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When Climate Meets Seismology:Exploring Multi-Hazard Risks in a Changing Planet

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Climate change is increasing the frequency and severity of extreme weather events, presenting substantial risksto both natural and constructed settings. In seismically active areas, the interplay between climate-induced events and geophysical processes may intensify seismic hazards, affecting essential infrastructure and ecosystems. The complex project "Competence Center for Climate Change Digital Twin Earth for forecasts and societal redressement: DTEClimate", funded within the framework of the National Recovery and Resilience Plan of Romania, consists of five other digital twin projects, including the project "The research center for climate change due to natural disasters and extreme weather events (**REACTIVE**)" coordinated by the National Institute for Earth Physics.

The REACTIVE project addresses these challenges by investigating the multi-hazard interplay between atmospheric, hydrosphere, and lithosphere at both local and national scales. The project utilizes historical and real-time data from seismic, GNSS, infrasound, and marine monitoring networks, concentrating on high-risk infrastructure locations such as nuclear power stations, cyanide tailings ponds, oil refineries, and water dams. A primary objective is to evaluate the impact of extreme weather events, including intense precipitation and abrupt temperature changes, on seismic risk in these susceptible regions. REACTIVE improves the efficacy of monitoring stations in the Black Sea region by incorporating advanced data processing techniques into current early warning systems. The project enhances links to European and national monitoring infrastructures, promoting a collaborative framework for hazard assessment. The results encompass enhanced predictive models for seismic events affected by climate extremes and practical insights for risk assessors, infrastructure managers, and regulators. REACTIVE enhances resilience and knowledge in responding to the intricate dynamics of multi-hazard threats associated with climate change.