Special Issue

Decoding Earthquake Complexity: From Earthquake Ruptures and Slip Styles to Seismic Sequences and Faulting

Message from the Guest Editors

Modern geophysical networks reveal complex fault interactions challenging existing models. Understanding complexity in seismicity and faulting is crucial for improving our knowledge of the physics of faulting and, above all, of how large earthquakes emerge in previously stable fault systems from the whole spectrum of fault slip styles, with outstanding future impact on next generation physics-based earthquake forecasting. To better understand emergent phenomena in seismology (e.g., preparatory processes of large earthquakes) and the complexity of seismicity and faulting, innovative and interdisciplinary research is needed handling large data amounts with more accurate physical, computational and AI-enhanced models able to investigate the chaotic and nonlinear nature of fault systems across multiple scales, from microfractures to global tectonic settings. This special issue will highlight interdisciplinary studies that push beyond phenomenological descriptions to reveal the fundamental mechanics governing fault system behavior. We particularly encourage contributions demonstrating how new observations can constrain physical models to embrace complexity in earthquake occurrences.

Guest Editors

Dr. Davide Zaccagnino

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Prof. Dr. Robert Shcherbakov

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Editor-in-Chief

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