Session 25

Preparatory processes of earthquakes, from laboratory experiments to large earthquakes

Conveners:
Antonio Giovanni Iaccarino[1], Matteo Picozzi[1,2], Daniele Spallarossa[3], Giuliana Rossi[2], Jorge Jara[4], Zahra Zali[4], Grzegorz Kwiatek[4]

[1]*Physics Department "E. Pancini", University of Naples Federico II, Naples, Italy*
[2]*National Institute of Oceanography and Applied Geophysics -OGS, Sgonico, Italy*
[3]*DISTAV, University of Genoa, Genoa, Italy*
[4]*GFZ German Research Centre for Geosciences, Helmholtz Centre Potsdam, Potsdam, Germany*

The physics of earthquake initiation is a challenging research field with severe implications for modern society in terms of earthquake forecasting and seismic risk mitigation. Several studies have shown that earthquakes can be anticipated by foreshocks, slip instabilities, and transient signals in ground motion displacement. In the last decade, significant advances have been achieved in this research field thanks to the availability of high-resolution data gathered across all scales of, the (a)seismic deformation processes, as well as the use of novel processing techniques including Machine Learning.

In recent years, many studies supported the existence of preparatory processes studying the seismicity preceding earthquakes, seismic noise, and/or the Global Navigation Satellite System (GNSS) data. Moreover, several laboratory studies indirectly proved it predicting the time and the size of the upcoming earthquake in laboratory conditions.

In this session, we look for works focused on the study of the preparatory processes of laboratory, anthropogenic, and natural earthquakes. This includes, but is not limited to:

1. Statistical studies on physical features extracted from the seismicity or the noise prior to the main event.
2. Applications of ML for pattern recognition in identifying preparatory processes leading up to earthquakes or for forecasting rupture times.
3. Studies of the deformation before the event using GNSS data.
4. Physical or statistical modelling of foreshock sequences and interaction with the main event.
5. Studies on fluids interaction with fault systems during earthquake sequences.
6. Studies supporting the non-existence of preparatory processes before earthquakes.
7. Projects related to preparatory processes.