



UNIVERSITÀ DEGLI STUDI DI MILANO



Dipartimento di Eccellenza 2018-2022

LE GEOSCIENZE PER LA SOCIETÀ: RISORSE E LORO EVOLUZIONE

Corso di Dottorato in  
Scienze della Terra



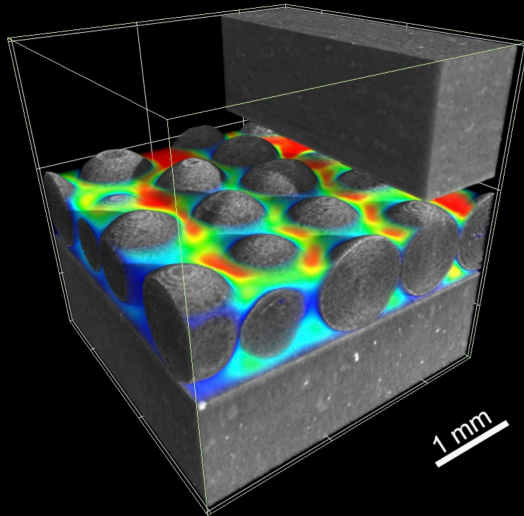
May X-Y<sup>th</sup> 2022 - Short course (3 cfu, 15 hours) – Room TBD

Dipartimento di Scienze della Terra "A. Desio", via Mangiagalli 34, Milano

## 4D X-Ray Imaging and Digital Rock Physics: Virtual Experiments on Digital Data

by Marco Voltolini

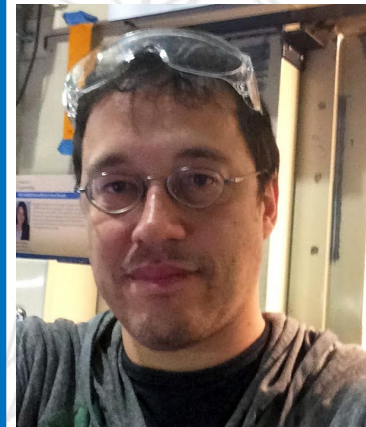
Ceramic proppant at 0.7 MPa dP



Fracture in an oil shale filled with ceramic spheres. The Stokes flow velocity field (in color) is calculated to model the hydraulic conductivity.

### PROGRAM

- Principles of 3D and 4D imaging
- Why measure dynamic processes?
- Quantitative image processing
- Building a model
- Principles of digital rock physics
- From rock to virtual experiment
- Different examples with applications



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## Objectives of this course:

- To deliver a basic understanding of the principles of 3D and 4D **tomographic imaging techniques**.
- Imaging is not only pictures! You will learn how to **extract quantitative information** from imaging datasets using free software.
- How to **build a digital rock physics tool**: a step-by-step example. We'll start from a sandstone sample, and we'll build a tool able to predict the distribution of CO<sub>2</sub> in the pore space after injection.
- A range of **examples** covering different processes (hydraulics, micro-mechanics, etc.) and applications (CO<sub>2</sub> geo-sequestration, multi-phase flow, oil&gas recovery, etc.) will be illustrated to help the students to understand how these techniques can be used in their research.

