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National network data contributions to seismic studies in the Kingdom of Saudi Arabia

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Increased urban development, occasional volcanic swarms, and large earthquakes surrounding the Kingdom of Saudi Arabia (KSA) have contributed to a renewed interest in understanding seismic hazard and risk within the Kingdom. In response, the KSA has expanded the national seismic network over the past several decades. Now, a sizable collection of local and regional data provides an opportunity to further develop KSA capabilities in seismology and seismic hazard assessment. The Lawrence Livermore National Laboratory (LLNL) and the National Center for Earthquakes and Volcanoes (NCEV) of the Saudi Geological Survey (SGS) started collaborating in 2016, with long-term goals of reducing seismic hazard and risk. We began by using time-domain full waveform moment tensor inversion and coda-envelope derived amplitude measurements to solve for earthquake source mechanism, moment magnitudes, and their source-type. We compare the moment magnitudes calculated from the two methods and publicly available earthquake catalogs and discuss the implications of the obtained source parameters. This study supports NCEV operational needs while obtaining stable and robust solutions that give quantitative information about the seismicity needed to better understand potential seismic hazards. A parallel collaborative study is focused on improving attenuation models of lithosphere for a broad frequency band using multiple-phase inversion.

Promotional text

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