Abstract delle keynote

Chris Marone

Efforts to forecast and predict earthquakes are hampered by a lack of reliable lab and field observations. However, recent advances show: 1) clear and consistent precursors prior to earthquake-like failure in the lab and 2) that lab earthquakes can be predicted using machine learning (ML). These works show that stick-slip failure events –the lab equivalent of earthquakes– are preceded by a cascade of micro-failure events that radiate elastic energy in a manner that foretells catastrophic failure. Remarkably, ML predicts the failure time and in some cases the magnitude of lab earthquakes. Here, I summarize recent lab observations of precursors to failure for the full spectrum of modes from stable creep to slow labquakes, and elastodynamic rupture. Remarkably, this range of events can be predicted using ML techniques to analyze acoustic emissions emanating from the fault.

Federico Rossetti

Metamorphic rocks retain the environmental conditions that deviate from the steady-state thermal structure of the lithosphere. The inversion of the P-T-t-deformation histories as derived from the study of the metamorphic rocks in orogenic suture zones has thus the potential to reconstruct the evolution of the Earth's crust in space and time (assembly and differentiation). A reappraisal of the contribution of metamorphic geology to the understanding of the lithosphere evolution and geodynamics is firstly presented, with a window on the early Earth. This is followed by a review of the subduction zone metamorphism, by presenting the controlling factors (intrinsic and extrinsic), the representative rock associations (HP and UHP series) and the metamorphic gradients expected during orogenic construction and destruction (collapse).