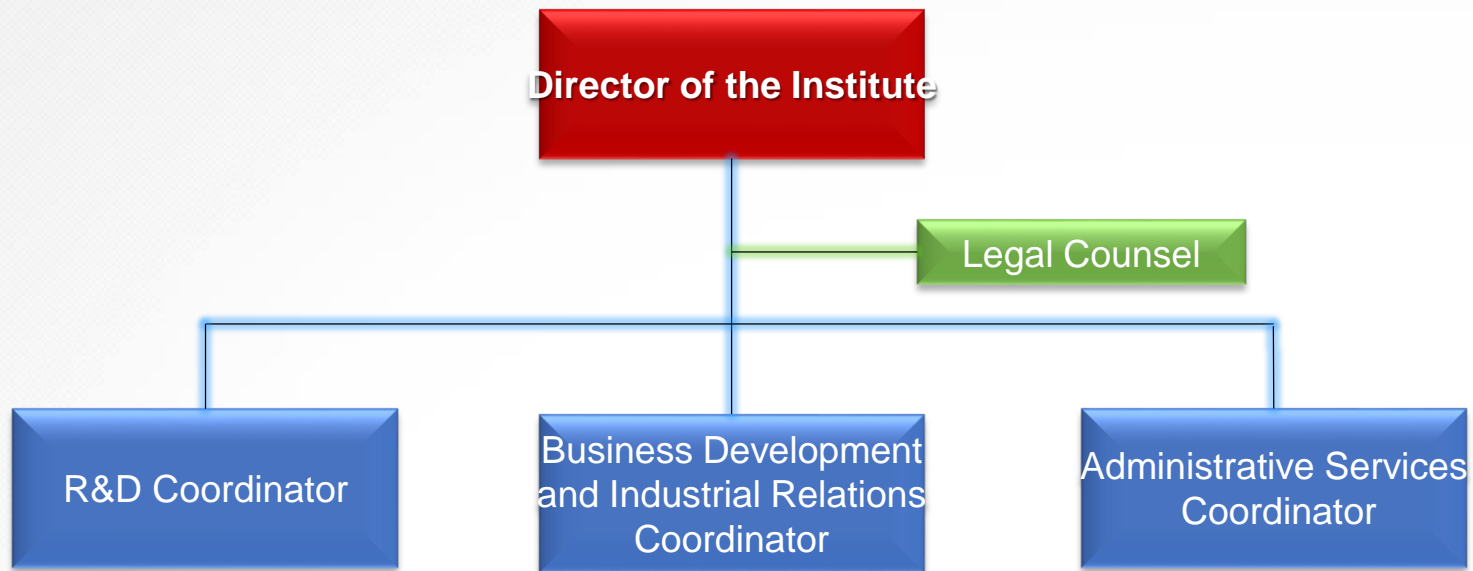
**Possible Cooperation with Japanese Institutions**



# Rare Earth Elements Research Institute (NATEN)

## Organizational Structure

- The Institute was established on July 15, 2018 with the Presidential Decree No: 4.



# Rare Earth Elements Research Institute (NATEN)

## The Objectives:

- ✓ To make basic and applied researches in order to develop technologies and produce related products
- ✓ To provide necessary scientific environment and infrastructure
- ✓ To provide the necessary information for short, medium and long term policy and strategies about REE and other elements
- ✓ To establish laboratories and research centers



# Rare Earth Elements Research Institute (NATEN)

## The Objectives:

✓ To provide coordination between public and industrial institutions and universities,

✓ To make researches about the effects of REE and other elements on the environment and human health



✓ To carry out studies regarding the cooperation between international institutions,

✓ To carry out R&D projects and other scientific studies in cooperation with public institutions and organizations

# Rare Earth Elements Research Institute (NATEN)

## The Objectives:

- ✓ To carry out book and journal publishing activities and cooperate with national and international organizations
- ✓ To carry out and/or support international research and development activities
- ✓ To support, organize and participate in scientific meetings and events



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# Potential Cooperation Between **NATEN** & Japanese Institutions

- ✓ **Cooperation in technology development**
- ✓ **Collaboration on R&D studies between related institutions from both sides**
- ✓ **Technology transfer**
- ✓ **Working on common pilot projects to share know-how**



- ✓ **Cooperation on investments for REE reserve utilization**



THANKS  
FOR YOUR LISTENING

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