1. Research activity

My research activity focuses on the seismogenic potential of basement fault rocks in two different contexts: natural seismicity and induced seismicity.

The sismogenic potential of the basement fault rocks can be described by frictional and permeability properties that are still partially unknown for basement rocks as schists and phyllites.

These properties are investigated by laboratory experiments on powdered and intact rocks, performed in the BRAVA apparatus hosted in the INGV High-Pressure-High-Temperature Laboratory.

Different basement rocks will be sampled:

1) Basement of Apennines (Southern Tuscany) representative of the basement characterized by microseismicity during the apenninic seismic sequences.
2) Basement of Central Alps representative of a deeper basement.
3) Basement of Oklahoma representative of the basement affected by induced seismicity in Oklahoma.
4) Basement of South Korea representative of the basement of the Pohang EGS field affected by induced seismicity.

The rocks sampling is accompanied by structural analysis in order to better reproduce the in-situ condition in laboratory.

Three different type of experiments are performed on the sampled rocks:

A) Characterization of friction and R&S parameters in dry and wet conditions. These experiments will allow us to develop a standard characterization of the frictional properties of the basement rocks and it represents an important benchmark for subsequent studies (B, C).
B) Characterization of the R&S friction parameters at different fluid pressures. These experiments will be unique in their kind because until today, for technological reasons, R&S parameters have been characterized only in wet and dry conditions. Recently experiments on carbonate gouges highlighted

changes in the R&S friction parameters with changes in fluid pressure. Therefore, a characterization of the R&S parameters of basement rocks will allow me to collect a unique dataset, useful for better understand the induced seismicity.

C) Experiments in load control with changes in stressing rates. During these experiments the experimental fault is loaded at constant shear stress value (usually 80-90% of the steady-state shear stress) successively the fault will be stimulated by increasing the stressing rates or by increasing the fluid pressure. Increment in shear stress are designed for reproducing the stressing rates possibly induced in the crystalline basement before and during the seismic sequence in the Apennines. Increments in fluid pressure are planned to simulate the pressurization processes along basement faults during fluid injection activities.

Other analysis will be conducted in order to better characterize: the mineralogical composition (XRD, SEM); the microstructures (SEM, OM) and the mechanical properties (Vp, Vs, Elastic moduli).

2. Research products

a) Publications (ISI journals)
b) Publications (NON ISI journals)
c) Manuscripts (submitted, in press)
d) Abstracts