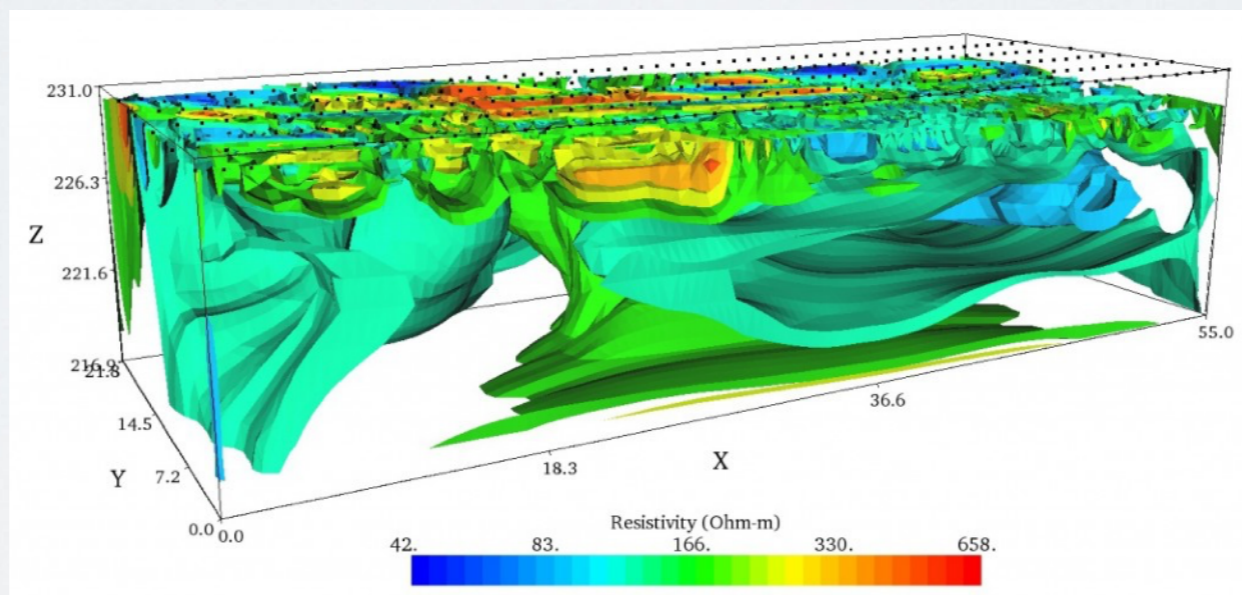




Geophysics for Natural Risks and Resources

ENVIRONMENTAL and ENGINEERING GEOPHYSICS a.y. 2021/22





Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: Who, *When*, *What* ?

Who

Responsible Teacher : **Prof. Jacopo Boaga**

Assistant : *Dr. Valeria Cascone*

(valeria.cascone@phd.unipd.it) - **jacopo.boaga@unipd.it**

Geophysicists at the 'Geosciences Department'
Università degli Studi di Padova

sect. Geo/11: Applied Geophysics

*working on Geophysical Prospecting mainly for engineering and environmental
applications for the near surface*

Near Surface Geophysics:

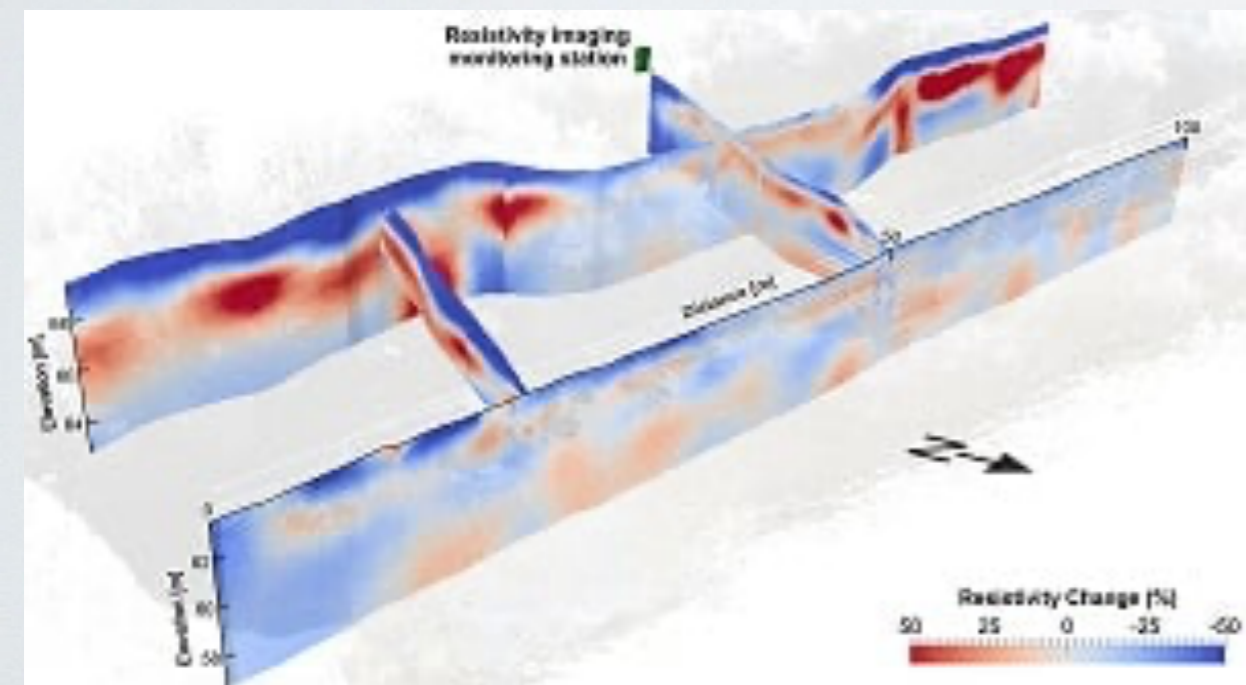
Near-surface geophysics is the use of geophysical methods to investigate small-scale features in the shallow (tens of meters) subsurface.

Applications: civil engineering , environmental science, archaeology, forensic science, military intelligence, geotechnical investigation, hydrogeology...

How?

Electric methods
Electro-magnetic methods
Seismic methods
Gravimetric methods

.....

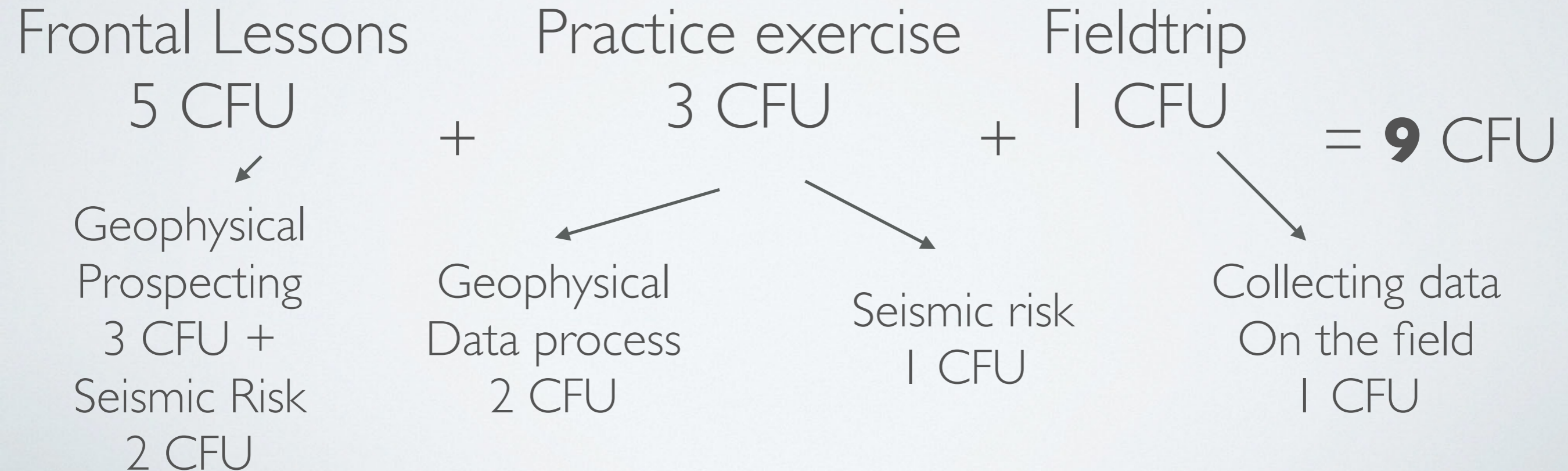


Geophysics for Natural Risks and Resources

ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

Course Structure (CFU = academic credit):

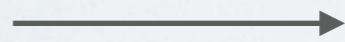


Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

Course official
schedule:

Most likely



Wednesday
10.30 - 13

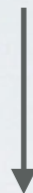
Wednesday
10.30 - 12.30

2L room

Friday
8.30 - 11

Friday
9 - 11

Period



October 2021

January 2022



Geophysics for Natural **Risks** and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

STUDY THE SUBSOIL FOR ENGINEERING PRACTICAL NEEDS

Non-invasive prospecting techniques
(GEOPHYSICS for environmental problems and
hydrological risk)
(3 CFU)

GEOPHYSICS for geotechnics and seismic hazard
reduction
(2 CFU)

Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

GEOPHYSICS for environmental
problems and hydrological risk

Practical Exercises 2 CFU

GEOPHYSICS for geotechnics and seismic
hazard reduction

Practical Exercises 1 CFU



Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

FIELD TRIP

I CFU

3 Days field trip on test site area with
ALL the geophysical equipments available

3-5 November 2021

(+ 1 trip to see industrial seismic equipment with
reflection seismic course, date to be defined (with the
expl. Seismology course)



Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

Geophysics Module

Introduction to the Engineering Geophysical Prospecting:

- i) The geophysical problem, **what for what ?**
- ii) Concepts of resolution and feasibility, **everything everywhere ?**
- iii) Concepts of prospecting cost, **the best or the better ?**
- iv) Data collecting and analysis (for the most diffused methods)

MANY CASE HISTORIES
Learning by experience....



Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

Geophysics Module

Geophysical exploration for environmental engineering:

- Geo-electrical methods: Electrical tomography, Induced polarisation methods, limits and applications PRACTICAL ASPECTS
- Electro-magnetic methods: Intro to the EM methods in time and frequency domain, Radar, limits and applications PRACTICAL ASPECTS
- Seismic methods: Intro to the seismic methods for engineering exploration, refracted and surface waves methods

Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

Geophysics Module

Geophysical for Seismic Risk:

- The Seismic Hazard
- How we can defend
- The Seismic response analysis
- Geophysical prospecting for the seismic hazard



Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

Frontal Lessons

Digital Lessons, ppt
presentations

Exercises

Laptop exercises with
existing dataset and
with YOURS data
(after the fieldtrip)



Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

Introduction to the Course: *Who, When, What?*

Books

- PPT as provided by the teachers

- Reynolds, An Introduction to Applied and Environmental Geophysics. --: John Wiley and Sons Ltd, 1997
- Sharma, Environmental and Engineering Geophysics. --: Cambridge University Press, 1997.
- W. M. Telford , L. P. Geldart , R. E. Sheriff, Applied Geophysics, Cambridge University Press
- Wood, D. M. (2014) "Geotechnical modelling" - CRC Press.
- S. Kramer. "Geotechnical Earthquake Engineering– Pearson.

Applied aspects will be preferred, basing on case studies and teachers experiences on the field.

ATTENDING THE LESSONS IS THEREFORE CONSIDERED
NECESSARY

Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

EXAMINATION

ORAL EXAMINATION

- 24/ 01/ 2022
- 07/ 02/ 2022

3 parts:

1. Discussion of a **research paper** (provided by the teachers)
2. Discussion about a **technical report** of the field trip
3. **General dissertation** on the course topics

Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

FieldTrip

From 3 to 5 November 2021

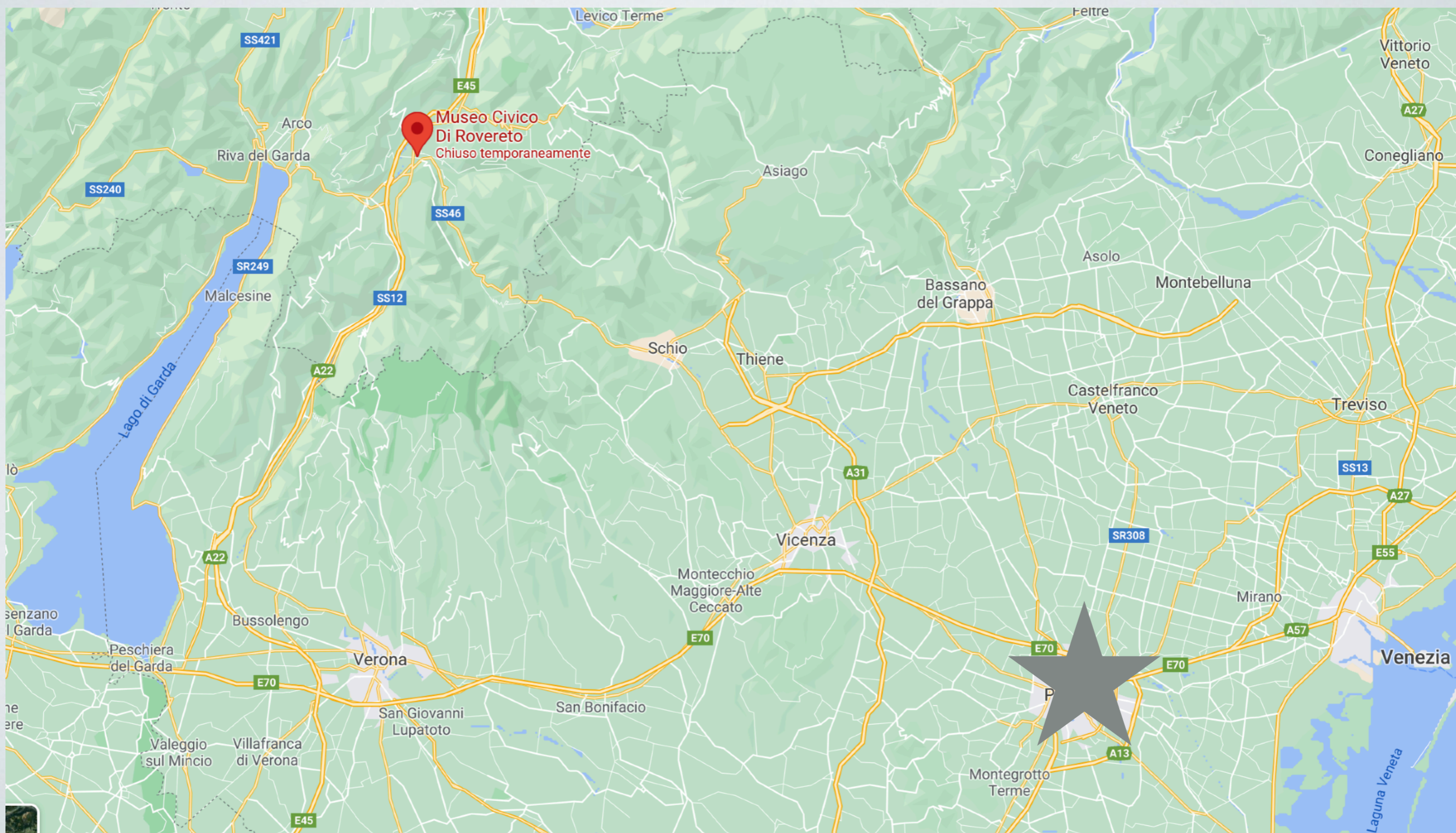
Rovereto - Trient, ITALY
In collaboration with
Fondazione
Museo Civico di Rovereto





Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

FieldTrip



Geophysics for Natural Risks and Resources ENVIRONMENTAL and ENGINEERING GEOPHYSICS

FieldTrip

3-5 November

Rovereto - Trient

Travel : by Train from Padua (2.5 h) or car
Local trans.: Unipd coach

Hosting: OSTELLO DELLA GIOVENTU' DI ROVERETO
<https://www.ostellorovereto.it>

BOOK NOW !!!

2 Nights from 3 November to 5 November 2021
ask refund to secretaries