



FOURTH SUMMER SCHOOL OF THE INTERNATIONAL ASSOCIATION FOR ENGINEERING GEOLOGY AND THE ENVIRONMENT

The role of geological model for geo-hazards management and infrastructure design

Aosta (Italy) 7 – 15 July 2025

The management of geo-hazards and the construction of structures and infrastructures are usually based on detailed studies that are supported by several geological, engineering geological, geomechanical and geotechnical datasets. In the study of a landslide, of a rockfall-prone area, of the seismic microzonation or for the design of a tunnel or a dam or any large structure, one of the most important pieces of information remains the geological model: a detailed definition of the structure and geological settings, its characteristics in terms of geomechanical and hydrological response are often essential elements that should be known to obtain a correct data entry that is the base of the model that will be developed and adopted in the project. Elaboration of a geological model for its use requires engineering geological skills and a multidisciplinary approach.

Recent years have been characterized by an increasing frequency of localised, high-magnitude processes that greatly impact urban settlements and infrastructures. The resulting damages are often very high in terms of casualties and economic, social, and psychological costs to society.

The 2025 IAEG Summer School will analyse the role of the geological model, and several methodologies adopted to acquire it, aimed at supporting the study of natural geo-hazards and the design of structures and infrastructures, with a special interest in engineering geological aspects.

The International Association for Engineering Geology and the Environment (IAEG) was founded in 1964 and is affiliated with the International Union of Geological Sciences (IUGS). IAEG is a worldwide scientific society that promotes and encourages the advancement of Engineering Geology through technological activities and research, improves teaching and training in Engineering Geology, and collects, evaluates and disseminates the results of engineering geological activities worldwide.

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FOURTH SUMMER SCHOOL OF THE INTERNATIONAL ASSOCIATION FOR ENGINEERING GEOLOGY AND THE ENVIRONMENT

PROGRAM

Monday - July 7, 2025

Introductions and background to school and fundamental concepts

8.00 – 8.30 Summer school registration

8.30 – 9.00 Introduction to the IAEG Summer School (*Vassilis Marinos, President of IAEG, Claudio Margottini, president of IAEG Italian NG*) and Welcome to the Aosta Valley Region *Raffaele Rocco/Sara Ratto (Aosta Valley Region Authority)*

9.00 – 10.45 The role of Engineering Geological Models in Geohazard Assessments. *Steve Parry - IAEG C25*

10.45– 11.15 Coffee break

11.15 - 13.00 Large infrastructures and geological settings, case studies and lessons learnt. *Vassilis Marinos - NTUA*

13.00 – 14.30 Lunch

14.30 – 16.15 The use of geological modelling in large infrastructures in Italy from theories to practice. *Gianluca Benedetti - ITALFER*

16.15 – 18.00 Students' presentations

18.00 – 19.00 Ice-break cocktail

Tuesday - July 8, 2025

Natural geo-hazards - Processes and modelling

9.00-10.45 From the geological to the numerical model of slopes. *Giovanni Crosta - UNIMIB*

10.45 – 11.15 Coffee break

11.15-13.00 Engineering geology and rock mechanics in practice. *Steve Hencher - LEEDS*

13.00-14.30 Lunch

14.30-16.15 Impact of Glaciers and permafrost-related instabilities on structures and settlements. *Fabrizio Troilo - FMS*

16.30 – 18.00 Student workshop – The use of digital image correlation in Earth Science. *Niccolò Dematteis – CNR-IRPI*

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FOURTH SUMMER SCHOOL OF THE INTERNATIONAL ASSOCIATION FOR ENGINEERING GEOLOGY AND THE ENVIRONMENT

Wednesday - July 9, 2025 - Field trip

Dangerous natural processes and mitigation solutions in Courmayeur

Thursday - July 10, 2025

Put theories into practice

9.00-10.45 Workshop - Rockfall modelling. *Giovanni Crosta, Paolo Frattini - UNIMIB*

10.45-11.15 Coffee break

11.15-13.00 Countermeasures design for slope instabilities, Active and Passive mitigation, land-planning, *Davide Bertolo - Aosta Valley Region Authority*

13.00-14.30 Lunch

14.30-16.15 The relevance of best practices in the engineering maintenance of large infrastructures *TBD*

16.15-18.00 Workshop - Rockfall modelling. *Giovanni Crosta, Paolo Frattini - UNIMIB*

Friday - July 11, 2025

Evaluation of impacts and possible solutions

9.00-10.45 Catastrophic long-range process cascades from de-glaciating high mountains *Wilfried Haeblerli - UZH*

10.45-11.15 Coffee break

11.15-13.00 MultiHazard and Multirisk analyses. *Cees Van Westen - UTWENTE*

13.00-14.30 Lunch

14.30-16.15 "Navigating nature challenges": Exploring risk perception, behavioural responses, and effective communication strategies in the face of natural hazards. *Simona Sacchi - UNIMIB*

16.15-18.00 Hazard and Risk assessment cost/benefit analyses *TBD*

Saturday - July 12, 2025 - Field trip

Impact of large slope instability on large dam: the case study of Beauregard dam

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FOURTH SUMMER SCHOOL OF THE INTERNATIONAL ASSOCIATION FOR ENGINEERING GEOLOGY AND THE ENVIRONMENT

Sunday - July 13, 2025

Free tour of Aosta and surroundings!!

Monday - July 14, 2025

Evaluation of impacts and possible solutions

9.00-10.45 Debris flow risk reduction strategies *Valerio Segor* - Aosta Valley Region Authority

10.45-11.15 Coffee break

11.15-13.00 Seismic micro zonation mapping – *Lucia Luzi* - INGV

13.00-14.30 Lunch

14.30-16.15 Debris flow dynamic and modelling *Francesco Comiti* - UNIPD

16.15-18.00 Student workshop – The use of digital image correlation in Earth Science. *Niccolò Dematteis* – CNR-IRPI

Tuesday - July 15, 2025

Put theories into practice

9.00-10.45 Understanding earthquakes and their interaction with the environment: an introduction to engineering seismology *Chiara Smerzini* – POLIMI

10.45-11.15 Coffee break

11.15-13.00 workshop - The use of digital outcrop models for the identification of discontinuities and critical orientations *Niccolò Menegoni* – UNIPV

13.00-14.30 Lunch

14.30-16.15 workshop – The use of digital outcrop models for the identification of discontinuities and critical orientations *Niccolò Menegoni* - UNIPV

16.15-18.00 Student workshop – The use of digital image correlation in Earth Science. *Niccolò Dematteis* – CNR-IRPI

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