

INTERNATIONAL WEBINAR ON ROCK MECHANICS

organized by **Alessandra Insana** and
Federico Vagnon with the partnership
of **AGI**

**Relating physical and
mechanical properties to
temperature-induced damage
in carbonate rocks**

Federico Vagnon

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Relating physical and mechanical properties to temperature-induced damage in carbonate rocks

Abstract

Carbonate rocks have a widespread diffusion in the Earth crust and are extensively used in cultural heritage and buildings. These rocks can be naturally or anthropically exposed to high temperatures. Consequently, relating physical and mechanical properties to temperature-induced damage is extremely important. Sets of compositionally and texturally different carbonate rocks, spanning from limestones and marbles to dolomitic marbles, were analysed in this study. Different physical and mechanical properties, such as porosity, seismic wave velocities, electrical resistivity and UCS were measured before and after thermal treatments with heating/cooling ranges between 105 and 600°C. Microstructural observations and optical analyses were used to investigate how temperature-induced damage affects the physical measured properties of the different microstructures. This integrated approach allowed to define a generalised relationship between rock properties and thermal-induced damage, by way of an induced damage index valid for a broad suite of carbonate rocks.

Speaker

Federico Vagnon is currently working as a Research Fellow at the Department of Earth Sciences - University of Turin. He graduated as an environmental engineer at the Polytechnic of Turin in 2013. He obtained his PhD in Earth Sciences at the University of Torino in 2017 with a thesis entitled "Theoretical and experimental study for the barrier optimization against debris flow risk". His research is focused on three main topics: 1) the geotechnical characterization of linear earth soil structures by coupling geo-electric and geo-seismic surveys; 2) the interaction between rapid slope movements, such as debris flow and rock fall phenomena, and protection structures and 3) the effect of temperature on the physical and mechanical properties of carbonate rocks.

