



Session 08 & 09

Physics of earthquake preparation process: From laboratory experiments to earthquake forecast

Conveners:

Eleftheria Papadimitriou¹, Alexey Zavyalov², Ramon Zuniga³ Daya Shanker⁴, Vasileios Karakostas⁵, George Kaviris⁶

¹Aristotle University of Thessaloniki, Thessaloniki, Greece

²Institute of Physics of the Earth RAS, Moscow, Russia

³Instituto de Geofísica, Universidad Nacional Autónoma de México, Mexico, Mexico

⁴Professor, Department of Earthquake Engineering, Indian Institute of Technology Roorkee, Roorkee-247667, Uttarakhand, India

⁵Professor, Department of Geophysics, Aristotle University of Thessaloniki, Greece

⁶Associate Professor of Seismology - Seismic Anisotropy, Section of Geophysics – Geothermics, Department of Geology and Geoenvironment National and Kapodistrian University of Athens, Greece

Session 08

In this Session, we invite researchers to discuss the results and directions for further studies of the physics of the seismic process – from experiments under laboratory conditions to rock bursts in mines and seismically active regions during the preparation phase of strong earthquakes.

Skepticism about earthquake forecasting, both deterministic and probabilistic, especially in real time, is related to the complexity of the earthquake process, which is a consequence of our limited scientific knowledge and insufficient understanding of it. Which are the physical phenomena that take place in the Earth's crust before the earthquake nucleates? How can we observe, describe and model them physically and statistically? Will artificial intelligence, with its neural networks, help us to understand the physics of the processes that take place inside our planet as it prepares for an earthquake?

We invite representatives of the seismological community to present their results on these topics, to show the current view of the state of the problem, what has been achieved in the field of earthquake forecasting, what needs to be done and in which direction to move forward. Reports on the use of forecasts to inform the public or to support earthquake mitigation planning are also welcome.

Session 09

Strong earthquakes are natural geological phenomena characterized by the sudden release of energy in the Earth's crust, resulting in seismic waves that can cause significant ground shaking. These events are driven by the movement of tectonic plates beneath the Earth's surface. Understanding these events involve studying the underlying processes, monitoring systems, recent development in dynamics of earthquakes and other complex earth systems and preparing communities for potential impacts. However, episodic events can refer to various geological phenomena that occur over relatively short and distinct time periods. The focus of this session is on highlighting experiences in all aspects of the stress changes and stress field evolution, strong continental earthquakes, along with historical earthquakes and statistics, precursor search, observations, monitoring. We welcome contributions with current state of art research for predicting/forecasting earthquake occurrences and their patterns, searching for earthquake precursors (e.g. geophysical & geological, geochemical & geohydrological and electromagnetic etc.), and their real-time validation, but not limited to the topics of cross cutting across all broad seismological fields.

