



Small things matter: nanoscale control of geological processes

The physical and chemical properties of the Earth depend on the atomic to nanoscale structure of their constituent rocks, minerals and fluids. During my talk I will focus on two examples to show how nanoscale processes control large-scale geological processes. The first example focuses on nanoscale transport processes during metamorphic fluid flow. Using multi-dimensional nano-imaging and (non-equilibrium) molecular dynamics simulations, I demonstrate that in feldspar, the most abundant mineral in the Earth's crust, electrokinetic transport through reaction-induced nanopores (10-100 nm) can be highly effective. This suggests that metamorphic fluid flow and fluid-mediated mineral transformation reactions can be considerably influenced by nanofluidic transport phenomena and are not solely reliant on tectonic forcing and fluid pressure gradients. In a second example I focus on the deformation of nanogranular media in earthquake-prone fault zones. Using a combination of natural samples from the seismically active Gulf of Corinth (Greece) and rock mechanics experiments I will discuss formation and deformation mechanisms of nanograins within carbonate faults and their impact on crustal fault zone stability and earthquake nucleation.

Seminar by Prof. *Oliver Plümper*

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Maximum 100 participants

Please register at dottorato@dsta.unipv.it

