World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:17, No:12, 2023

Understanding the Impact of Out-of-Sequence Thrust Dynamics on Earthquake Mitigation: Implications for Hazard Assessment and Disaster Planning

Authors : Rajkumar Ghosh

Abstract : Earthquakes pose significant risks to human life and infrastructure, highlighting the importance of effective earthquake mitigation strategies. Traditional earthquake modelling and mitigation efforts have largely focused on the primary fault segments and their slip behaviour. However, earthquakes can exhibit complex rupture dynamics, including out-of-sequence thrust (OOST) events, which occur on secondary or subsidiary faults. This abstract examines the impact of OOST dynamics on earthquake mitigation strategies and their implications for hazard assessment and disaster planning. OOST events challenge conventional seismic hazard assessments by introducing additional fault segments and potential rupture scenarios that were previously unrecognized or underestimated. Consequently, these events may increase the overall seismic hazard in affected regions. The study reviews recent case studies and research findings that illustrate the occurrence and characteristics of OOST events. It explores the factors contributing to OOST dynamics, such as stress interactions between fault segments, fault geometry, and mechanical properties of fault materials. Moreover, it investigates the potential triggers and precursory signals associated with OOST events to enhance early warning systems and emergency response preparedness. The abstract also highlights the significance of incorporating OOST dynamics into seismic hazard assessment methodologies. It discusses the challenges associated with accurately modelling OOST events, including the need for improved understanding of fault interactions, stress transfer mechanisms, and rupture propagation patterns. Additionally, the abstract explores the potential for advanced geophysical techniques, such as high-resolution imaging and seismic monitoring networks, to detect and characterize OOST events. Furthermore, the abstract emphasizes the practical implications of OOST dynamics for earthquake mitigation strategies and urban planning. It addresses the need for revising building codes, land-use regulations, and infrastructure designs to account for the increased seismic hazard associated with OOST events. It also underscores the importance of public awareness campaigns to educate communities about the potential risks and safety measures specific to OOST-induced earthquakes. This sheds light on the impact of out-of-sequence thrust dynamics in earthquake mitigation. By recognizing and understanding OOST events, researchers, engineers, and policymakers can improve hazard assessment methodologies, enhance early warning systems, and implement effective mitigation measures. By integrating knowledge of OOST dynamics into urban planning and infrastructure development, societies can strive for greater resilience in the face of earthquakes, ultimately minimizing the potential for loss of life and infrastructure damage.

Keywords : earthquake mitigation, out-of-sequence thrust, seismic, satellite imagery
Conference Title : ICNHSHM 2023 : International Conference on Natural Hazard Science and Hazard Mitigation
Conference Location : Amsterdam, Netherlands
Conference Dates : December 04-05, 2023