



Coordinating and integrating state-of-the-art  
Earth Observation Activities in the regions of  
North Africa, Middle East and Balkans  
and Developing Links with GEO related initiatives  
toward GEOSS

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**GEO-CRADLE pre-Kick-Off Meeting**  
**Friday, 18<sup>th</sup> of February, 2016**

**Željko Dedić,**  
**Croatian Geological Survey**



# Croatian geological survey



Founded in 1909 as *“The Geological Committee for the Kingdom of Croatia and Slavonia”* within the Austro-Hungarian monarchy by the famous Croatian geologist Dr. Dragutin GORJANOVIĆ KRAMBERGER who also discovered the remains of the Neanderthal man at Krapina.



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# Croatian geological survey

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## THE INSTITUTE CURRENTLY 112 EMPLOYEES

**85 are scientists**

**41 Ph.D. Scientists**

**6 M.Sc. Scientists**

**29 B.Sc. Research associates**

**9 Research assistants**

**15 are technical staff**

**12 are administration**



# Croatian geological survey

## ORGANISATION - TODAY

Ministry of Science,  
Education and Sports



HRVATSKI GEOLOŠKI INSTITUT  
CROATIAN GEOLOGICAL SURVEY

Research



### Supporting Units

Department  
of  
Geology

Department  
of  
Hydrogeology and  
Engineering Geology

Department  
of  
Mineral Resources

Geological  
Service

Administration  
Library  
**Geological Archive**  
**Geologica Croatica**

Laboratories



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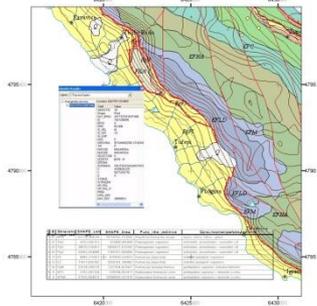




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## Products and Services

**Geological and  
geochemical Mapping**



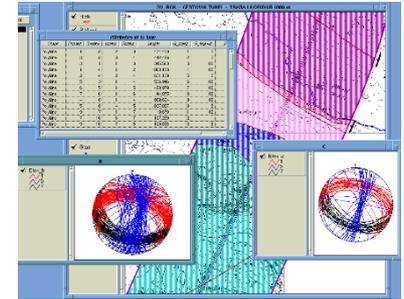
**Education and  
Outreach**

**Resource  
Evaluation**

**Maps,  
Publications,  
Reports,  
Data collection,  
Data storage,  
Geological Service**



**GIS and Digital  
Products**



**Geohazards,  
Environmental,  
Hydrogeological and  
Engineering Geology  
Studies (most of them for  
the private sector)**



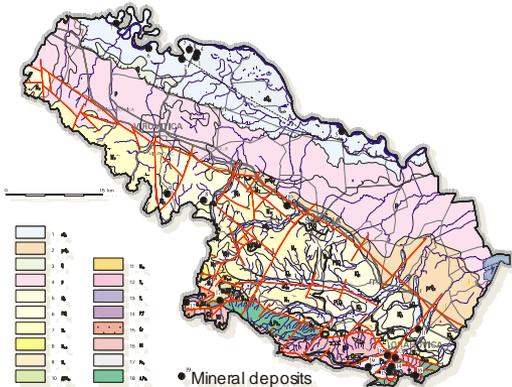
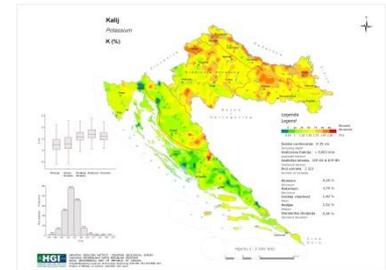
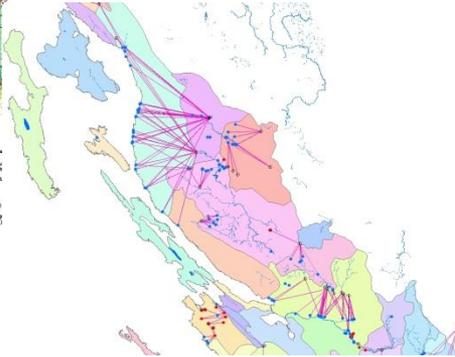
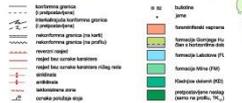
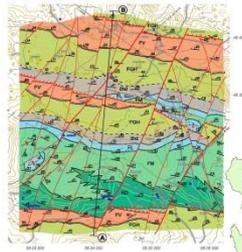
# Croatian geological survey

## Basic research projects

**funded by the Ministry of Science, Education and Sports  
and in the future additionally by the Ministry of Economy  
2015-2017**

### Long-term projects (basic projects)

1. The basic Geological Map, scale of 1: 50,000
2. The Hydrogeological Map
3. The Geohazard Maps (Risk Maps), scale 1:100,000



### 4. The Map of Mineral and Energetic Resources

### 5. The Geochemical Map

### 6. Geological Map of Adria Seabed – in connection with EU

#### project EMODNET

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# Croatian geological survey

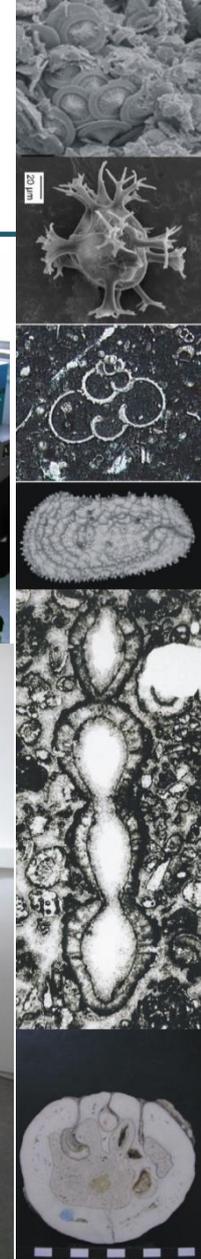
## LABORATORIES:

### Geological and geochemical laboratories

**The laboratory covers a wide-range of analytical techniques.**

**These are staffed by expert paleontologist, mineralogists, petrologists and geochemists.**

- Analysis of micro- and macrofauna,
- Analysis of nannoplankton,
- Palynological and palynofacies analysis,
- Petrographic analysis,
- **Atomic absorption analysis,**
- **XRD – analysis,**
- **Soil and water laboratory testing**





# Croatian geological survey

## Laboratory for engineering geology

### Core business

Laboratory covers a large number of laboratory and field testing methods in the domain of geotechnical engineering. Its main task is to determine the physical and mechanical properties of rocks and soils (in the engineering geological terms).



### Main benefits:

- ✓ enables gathering of the data used by scientists of engineering geological group to carry out engineering categorization of rocks and soils;
- ✓ enables young scientists to perform several kinds of test to collect data for their scientific work;



### Basic tests which can be performed in the laboratory:

#### Soil:

- ✓ Soil classification tests
- ✓ Direct shear test
- ✓ Triaxial test
- ✓ Shear vane test

#### Rock:

- ✓ Uniaxial compressive test
- ✓ Point load test
- ✓ Indirect tensile strength test (Brazilian test)
- ✓ Schmidt hammer test

## Hydrochemical laboratory



*Measurements in lake water with MPS-D3*



*Atomic absorber*



*Ion chromatograph*

- Founded in the late 90-es
- measuring of physical, physicochemical and chemical parameters in groundwater, lake and river water samples
- measuring of dyes in water samples
- **Lab. equipment:** ion chromatograph, atomic absorber, spectrophotometer, luminescence spectrometer, turbidity meter, digital titrator, COD reactor
- **pH, EC and Oxi meters and water quality probe MPS-D3 – for measuring at the field**
- hydrochemical parameters which are measured: EC, T, pH, O<sub>2</sub>, turbidity, major cations and anions, heavy metals, hardness



# Croatian geological survey

## EUROGEOSURVEYS:

1. OneGeology EU Plus – **ONGOING**
2. EGDI\_Scope: “Eurogeosurveys Research Infrastructure: Design study” - **FINISHED**

1. EGS Expert Groups:
  - Geochemistry Expert Group
  - Mineral Resources Expert Group
  - Marine Geology Expert Group
  - Superficial Deposits TF
  - Water resources Expert Group

## EUROGEOSURVEYS EU - PROJECTS:

- “Geochemical Atlas of Europe” – **FINISHED**
- “Geochemistry of European Bottled Water” - **FINISHED**
- “Geochemical Mapping of Agricultural and Grazing Land Soils” in Europe – **FINISHED**
- „Minerals4EU” – **FINISHED**
- „EMODNET – Mediterranean” - **ONGOING**
- „GEO-CRADLE” – **ONGOING**
- „EUOGA” – **ONGOING**
- „MICA” - **ONGOING**
- “Urban Geochemistry in Europe (URGE) – Soil, Children, Health” – **ONGOING**



# Croatian geological survey

## MAIN STRATEGIC PROJECTS of HGI-a for the time span from 2012 – 2020

1. Geological mapping - **Priority**
  - a) **Geological Map of Croatia, Scale 1:50.000 - PRIORITY**
  - b) Lithological Map of Croatia, Scale 1:100.000
  - c) Hydrogeological Map, Scale 1:100.000
  - d) **Geohazard Maps (Risk Maps) - PRIORITY**
  - e) Map of Mineral resources (energetic and non-energetic)
  - f) Geochemical Maps
  - g) **Geological Map of Adria Seabed – PRIORITY**
2. Water resources (Water protection, water supply)
3. **Geohazards - PRIORITY**
4. **Environment - PRIORITY**
5. Marine Geology
6. Knowledge transfer to economy
7. Education
8. Mineral Resources (Evaluation etc.)



# Croatian geological survey - Short Review of Usage of Methods of Remote Sensing

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In Croatian Geological Survey there is a history of usage of different types of methods of remote sensing in the field of geosciences and geological engineering.

For example:

- (i) aerial photographs were used in CGS basic activity – development of geological maps;
- (ii) occasionally in education – lectures for students and teachers;
- (iii) in some project proposals/drafts different methods of remote sensing are included;
- (iv) in research i.e. of flysch badlands erosion or landslide investigation



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Aerial photographs were used in landslide research for PhD thesis:

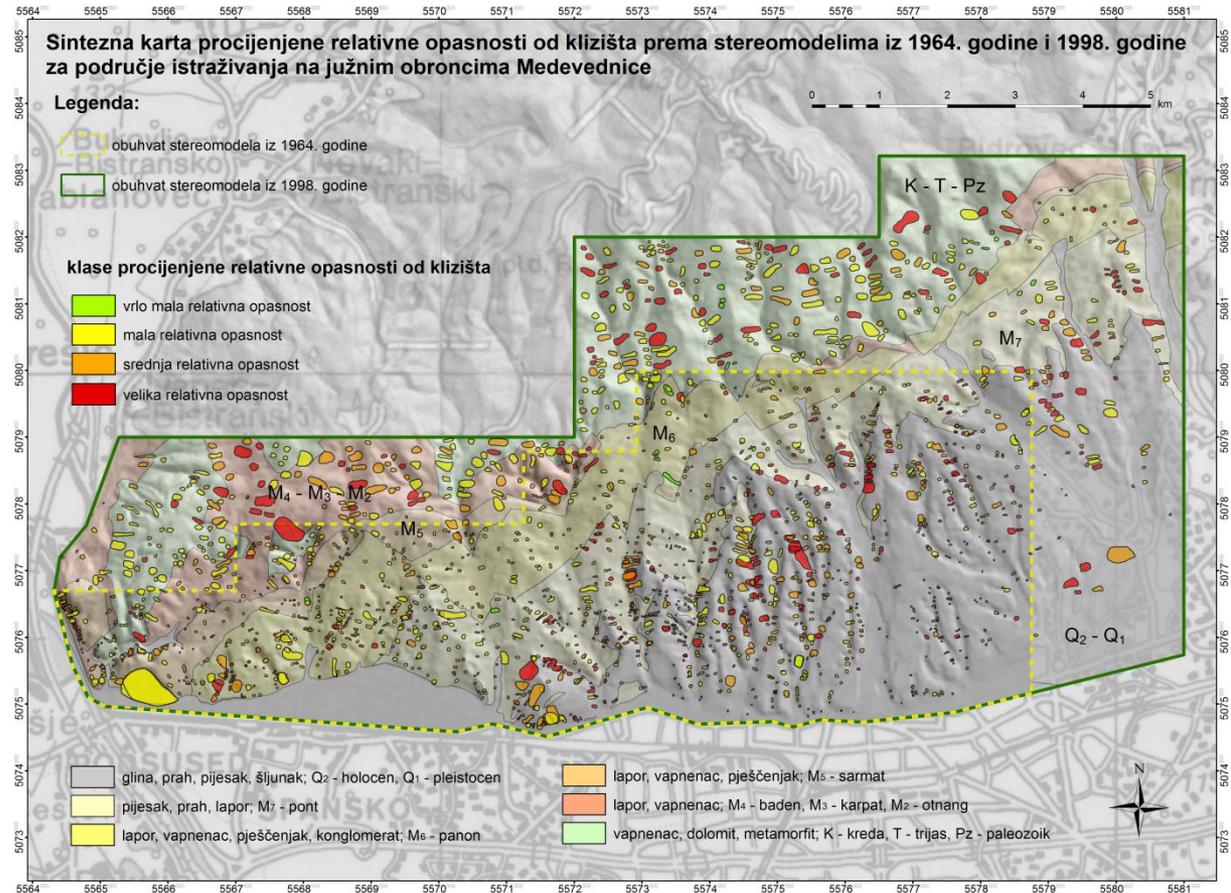
Stereoscopic analysis of landslides was conducted on two stereomodels. One from 1964 in scale of 1:8.000 and one from 1998 in scale of 1:20.000.

More than 2.000 landslides were identified and all identified landslide features and landslides were organized into a developed database.

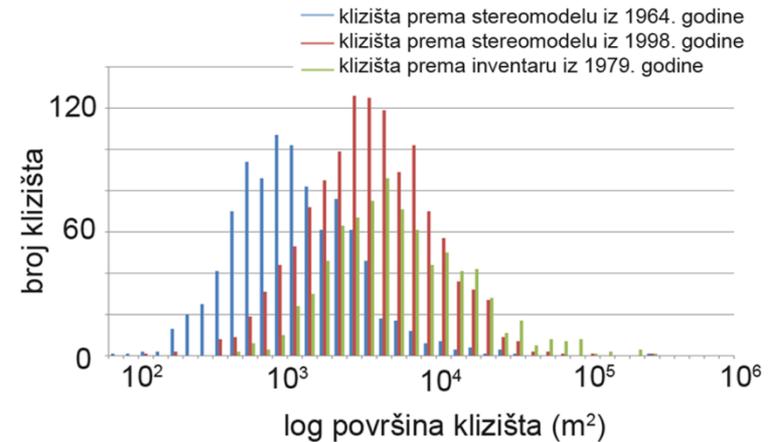
The importance of the research is in the:

- (i) acquiring historical landslide data and
- (ii) applicability of the used methodology in a “quick” landslide inventory development anywhere where landslides exists in same or similar geomorphological conditions.

Map of relative landslide danger according to stereomodels from 1964 and 1998 for the area of research on the southern slopes of the Medvednica Mt. with landslide classification determined by AHP methodology



Frequency comparison of landslide areas from developed landslide inventories from stereomodels from 1964 (blue) and 1998 (red) and landslide areas from historical landslide inventory from 1979 (green) for the area of research on the southern slopes of the Medvednica Mt.





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Thank you!!