



The Geological Surveys of Europe

# EuroGeoSurveys

***EU-Latin America Dialogue on Raw Materials: enhancing the co-operation  
Santiago del Chile, 25-26 April 2016***



## **EU-LATAM Geological Cooperation**

**40 Years Listening to the Beat of the Earth**

# EuroGeoSurveys

37 Geological Surveys

Work force of  
**SEVERAL THOUSANDS**

Over 1 billion euro (1,13 billion USD)  
*annual turnover*

Albania  
Austria  
Belgium  
Bosnia & Herzegovina  
Croatia  
Cyprus  
Czech Republic  
Denmark  
Estonia  
Finland  
France  
FYROM  
Germany  
Greece  
Hungary  
Ireland  
Italy  
Kosovo  
Latvia  
Lithuania  
Luxembourg  
The Netherlands  
Malta  
Norway  
Poland  
Portugal  
Romania  
Russian Federation  
Serbia  
Slovakia  
Slovenia  
Spain  
Sweden  
Switzerland  
Ukraine  
United Kingdom



**GEOCHEMISTRY**

**SOIL RESOURCES  
(SUPERFICIAL DEPOSITS)**

**SPATIAL INFORMATION  
(INSPIRE)**



**MINERAL RESOURCES**



**MARINE GEOLOGY**



**GEOENERGY**



**STRATEGY**



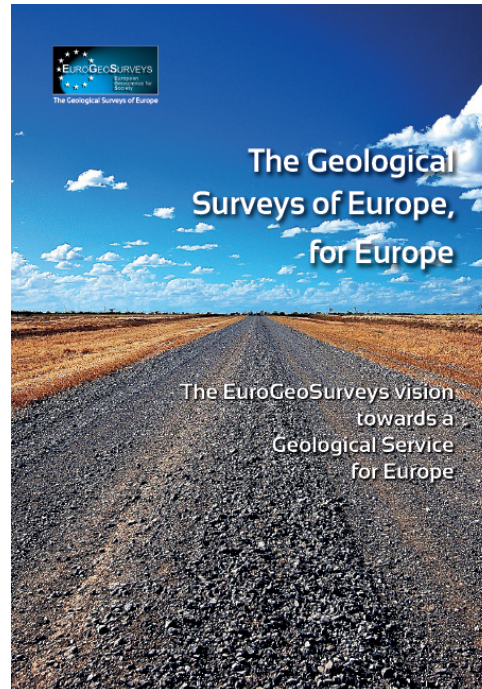
**INTERNATIONAL COOPERATION  
AND DEVELOPMENT**



**EARTH OBSERVATION  
AND GEOHAZARDS**



**WATER RESOURCES**



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# Geological continental cooperation

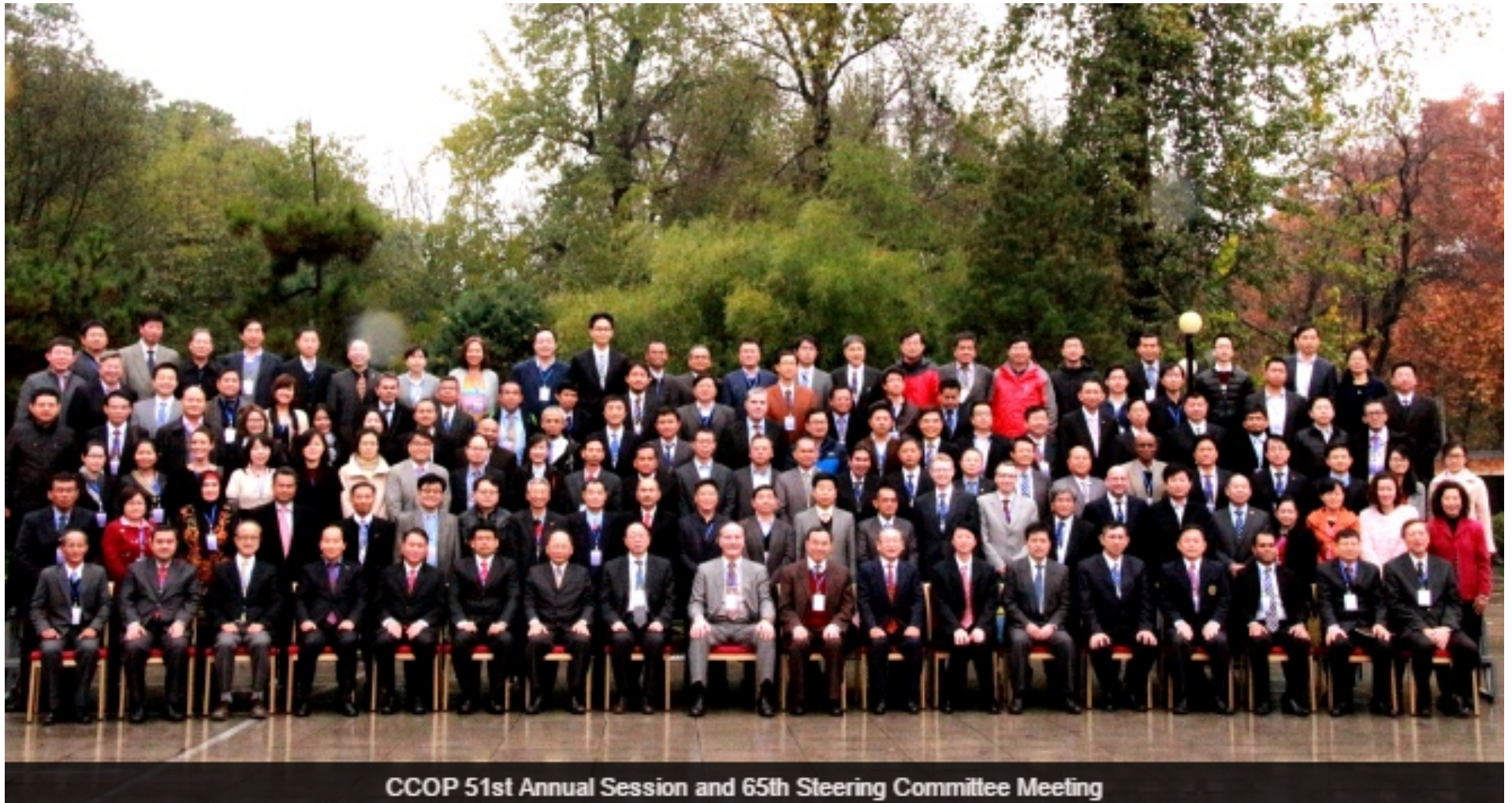


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# External relations

## CCOP General Meeting – November 2015



# Implementation



## Governance

**Workshop on Mining Taxation**  
"Transforming mineral wealth into sustainable development", Addis Ababa on 9-10 December 2011

## Investment and infrastructure

**AU-EU joint event on infrastructure** for extractive industries, Brussels, 19-20 March 2015

## Geological knowledge and skills

**Support for the EGS-OAGS scoping study** on geological co-operation from the JAES support mechanism

# A success story



OAGS General Meeting in  
Niamey, Niger

**26-27 September 2011**

Delivery of EGS geological  
data compilation to OAGS,  
Windhoek, Namibia

**11-12 December 2012**

EGS-OAGS Technical  
Meeting, Niamey, Niger

**16 July 2013**

Signature of contract EGS-  
EC, Brussels, Belgium



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**After two years of intensive joint work...**



# Raising interest... Building consensus!



# When cooperation is real, it brings results!



**Organisation of African Geological Surveys**  
Organisation des Services Géologiques Africains  
Organização de Serviços Geológicos Africanos

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EGS-OAGS Workshop Brussels 2014

# Geoscientific knowledge and skills in African Geological Surveys

SERVICE CONTRACT FOR EUROPEAN UNION  
EXTERNAL ACTIONS  
N° 323 - 534  
FINANCED FROM THE EDF  
FINAL REPORT



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irope

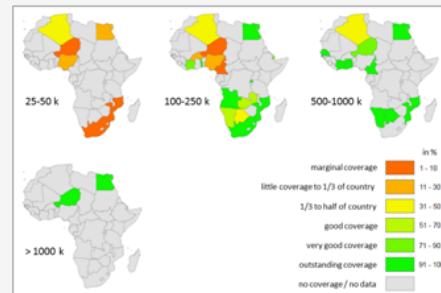


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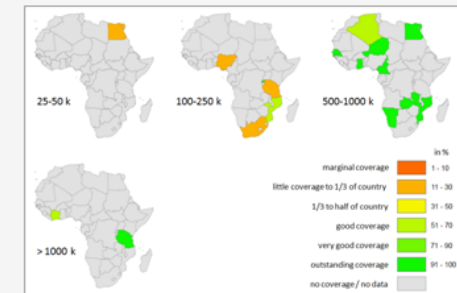
# A success story - Gap analysis results

## Estimated coverage of **geoscientific maps** for different scale ranges

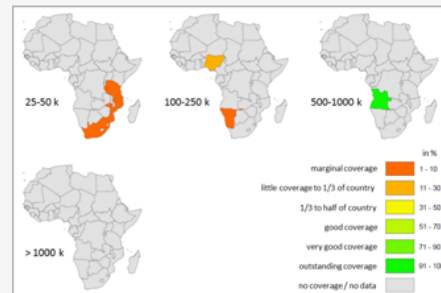
### Geology



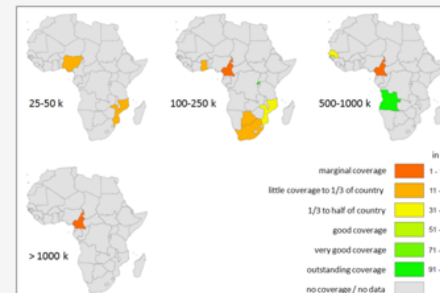
### Mineral resources



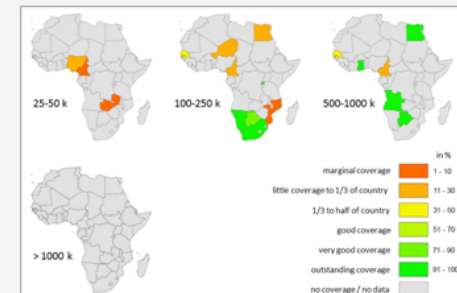
### Engineering geology



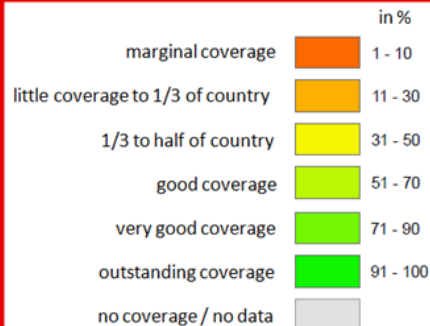
### Geochemistry



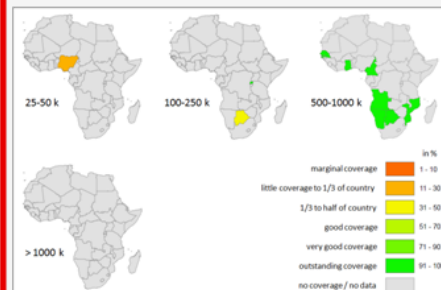
### Geophysics



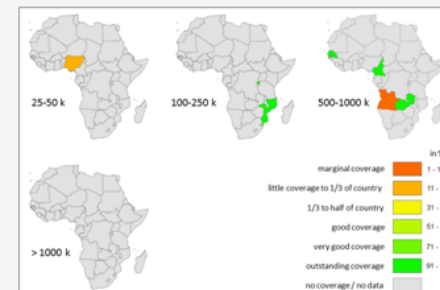
### Coverage in %



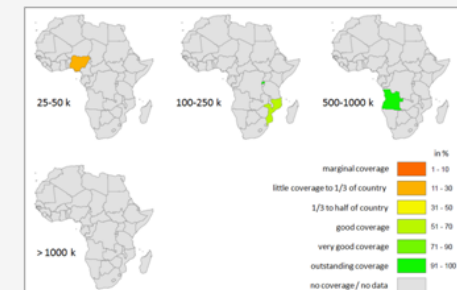
### Groundwater



### Soil



### Land use



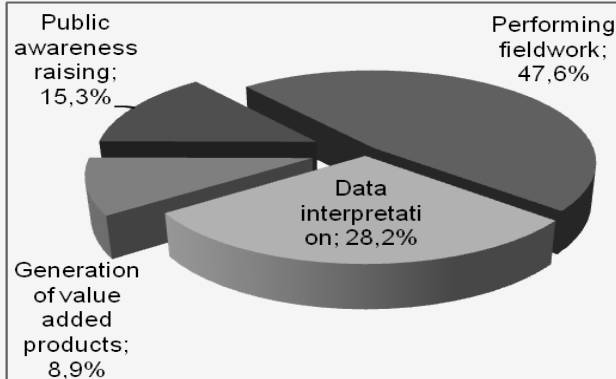
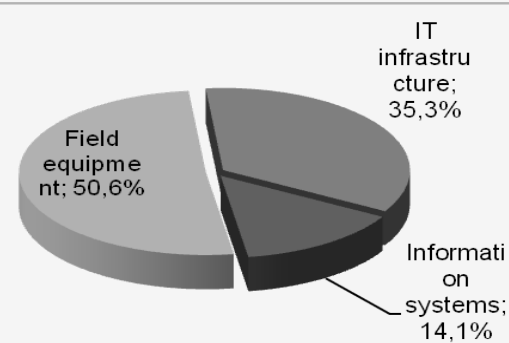
# A success story - Gap analysis results

## Obstacles to performing geoscientific mapping

### Reasons for reduced field activities



### Lack of equipment



Staff not adequately skilled

Lack of **skilled staff** and **technical resources** in the field and in the laboratory;

Not enough **expertise** to do data analysis and interpretation;

**Quality and availability of data on mineral resources** doesn't cover the needs of exploration and mining



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## Questionnaires' Reported numbers of ASM in African countries

**Ethiopia:** Estimated 1 million AM

**DRC:** More than a million ASM

**Tanzania:** 700.000 to 800.000 ASM

**Ivory Coast:** More than 500.000 ASM

**Niger:** Estimated 400.000 ASM

**Zimbabwe:** Estimated 250.000 ASM

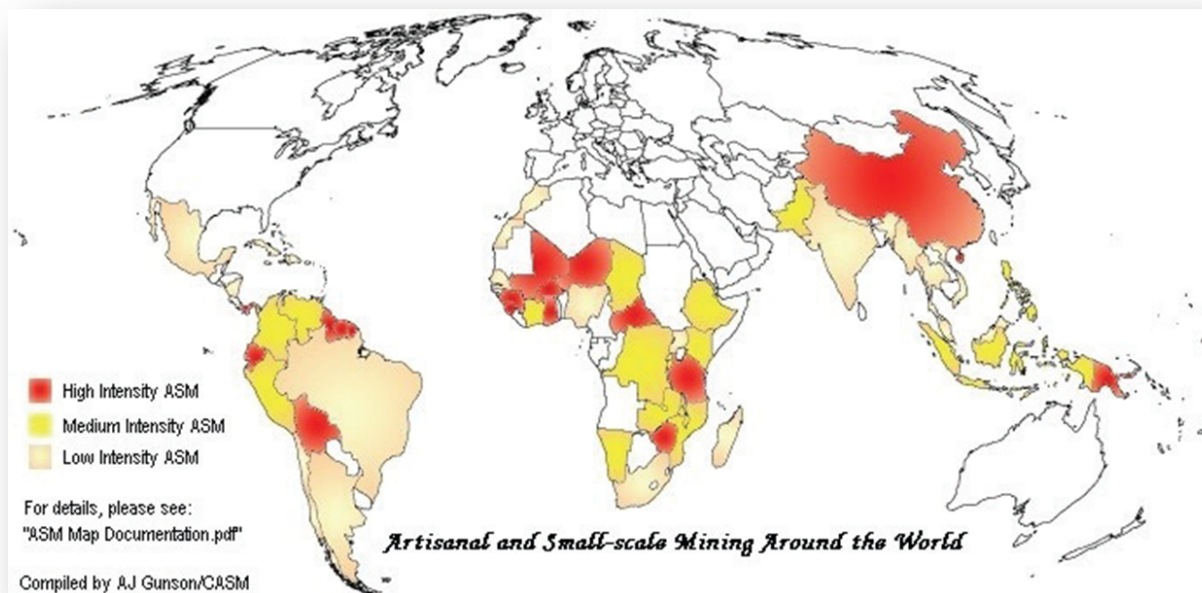
**Nigeria:** 200.000 to 250.000 ASM

**Mozambique:** 150.000 to 200.000 ASM

**Zambia:** Estimated 150.000 ASM

**Uganda:** Estimated 150.000 ASM

**Malawi:** Estimated 150.000 ASM



**Best total estimate for Africa is 6-7 million ASM operators with 35-50 million dependent**



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# ASM in Ethiopia



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# ASM in Ivory Coast



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# **A 25 millions euro (28 millions USD) EGS-OAGS project is now starting**











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ASGMI

Asociación de Servicios  
de Geología y Minería  
Iberoamericanos



EuroGeoSurveys  
The Geological Surveys  
of Europe

ASGMI  
Asociación de Servicios  
de Geología y Minería Iberoamericanos

## Memorandum of Understanding

Closer Ties: International Cooperation in Earth Sciences between  
Ibero-America and Europe  
Estrechando Lazos: Cooperación Internacional en Ciencias de la Tierra entre  
Iberoamérica y Europa

20<sup>th</sup> and 21<sup>st</sup> October 2015  
IGME | Madrid, 23, Rios Rosas ES-28003, Spain

# Priorities for future cooperation EGS – ASGMI

## STRUCTURAL

- **Institutional strengthening  
(in the case of incoming geological surveys)**
- **Support for the creation  
of ASGMI experts groups**
- **Creation of mixed EGS  
– ASGMI experts groups**
- **Geological surveys staff training**



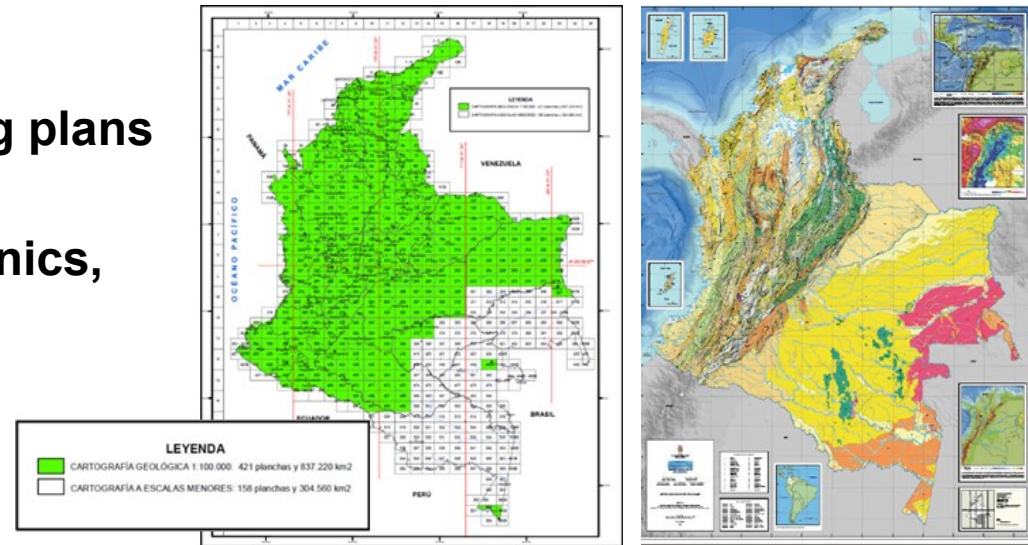
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# Priorities for future cooperation EGS – ASGMI

## GEOLOGICAL MAPPING

- Support for national mapping plans on a larger scale.
- Structural geology and tectonics, including application of remote sensing methods.
- GIS modelling and spatial analysis.



## REGIONAL GEOLOGY EXAMPLES FROM COLOMBIA

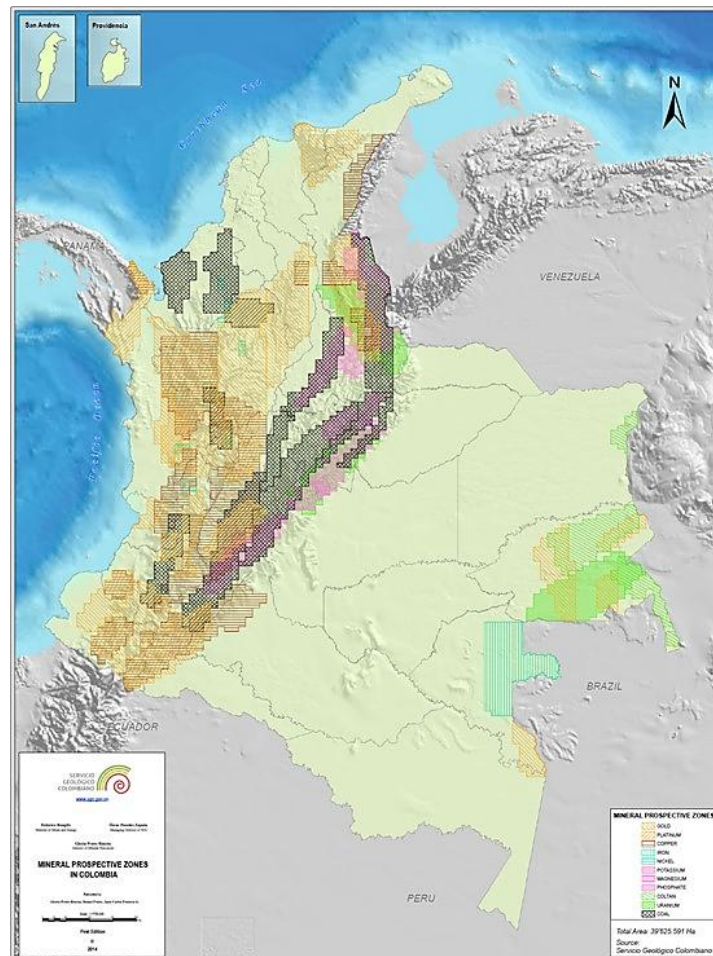
- Goal to 2016: 73% of the Colombian territory (1:100.000), that represents the target at this scale.
- Advances in 1:50.000 scale



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# Priorities for future cooperation EGS – ASGMI



## MINERAL RESOURCES PROSPECTION AND EXPLORATION

### MINERAL PROSPECTIVE ZONES



Total Area: 39'625.591 Ha

Source:  
Servicio Geológico Colombiano

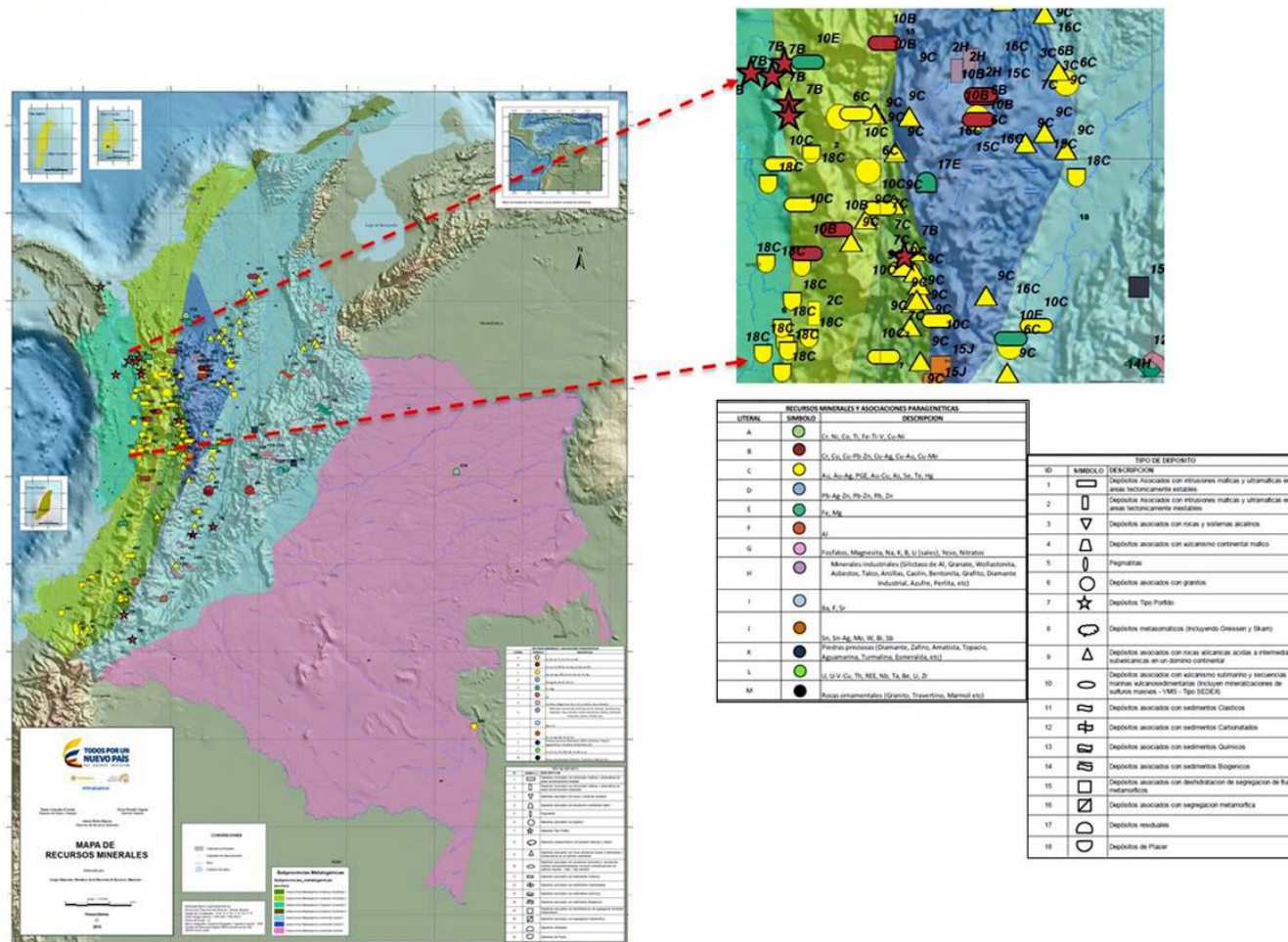


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# Priorities for future cooperation EGS – ASGMI

## METALLOGENETIC STUDIES



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# Priorities for future cooperation EGS – ASGMI

- **Impact of illegal mining (active and abandoned mining waste facilities).**
- **Mine tailings characterization using spectroscopy (to identify the presence of sulphide-rich minerals and their spatial distribution).**
- **Acid rock drainage studies.**

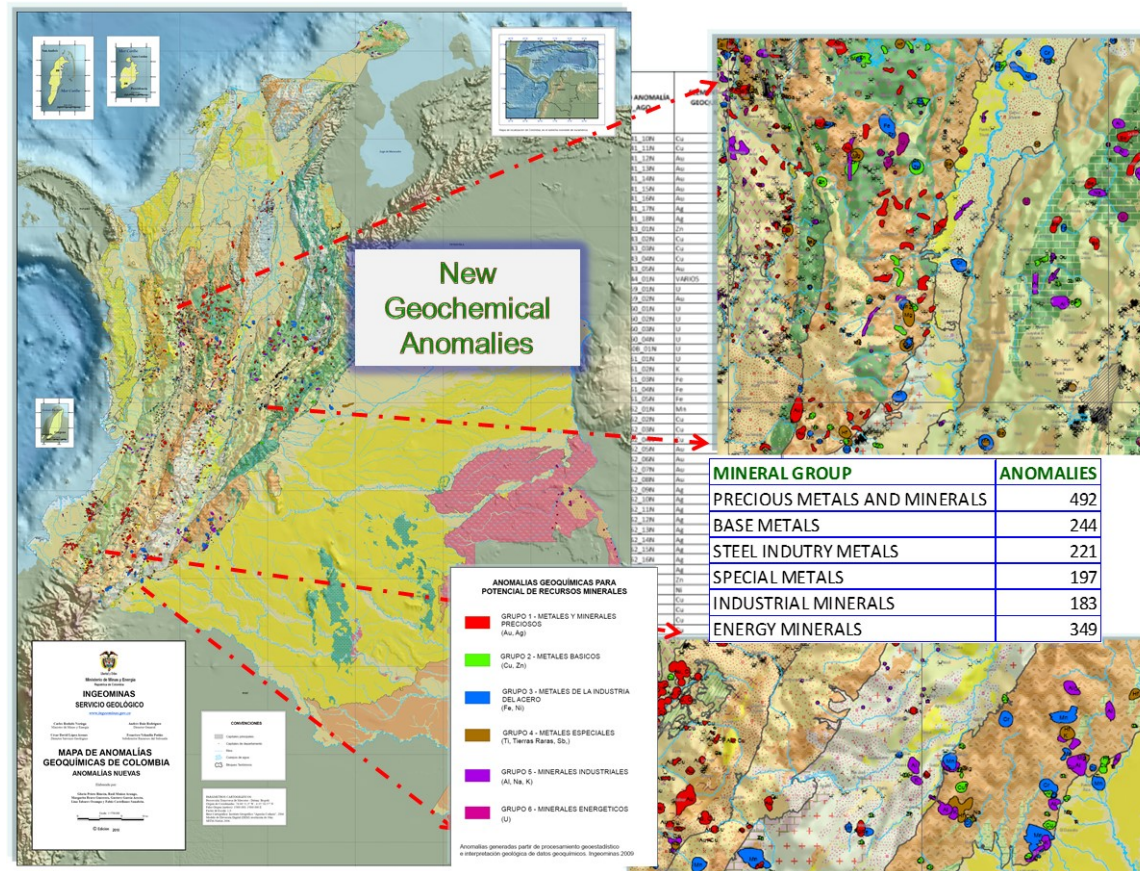


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# Priorities for future cooperation EGS – ASGMI

## Geochemical data processing and development of geochemical Atlases



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# Priorities for future cooperation EGS – ASGMI

## Groundwater exploration and modeling

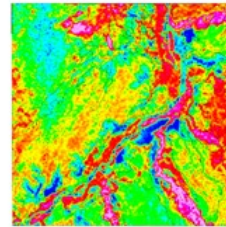
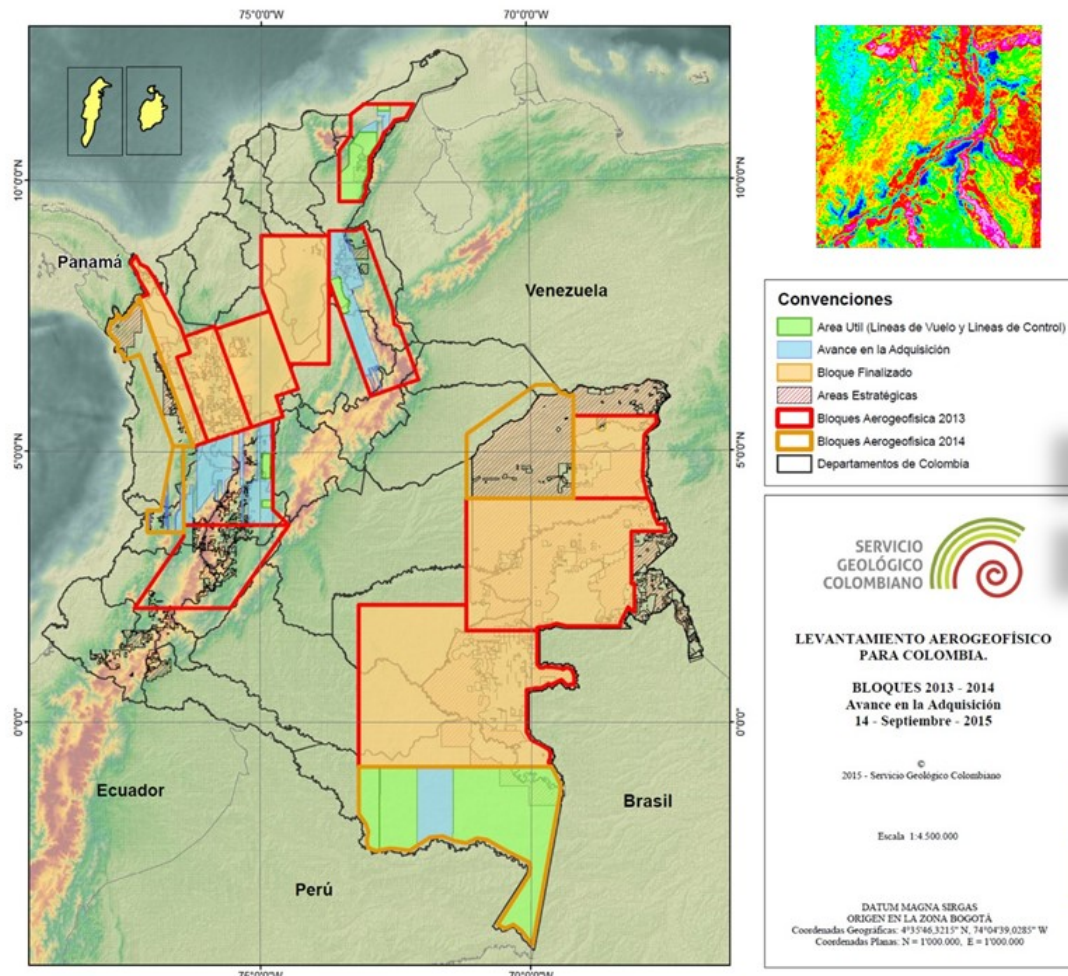


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# Priorities for future cooperation EGS – ASGMI

## Geophysical data processing and interpretation



Magnetometry

Gamma - spectrometry

Lines 500m / 5km (N20W)  
Lines 1000m / 10km (N-S)  
Altitude /100 a 300m

Total km 633.108 km

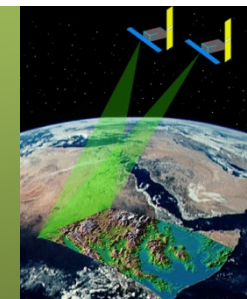
Total km<sup>2</sup> 438.630 km<sup>2</sup>



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# Priorities for future cooperation EGS – ASGMI



## Ground deformation detecting and modeling using satellite interferometry

### Volcanic activity

Colombia **18 volcanoes**

Ecuador **27 volcanoes**

Peru **16 volcanoes**

Northern Chile, Bolivia and  
Argentina **63 volcanoes**

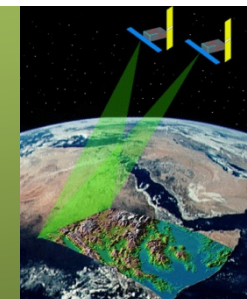
Central Chile and Argentina  
**45 volcanoes**



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# Priorities for future cooperation EGS – ASGMI



## Ground deformation detecting and modeling using satellite interferometry

### Seismic activity

#### **7 October 2015 – Earthquake activity**

**about 5 hours ago** 4.7 magnitude, 7 km depth  
Coquimbo, Coquimbo, Chile

**about 7 hours ago** 4.9 magnitude, 123 km depth  
Tacna, Tacna, Peru

**about 11 hours ago** 4.2 magnitude, 12 km depth  
Coquimbo, Coquimbo, Chile

**about 14 hours ago** 4.8 magnitude, 31 km depth  
Ovalle, Coquimbo, Chile

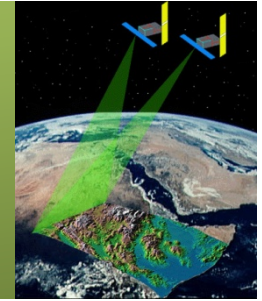
**about 20 hours ago** 4.2 magnitude, 11 km depth  
Iquique, Tarapaca, Chile



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# Ground deformation detecting and modeling using satellite interferometry



## Landslides, water pumping, urban subsidence



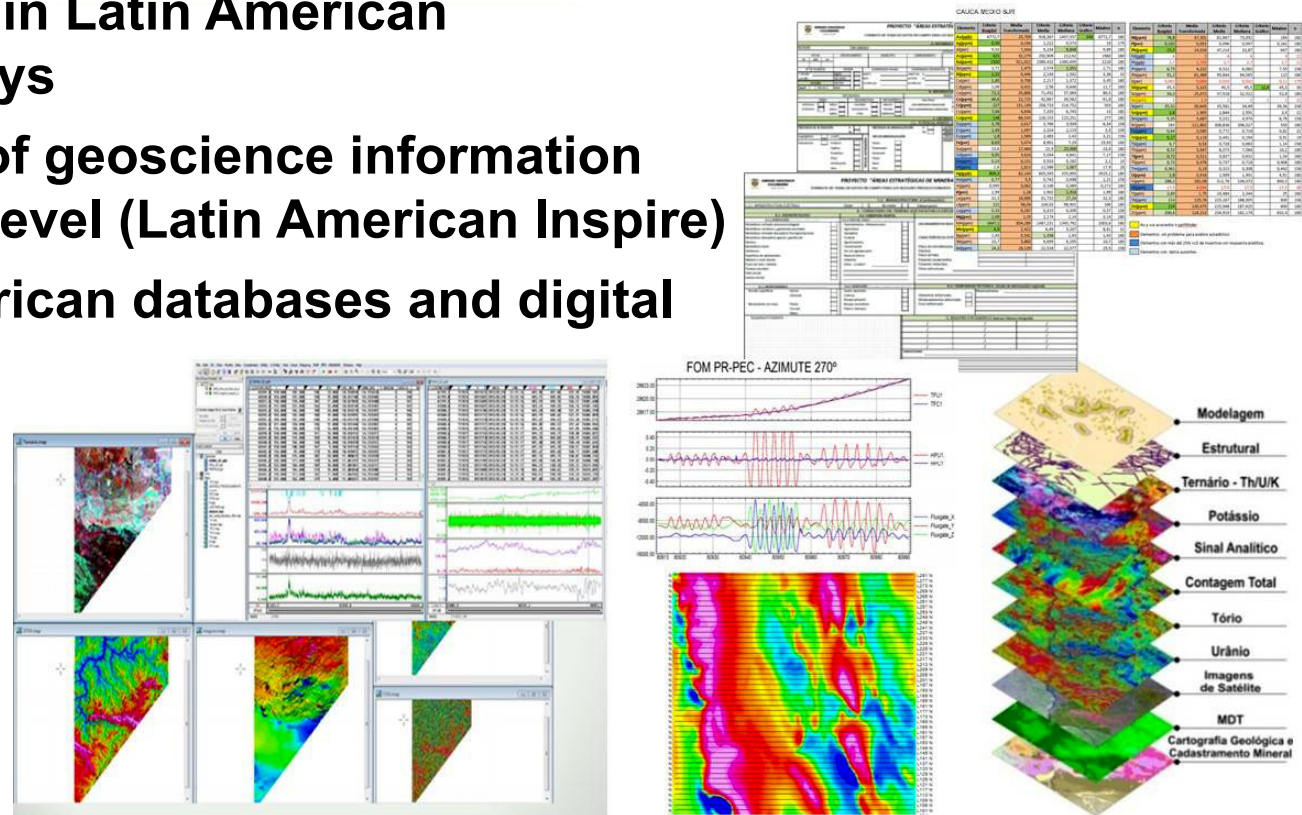
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# Priorities for future cooperation EGS – ASGMI

## GEODATABASE

- Updating of dissemination tools (OGC standards) in Latin American Geological Surveys
- Standardisation of geoscience information on a continental level (Latin American Inspire)
- Work in pan-american databases and digital cartography
- Standardisation
- Safe storage
- Available on line



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# Priorities for future cooperation EGS – ASGMI

## Micro – area analysis laboratory – SHRIMP IIe/MC Ion Microprobe Section

Definition:

**S**ensitive  
**H**igh  
**R**esolution  
**I**on  
**M**icro  
**P**robe

For microsamples  
in solid state:

- single grains (e.g. zircon),
- micro-fossils,
- rock chips etc.

**SIMS** Secondary Ion Mass Spectrometer



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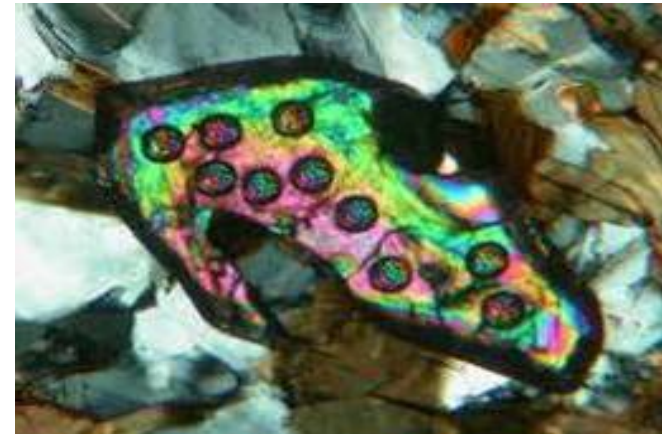


# Priorities for future cooperation EGS – ASGMI

## Micro – area analysis laboratory – SHRIMP IIe/MC Ion Microprobe Section

### Main points

- Ion microprobe provide accurate *in situ* chemical and isotopic analyses on a scale of a few microns and detect sample heterogeneity
- The main geological applications are:
  1. geochronology, including datings: magmatism, metamorphism, diagenesis, magma sources and sediment provenance.
  2. stable isotopes including B, C, O, S, Si, Mg, Ti,
  3. isotope anomalies in cosmogenic material
  4. trace element analysis.
- Other applications include isotopic imaging and depth profiling.



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# Concrete opportunities

## European Innovation Partnership on Raw Materials (EIP):

- Advancing the idea of a World Forum on Raw Materials
- International Network of Raw Materials Training Centres

## Development and Cooperation:

- PanLatGeo (together with UNESCO, UNEP, UNDP)





## Simposio

Servicio Geológico Colombiano

**100 años**  
de producción científica  
al servicio de los colombianos



27 de junio al 1.º de julio de 2016

Centro Empresarial y Recreativo El Cubo  
Carrera 30 n.º 52-77 · Bogotá - Colombia

Informes: aniversario100@sgc.gov.co  
Inscripciones: www.sgc.gov.co



EuroGeoSurvey



of Europe



# THANK YOU FOR YOUR ATTENTION!



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